INVENTORY OF CLIMATE SMART AGRICULTURE POTATO TECHNOLOGIES, INNOVATIONS &MANAGEMENT PRACTICES

Compiled by

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1.0 Definition of terms and summary tables of Potato Technologies, Innovations and Management Practices (TIMPS)

1.1 Definition of terms

Technology: This is defined as an output of a research process which is beneficial to the target clientele (mainly farmers, pastoralists, agro-pastoralists and fisher folk for KCSAP's case), can be commercialized and can be patented under intellectual property rights (IPR) arrangements. It consists of research outputs such as tools, equipment, genetic materials, breeds, farming and herding practices, gathering practices, laboratory techniques, models etc.

Management practice: This is defined as recommendation(s) on practice(s) that is/are considered necessary for a technology to achieve its optimum output. These include, for instance, different agronomic and practices (seeding rates, fertilizer application rates, spatial arrangements, planting period, land preparation, watering regimes, etc.), protection methods, for crops; and feed rations, management systems, disease control methods, etc. for animal breeds. This is therefore important information which is generated through research to accompany the parent technology before it is finally released to users and the technology would be incomplete without this information.

Innovation: This is defined as a modification of an existing technology for an entirely different use from the original intended use. (e.g. fireless cooker modified to be used as a hatchery)

1.2 Summary of Inventory of TIMPs in the Potato Value Chain

The inventory process resulted in a total of **72** TIMPs including 50 technologies, 7 innovations and 15 management practices, distributed among the 5 sub-themes, as indicated in Table 1

Commodity/VC	Sub-Theme	Technologies	Innovations	Management Practices
Potato	Potato improvement approaches for food security, processing and economic growth	27	3	3
Potato	Appropriate good agricultural practices for achieving high potato yields	4	0	1
Potato	Seed Potato production technologies for improved potato yields	7	1	1
Potato	Pests and disease management in Potato production	4	1	9
Potato	Postharvest management of potato	8	2	1
Overall Total		**50**	**7**	**15**

1.3 Summary of Status of TIMPs in Potato Value Chain

The inventory process resulted in a total of 72 TIMPs; 36 that are ready for up-scaling, 12 TIMPs that require validation and 24. TIMPs that require further research in the sub-themes, as indicated in Table 2.

Table 2. Number of TIMPs ready for up-scaling, require validation or further research

Commodity/VC	Sub-Theme	Ready for up-scaling	Require validation	Further Research
Potato	Improved potato varieties for food security, processing and economic growth	17	6	10
Potato	Appropriate good agricultural practices for achieving high potato yields	2	1	2
Potato	Seed Potato production technologies for improved potato yields	6	1	2
Potato	Pests and disease management in Potato production	7	2	5
Potato	Postharvest management of potato	4	3	5
Overall Total		**36**	**12**	**24**

Table3: Inventory of Potato TIMPs by Category and Status

TIMPs Sub-Theme	TIMPs Title	TIMPs Category	Status
2.1 Potato improvement for food security, processing and economic growth	2.1.1 Potato variety Shangi	Technology	Ready for upscaling
	2.1.2 Potato variety Kenya Mpya	Technology	Ready for upscaling
	2.1.3 Potato variety Unica	Technology	Ready for upscaling
	2.1.4 Potato variety Kenya Karibu	Technology	Ready for upscaling
	2.1.5 Potato variety Dutch Robyjn	Technology	Ready for upscaling
	2.1.6 Potato variety Sherekea	Technology	Ready for upscaling
	2.1.7 Potato variety Asante	Technology	Ready for upscaling
	2.1.8 Potato variety Tigoni	Technology	Ready for upscaling
	2.1.9 Potato variety Lenana	Technology	Ready for upscaling
	2.1.10 Potato variety Konjo	Technology	Ready for upscaling
	2.1.11 Potato variety Wanjiku	Technology	Ready for upscaling
	2.1.12 Potato variety Nyota	Technology	Ready for upscaling
	2.1.13 Potato variety Chyulu	Technology	Ready for upscaling
	2.1.21 Variety descriptors	Management practice	Ready for upscaling
	2.1.21 Rooted Apical cuttings technology	innovations	Ready for upscaling
	2.1.22 Aeroponics	innovations	Ready for upscaling
	2.1.23 Tissue culture	innovations	Ready for upscaling
	Potato variety/line 3H17	Technology	Further research
	Potato variety/line 1HD1	Technology	Further research
	Potato variety/line 6B170	Technology	Further research
	Potato variety/line 1G70	Technology	Further research
	Potato variety/line 3C22	Technology	Further research
	Potato variety/line 3C48	Technology	Further research
	Potato variety/line 1 HG	Technology	Further research
	2.1.24 Suitability maps for potato varieties	Knowledge/management practice	Further research
	2.1.25 Genetic fingerprinting	Management practice	Further research
	2.1.26 Advanced breeding lines (6)	Technology	Need validation
2.2Appropriate good agricultural practices for achieving high potato yields	2.2.1 Potato nutrient management	Management practice	Ready for upscaling
	2.2.2 Potato mechanization	Technology	Ready for Up-scaling
	2.2.3 Potato mechanization	Technology	Requires validation
	2.2.4 Potato nutrient management (calcium and potassium for enhancing storage and processing)	Technology	Further research

	2.2.5 Mobile soil testing clinics	Technology	Further research
2.3Seed Potato production technologies for improved potato yields	2.3.1 Satellite seed potato business incubation centers	Innovation	Ready for upscaling
	2.3.2 Sand ponics	Technology	Ready for upscaling
	2.3.3 Positive seed selection	Management practice	Ready for upscaling
	2.3.4 Certified seed potato	Technology	Ready for upscaling
	2.3.5 Sprouting technologies	Technology	Ready for upscaling
	2.3.6.Quality declared seed	Technology	Ready for up-scaling
	2.3.7 Sprouting technologies	Technology	Requires validation
	2.3.8 Cut seed potato tubers	Technology	Further research
	2.3.9True potato seed (hybrid true potato seed)	Technology	Further research
2.4 Pests and disease management in Potato production	2.4.1 Integrated management of Potato cyst Nematode (PCN)	Innovation	Ready for up-scaling
	2.4.2 Integrated management of bacterial wilt (BW)	Management practice	Ready for upscaling
	2.4.3 Integrated late blight management	Management practice	Ready for upscaling
	2.4.4 Management of viruses in Potato	Management practice	Ready for upscaling
	2.4.5 Integrated management of potato tuber-moth	Management practice	Ready for upscaling
	2.4.6 Integrated pest management of potato aphids	Management practice	Ready for up scaling
	2.4.7 Disease diagnostics and testing (bacterial wilt)	Technology	Ready for up scaling
	2.4.8 Disease diagnostics and testing (PCN)	Technology	Requires validation
	2.4.9 Disease diagnostics and testing (potato viruses)	Technology	Require validation
	2.4.10 Integrated pest management of black leg	Management practice	Further research
	2.4.11 Disease diagnostics and testing (black leg)	Technology	Further research
	2.4.12 Host resistance in commercial potato varieties	Knowledge & information	Further research
	2.4.13 mapping for potato pest and diseases in the country	Knowledge & information	Further research
	2.4.14 Pest surveillance and profiling	Management practice	Further research
2.5 Postharvest management of potato	2.5.1 Diffused light store for seed potato	Technology	Ready for up-scaling
	2.5.2 Improved ware potato storage	Technology	Ready for up-scaling

	2.5.3Production of potato starch	Technology	Requires validation
	2.5.4 Cold storage	Technology	Ready for up-scaling
	2.5.6 Pre and post harvesting guidelines	Management practices	Ready for up scaling
	2.5.7 Potato product diversification (fresh cuts, frozen chips, dehydrated cubes, flour, whole peels, confectionaries, flakes, crisps, soap, tea, wine)	innovation	Needs validation
	2.5.8 standards, protocols and recipes	innovation	Needs validation
	2.5.9 Sprout suppressants	Technology	Further research
	2.5.10 Feed rations	Technology	Further research
	2.5.11 Potato peels as organic manure	Technology	Further research
	2.5.12 Standards and protocols for efficient quantification of glycoalkaloids/acrylamide in fresh and stored potatoes	Technology	Further research
	2.5.13 Keeping quality of commercial varieties	innovation	Further research

2.0 Detailed Potato Value chain TIMPS

2.1 Improved potato varieties for food security, processing and economic growth

1. Improved potato varieties for food security, processing and economic growth

Technology name	**Potato variety: Shangi**
Category (i.e. technology, innovation or management practice)	Technology
A: Description of the technology, innovation or management practice	
Problem to be addressed	Many commercial varieties are late maturing and have long dormancy periods, Shangi can be harvested 75 days after emergence hence an assured food source for vulnerable families/groups
What is it? (TIMP description)	It is a drought/heat tolerant, early maturing, maturity is 2-3 months and high yielding potato variety (35 tons/ha), best variety for altitudes below 1500m a.s.l to as high as 3000m a.s.l, prefers a wide range of temperatures but optimum is above 15^{o}C and below 21^{o}C, grows well in sand loams and alluvial soils; suitable for fresh chips, crisps and table consumption. Its characteristic features include; cream white skin with red eyes oval shaped and medium eye depth. The variety is moderately susceptible to late blight. It has short tuber dormancy, hence cannot be stored for long. It is therefore not preferred by processors except during acute shortage of ware potato.
Justification	The variety is accepted by farmers countrywide with good market demand. It is early maturing and well adapted to various agro-ecological zones. It is a climate smart variety since it has a short life cycle, drought tolerant and versatile for processing i.e. it can be processed into chips, crisps, starch and home consumption. The government has identified potato as a key food security crop under the Big Four Agenda and this variety has the potential of making Kenya attain food security because of its early maturity, adaptability to wide agro-ecological range and wide range of utilization from home consumption to processing
B: Assessment of dissemination and scaling up/out approaches	
Users of TIMP	• Farmers • Seed producing companies and SMEs

	• Other research organizations/institutions (universities)
Approaches used in dissemination	• Farmer Participatory Evaluation exercises • On-farm demonstration • Field days • Agricultural shows • MoA/Extension officers • Partners (CIP, NPCK, FAO, ICIPE, GIZ) • Mobile phone text initiative-ICT platform (Viazi soko) • Farmer to farmer peer learning • Mass media- e.g Mkulima programme, Seeds of Gold, Smart Farmer • Workshops, Seminars, Meetings, trainings • Promotional materials (posters/brochures/leaflets/Variety catalogue) • Social Media platforms
Critical/essential factors for successful promotion	• Recruitment and support for SMEs for potato production • Field demonstrations on improved potato varieties alongside existing local varieties • funding by government to promote production and distribution of seed of selected potato varieties
Partners/stakeholders for scaling up and their roles	• Ministry of Agriculture Livestock Fisheries &Irrigation (MoALF&I)-Extension and Capacity Building • CIP (International Potato Centre) – Collaborative research on potato variety development • ICIPE (International Centre for Insect Physiology and Ecology)– collaborative research on crop protection • FAO (Food and Agricultural Organization)- co-sharing of resources and networking and knowledge management • CIGs (Common Interest Groups)- back stopping the technologies at grass root levels • GIZ- Nutrition and potato utilization by the communities • NGOs (Non-governmental organization)(CARE Kenya): Farmer Input Promotion
C: Current situation and future scaling up	
Counties where already promoted, if any	Nyandarua, Nyeri, Kiambu, Taita Taveta, Nakuru, Bomet, Narok, Elgeyo Marakwet, Uasin Gishu, Bungoma, West Pokot, Nandi, Kisii; Murang'a, Baringo, Nyamira, Kirinyaga, Laikipia, and Kericho) emerging potato producing counties in mid-altitude AEZ (Samburu, Trans-nzoia, Makueni, Embu, Tharaka Nithi, Machakos, Kajiado, and Nairobi
Counties where TIMP will be up-scaled	Elgeyo Marakwet, Nyandarua, Nyeri, Taita Taveta, Bomet and Uasin Gishu as prioritized by counties
Challenges in dissemination	• Lack of information about the existence of variety/Non-exposure of the end-user to a technology • Variability in weather conditions in KENYA threatening food production • Limited Community Interest Groups (CIG) based supportive seed system

	• Limited publicity about varieties • Weak research- extension- farmer linkage to support dissemination
Suggestions for addressing the challenges	• Information dissemination through public forums such as fairs, exhibitions, field days, road shows and FFBS • Scaling up participation of end-user in on-farm activities/adaptive research/extension activities • Market promotions for variety Shangi targeting grain traders through road shows • Shortening the marketing chains by forming producer and marketing groups/cooperatives • Find innovations in reducing production costs to encourage further production • Capacity building of all value chain actors
Lessons learned in up-scaling, if any	• Use of FFBS is effective in technology dissemination and adoption • Involvement of farmers alone is not enough to support adoption, need to involve traders, processors and exporters and other actors in the value chain, Partnership is important in technology dissemination • Use of roadshows and mass media communication will upscale the awareness creation of the variety
Social, environmental, policy and market conditions necessary for Development and upscaling	• Important in the local diet • Environmentally friendly, resilient and climate smart • There is availability of market: domestic and regional • Reliable markets • Favourable weather • Awareness and acceptability of the variety by target communities. • Enabling policy framework such as the Irish Potato Regulations, 2019
D: Economic, gender, vulnerable and marginalized groups (VMGs) considerations	
Basic costs	Cost of a bag of certified basic seed potato 50kg KES. 3,000 @ 16 bags per acre (KES 48,000) including other costs total **KES100,000** per acre
Estimated returns	Estimated output of 150 bags of 50kg @KES 1500; total revenue KES **225,000** less costs of KES 100,000=**KES 125,000**
Gender issues and concerns in development, dissemination, adoption and scaling up	• Potato Value chain is engendered with distinct roles for each gender group. • Shangi variety cooks fast hence less fuel consumption. Savings made on energy can be utilized for other household priority needs such as medical care an school fees; time saved can be used for other economic activities • Land ownership mainly by men and therefore women are not involved in decision making on the varieties to grow • Most farmer groups are composed of women and this may leave out the opinion and interests of men • Production is done by youth and women but the money goes to the men

Gender related opportunities	• Women and youth friendly production techniques such as mechanization and business incubation models • Since it is highly demanded variety it creates opportunity for women in production, retailing, value addition and marketing
VMG related opportunities	• There exists opportunities for people living with disabilities; SMEs in seed potato production, processing (whole peels, fresh cuts, crisps) and packaging • SMEs which are led by VMG especially people living of disabilities are preference in capacity building or business development services • Since potato is nutritious particularly with the skin, it is a dietary option for the VMGs
	• Short cropping cycle allows production of several crops per year thus important in improving food and nutrition for the VMG • There is expected increase in business opportunities for enterprises run by VMGS • Fits well in major cropping patterns • Capacity building for the VMGs in agri-business will ensure better participation in value addition and trade
E: Case studies/profiles of success stories	
Success stories from previous similar projects	When it was officially released in 2013, Shangi variety became widely adopted and has increased to occupy 80% of the market share in Kenya
Application guidelines for users	* Selected land should not have been grown with potato for the last 4 seasons * Soil analysis for nutrients, bacterial wilt and potato cyst nematodes (PCN)should be done before site selection *Land should be ploughed and harrowed well to level the surface and enable good uniform seed germination and uniform maturity *Use certified seed from known seed merchants (seed retained on-farm may have deteriorated). *Early planting helps in avoiding infestation by insects (aphids) *correct spacing – 75cm by 30cm if using size II seed * Fertilizer application rates – 4 bags (50kg) per acre if using DAP *Crop management practices – weeding; earthing up/hilling; crop protection; water application; dehaulming *crop protection – protective fungicides at emergence and afterwards spraying every week with recommended fungicides *Harvesting done when the crop is physiologically mature/foliage begin to turn yellow *Storage – store in DLS after harvesting, sorting, grading, curing and cleaning if for seed and in ware store if potatoes for eating
F: Status of TIMP readiness (1-ready for up-scaling;, 2-requires	Ready for up-scaling

validation; 3-requires further research**)**	
F: Contacts	
Contacts	Centre Director, KALRO-Tigoni P.O. Box 338-00217, Limuru, Kenya Telephone: 0202023213 Mobile: 0727031783 E-mail: kalro.tigoni@kalro.org
Lead organization and scientists	KALRO-Tigoni,
Partner organizations	• Ministry of Agriculture, Livestock, Fisheries and Irrigation (MoALF&I) • International Potato Centre (CIP) • National Potato Centre of Kenya (NPCK) • International Centre for Insect Physiology and Ecology (ICIPE) • FAO (Food and Agriculture Organization) • Common Interest Groups (CIGs) • Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) • NGOs (CARE Kenya): (Farmer Input Promotion)

Research Gaps-Shangi

Poor storability; deep eyes and therefore high wastage during peeling; poor colour of processed products hence not good for processing

Technology name	**Potato variety: Kenya Mpya**
Category (i.e. technology, innovation or management practice)	Technology
A: Description of the technology, innovation or management practice	
Problem to be addressed	Majority of commercial varieties are low yielding and susceptible to late blight disease implying high costs of production through disease management. Kenya Mpya is late blight tolerant hence less cost in disease management and equally high yielding
What is it? (TIMP description)	It is a high yielding, late blight tolerant and a late maturing variety suitable for fresh chips, crisps and table consumption. Its characteristic features include; white skin with shallow pink eyes, oval shaped and medium eye depth. It has medium tuber dormancy period and greens easily during storage. Kenya Mpya matures between 3 to 4 months; yields over 40 tons/ha; does well from 1500 to 3000m a.s.l, requires well- draining, fertile soils which are sandy loams or alluvials; temperatures between 15 to 18^{o}C.
Justification	The variety is accepted by farmers countrywide with good market demand. It is early maturing and well adapted to various agro-ecological zones. It is suitable for processing into frozen fries and

	yields 40 to 45 tons/ha. In the face of the climate change induced disease outbreaks and associated crop failures, require effective and affordable management practices and adoption of Kenya Mpya is one way to promote household resilience in the face of these challenges.
B: Assessment of dissemination and scaling up/out approaches	
Users of TIMP	• Farmers • Seed producing companies and SMEs • Other research organizations/institutions (universities)
Approaches used in dissemination	• Farmer Participatory Evaluation exercises • On-farm demonstration • Field days • Trade fair • Agricultural shows • MoALFI/Extension officers • Partners (CIP, NPCK, FAO, ICIPE, GIZ) • Mobile phone text initiative- ICT platform (Viazi soko) • Farmer to farmer peer learning • Mass media- e.g. Mkulima programme, Seeds of Gold, Smart Farmer • Workshops, Seminars, Meetings, trainings • Promotional materials (posters/brochures/leaflets/Variety catalogue) • Social Media platforms
Critical/essential factors for successful promotion	• Functioning seed production system to ensure availability of adequate quality seed • Recruitment and support for SMEs for potato production • Field demonstrations on improved potato varieties alongside existing local varieties • Use of good agricultural practices • Effective agricultural extension services • County and central government support • Well organized farmer groups • Good Marketing Models
Partners/stakeholders for scaling up and their roles	• Ministry of Agriculture Livestock Fisheries &Irrigation (MoALF&I)-Extension and Capacity Building • CIP(International Potato Centre) – Collaborative research on potato variety development • ICIPE (International Centre for Insect Physiology and Ecology)– collaborative research on crop protection • FAO (Food and Agricultural Organization)- co-sharing of resources and networking and knowledge management • CIGs(Common Interest Groups) - back stopping the technologies at grass root levels • GIZ- Nutrition and potato utilization by the communities • NGOs –Non Governmental Organizations (CARE Kenya): Farmer Input Promotion
C: Current situation and future scaling up	

Counties where already promoted, if any	Nyandarua, Nyeri, Kiambu, Taita Taveta, Nakuru, Bomet, Narok, Elgeyo Marakwet, Uasin Gishu, Bungoma, West Pokot, Nandi, Kisii; Murang'a, Baringo, Nyamira, Kirinyaga, Laikipia, and Kericho) emerging potato producing counties in mid-altitude AEZ (Samburu, Trans Nzoia, Makueni, Embu, Tharaka Nithi, Machakos, Kajiado, and Nairobi
Counties where TIMPs will be up-scaled	Elgeyo Marakwet, Nyandarua, Nyeri, Taita Taveta, Bomet and Uasin Gishu as prioritized by counties
Challenges in dissemination	• Lack of information about the variety/Non-exposure of the end-user to a technology • High marketing cost due to poor and undeveloped physical and marketing infrastructure • Limited Community Interest Groups (CIG) based supportive seed system • Limited publicity about varieties • Weak research- extension- farmer linkage to support dissemination
Suggestions for addressing the challenges	• Promotional campaigns • Scaling up participation of farmers in on-farm activities/adaptive research/extension activities • Market promotions for variety Kenya Mpya targeting potato traders • Shortening the marketing chains – form producer and marketing groups/cooperatives • Innovations reducing production costs will encourage improved production
Lessons learned in up-scaling, if any	Adoption of FFBS effective in technology dissemination and adoption Involvement of farmers alone is not enough to support adoption, need to involve traders, processors and exporters and other actors in the value chain. Partnership is important in technology dissemination
Social, environmental, policy and market conditions necessary for development and up-scaling	• Important in the local diet • Environmentally friendly resilient and climate smart. • There is availability of a reliable domestic and regional market • Awareness and acceptability of the variety by target communities. • Enabling policy framework
D: Economic, gender, vulnerable and marginalized groups (VMGs) considerations	
Basic costs	Cost of a bag of certified basic seed potato 50kg KES. 3,000 @ 16 bags per acre (KES 48,000) including other costs total **KES100,000** per acre
Estimated returns	Estimated output of 150 bags of 50kg @KES 1500; total revenue KES **225,000** less costs of KES 100,000=**KES 125,000**
Gender issues and concerns in development, dissemination, adoption and scaling up	• Potato Value chain is engendered with distinct roles for each gender group • The variety cooks fast hence less fuel consumption. Savings made on energy can be utilized for other household priority needs such as medical care an school fees; time saved can be used for other economic activities

	• Land ownership mainly by men and therefore women are not involved in decision making on the varieties to grow • Most farmer groups are composed of women and this may leave out the opinion and interests of men • Production is done by youth and women but the money goes to the men • Since it is highly demanded variety it creates opportunity for women in production, retailing, value addition and marketing
Gender related opportunities	• Women and youth friendly production techniques such as mechanization and business incubation models • Since it is highly demanded variety it creates opportunity for women in production, retailing, value addition and marketing
VMG issues and concerns in development, dissemination adoption and scaling up	• There exists opportunities for people living with disabilities; SMEs in seed potato production, processing (whole peels, fresh cuts, crisps) and packaging • SMEs which are led by VMG especially people living of disabilities are preference in capacity building or business development services • Since potato is nutritious particularly with the skin, it is a dietary option for the VMGs
VMG related opportunities	• Short cropping cycle allows production of several crops per year thus important in improving food and nutrition for the VMG • There exists business opportunities in processing Kenya Mpya into fresh chips and crisps for sale • Fits well in major cropping patterns • Capacity building for the VMGs in agri-business will ensure better participation in value addition and trade
E: Case studies/profiles of success stories	
Success stories from previous similar projects	The variety has been successfully grown by several farmers in various counties with good performance
Application guidelines for users	*Selected land should not have been grown with potatoes for the last 4 seasons Soil analysis for nutrients, bacterial wilt and potato cyst nematodes (PCN)should be done before site selection *Land should be ploughed and harrowed well to level the surface and enable good uniform seed germination and uniform maturity *Use certified seed from known seed merchants (seed retained on-farm may have deteriorated). *Early planting helps in avoiding infestation by insects (aphids) *correct spacing – 75cm by 30cm if using size II seed * Fertilizer application rates – 4 bags (50kg) per acre if using DAP *Crop management practices – weeding; earthing up/hilling; crop protection; water application; dehaulming *crop protection – protective fungicides at emergence and afterwards spraying every week with recommended fungicides *Harvesting done when the crop is physiologically mature/foliage begin to turn yellow

	*Storage – store in DLS after harvesting, sorting, grading, curing and cleaning if for seed and in ware store if potatoes for eating
F: Status of TIMP readiness (1-ready for upscaling;, 2-requires validation; 3-requires further research**)**	**Ready for upscaling**
G: Contacts	
Contacts	Centre Director, KALRO-Tigoni P.O. Box 338-00217, Limuru, Kenya Telephone: 0202023213 Mobile: 0727031783 E-mail: kalro.tigoni@kalro.org
Lead organization and scientists	KALRO-Tigoni,
Partner organizations	• Ministry of Agriculture, Livestock, Fisheries and Irrigation (MoALF&I) • International Potato Centre (CIP) • National Potato Centre of Kenya (NPCK) • International Centre for Insect Physiology and Ecology (ICIPE) • FAO (Food and Agriculture Organization) • Common Interest Groups (CIGs) • Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) • NGOs (CARE Kenya): (Farmer Input Promotion)

Technology name	**Potato variety: Unica**
Category (i.e. technology, innovation or management practice)	Technology
A: Description of the technology, innovation or management practice	
Problem to be addressed	- Low adoption of high yielding potato varieties and low farm yields (below 7 tons/ha) - Lack of suitable processing varieties that can store for longer period without sprouting
What is it? (TIMP description)	Unica – red pink skin with shallow white eyes; oval shaped; heat/drought tolerant; very high yielding; very good for fresh & processed chips, table consumption; good in storage up to 6 months; tolerant to late blight. It is the only variety that has high levels of zinc and iron for boosting micronutrient levels in local diets. Unica grows well in altitudes even below 1400 m a.s.l to 3000m a.s.l. This variety does well in wide temperature range from 15 to 27^{o} C
Justification	The variety is drought and heat tolerant and can be stored for very long, hence ensuring household food security. It is a market demanded variety for processing into chips; accepted mainly by eastern part of Kenya and yields above 45 tons/ha. This is a climate smart variety that is adaptable to a wide range of climate, early maturing, drought and heat tolerant and tolerant to late blight.
B: Assessment of dissemination and scaling up/out approaches	

Users of TIMP	• Farmers • Seed producing companies and SMEs • Research organizations and Universities) • Processors • Extension Service providers (Public and Private)
Approaches used in dissemination	• Farmer Participatory Evaluation exercises • On-farm demonstration • Field days • Trade fair • Agricultural shows • MoA/Extension officers • Partners (CIP, NPCK, FAO, ICIPE, GIZ) • Mobile phone text initiative- ICT platform (Viazi soko) • Farmer to farmer peer learning • Mass media- e.g. Mkulima programme, Seeds of Gold, Smart Farmer • Workshops, Seminars, Meetings, trainings • Promotional materials (posters/brochures/leaflets/Variety catalogue) • Social Media platforms
Critical/essential factors for successful promotion	• Recruitment and support for SMEs for potato production • Field demonstrations on improved potato varieties alongside existing local varieties • funding by government to promote production and distribution of seed of selected potato varieties • Functioning seed production system to ensure availability of adequate quality seed • Field demonstrations on improved potato varieties alongside existing local varieties • County and central government support • Well organized farmer groups
Partners/stakeholders for scaling up and their roles	• Ministry of Agriculture Livestock Fisheries &Irrigation (MoALF&I)-Extension and Capacity Building • CIP – Collaborative research on potato variety development • ICIPE – collaborative research on crop protection • FAO - co-sharing of resources and networking and knowledge management • CIGs - Back stopping the technologies at grass root levels • GIZ- Nutrition and potato utilization by the communities • NGOs (CARE Kenya)-Farmer Input Promotion
C: Current situation and future scaling up	
Counties where already promoted, if any	Nyandarua, Nyeri, Kiambu, Taita Taveta, Nakuru, Bomet, Narok, Elgeyo Marakwet, Uasin Gishu, Bungoma, West Pokot, Nandi, Kisii; Murang'a, Baringo, Nyamira, Kirinyaga, Laikipia, and Kericho) emerging potato producing counties in mid-altitude AEZ (Samburu, Trans Nzoia, Makueni, Embu, Tharaka Nithi, Machakos, Kajiado, and Nairobi

Counties where TIMPs will be up-scaled	Elgeyo Marakwet, Nyandarua, Nyeri, Taita Taveta, Bomet and Uasin Gishu
Challenges in dissemination	• Lack of information about the existence of variety/Non-exposure of the end-user to a technology • Limited market availability because sufficient awareness has not been done on this variety, hence adoption rate may not be high
Suggestions for addressing the challenges	• Scaling up participation of farmers in on-farm activities/adaptive research/extension activities • Information dissemination - GAPs • Scaling up participation of end-user in on-farm activities/adaptive research/extension activities • Market promotions for new varieties targeting grain traders • Shortening the marketing chains – form producer and marketing groups/cooperatives • Find innovations in reducing production costs to encourage further production.
Lessons learned in upscaling if any	• Adoption of FFBS effective in technology dissemination and adoption • Partnership is important in technology dissemination • Involvement of farmers alone is not enough to support adoption, need to involve traders, processors and exporters and other actors in the value chain
Social, environmental, policy and market conditions necessary for development and upscaling	• Important in the local diet – • Environmentally friendly resilient and climate smart. • There is availability of market: domestic and regional
D: Economic, gender, vulnerable and marginalized groups (VMGs) considerations	
Basic costs	Cost of a bag of certified basic seed potato 50kg KES. 3,000 @ 16 bags per acre (KES 48,000) including other costs total **KES100,000** per acre
Estimated returns	Estimated output of 150 bags of 50kg @KES 1500; total revenue KES **225,000** less costs of Ksh 100,000=**KES 125,000**
Gender issues and concerns in development, dissemination, adoption and scaling up	• Women may be excluded be excluded from decision making and may not benefit from technologies and practices that could help them adapt to new climatic conditions • The variety cooks fast hence less fuel consumption. Savings made on energy can be utilized for other household priority needs such as medical care an school fees; time saved can be used for other economic activities • Social and institutional barriers may lead to a gender gap that hinders women's productivity and reduce their contributions to production of Kenya Mpya and achievement of broader economic and social development goals.
Gender related opportunities	• Unica has high levels of zinc and iron compared to other potato varieties and therefore key in boosting micronutrient levels in local diets for woman and children • Women and youth friendly production techniques such as mechanization and business incubation models

	• Since it is highly demanded variety it creates opportunity for women in production, retailing, value addition and marketing
VMG issues and concerns in development, dissemination, adoption and scaling up	• There exists opportunities for people living with disabilities; SMEs in seed potato production, processing (whole peels, fresh cuts, crisps) and packaging • SMEs which are led by VMG especially people living of disabilities are preference in capacity building or business development services • Since potato is nutritious particularly with the skin, it is a dietary option for the VMGs
VMG related opportunities	• There exists opportunities for people living with disabilities; SMEs in seed potato production, processing (whole peels, fresh cuts, crisps) and packaging VMGs will receive social and economic benefits that are culturally appropriate as well as generationally inclusive • SMEs which are led by VMG especially people living of disabilities are preference in capacity building or business development services • Since potato is nutritious particularly with the skin, it is a dietary option for the VMGs
E: Case studies/profiles of success stories	
Success stories from previous similar projects	Since Unica was released in 2016, it has been promoted mainly in Eastern regions of Kenya. Over 100 Potato farmers have been capacity built on improved potato production technologies and marketing.
Application guidelines for users	*Selected land should not have been grown with potatoes for the last 4 seasons * Soil analysis for nutrients, bacterial wilt and potato cyst nematodes (PCN)should be done before site selection *Land should be ploughed and harrowed well to level the surface and enable good uniform seed germination and uniform maturity *Use certified seed from known seed merchants (seed retained on-farm may have deteriorated viability). *Early planting helps in avoiding infestation by insects (aphids) *correct spacing – 75cm by 30cm if using size II seed * Fertilizer application rates – 4 bags (50kg) per acre if using DAP *Crop management practices – weeding; earthing up/hilling; crop protection; water application; dehaulming *crop protection – protective fungicides at emergence and afterwards spraying every week with recommended fungicides *Harvesting done when the crop is physiologically mature/foliage begin to turn yellow *Storage – store in DLS after harvesting, sorting, grading, curing and cleaning if for seed and in ware store if potatoes for eating
F: Status of TIMP readiness (1-ready for upscaling;, 2-requires validation; 3-requires further research**)**	Ready for upscaling
G: Contacts	

Contacts	Centre Director, KALRO-Tigoni P.O. Box 338-00217, Limuru, Kenya Telephone: 0202023213 Mobile: 0727031783 E-mail: kalro.tigoni@kalro.org
Lead organization and scientists	KALRO-Tigoni,
Partner organizations	• Ministry of Agriculture, Livestock, Fisheries and Irrigation (MoALF&I) • International Potato Centre (CIP) • National Potato Centre of Kenya (NPCK) • International Centre for Insect Physiology and Ecology (ICIPE) • FAO (Food and Agriculture Organization) • Common Interest Groups (CIGs) • Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) • NGOs (CARE Kenya): (Farmer Input Promotion)

Research Gaps-Unica Variety

1. the variety has long dormancy hence the need to develop accompanying technology on dormancy breaking;
2. rapid tuber expansion results in large distribution of ware sized tubers even in seed crops, accompanying technology on spacing needed to improve seed supply

Technology name	**Potato variety: Kenya Karibu**
Category (i.e. technology, innovation or management practice)	Technology
A: Description of the technology, innovation or management practice	
Problem addressed	Limited availability of potato variety for crisp processing and poor quality of raw potatoes available for processing
What is it? (TIMP description)	It is a high yielding variety which is tolerant to late blight. The variety yields 35 to 40 tons/ha. Its characteristic features include; deep red skin with deep red eyes, and round shaped. Kenya Karibu has medium dormancy period up to 2 to 3 months. It is good for table consumption. The variety is not drought tolerant
Justification	Kenya Karibu is a farmer accepted, market demanded and well adapted variety. It is a potential variety for processing into crisps and can be stored for long by households. This variety is not affected by increase in carbon dioxide concentration in the atmosphere and fairly stable to temperature fluctuations.
B: Assessment of dissemination and scaling up/out approaches	
Users of TIMP	• Farmers • Seed producing companies and SMEs • Other research organizations/institutions (universities)
Approaches used in dissemination	• Farmer Participatory Evaluation exercises • On-farm demonstration • Field days

	• Trade fair • Agricultural shows • MoALF & I/Extension officers • Partners (CIP, NPCK, FAO, ICIPE, GIZ) • Mobile phone text initiative- ICT platform (Viazi soko) • Farmer to farmer peer learning • Mass media- e.g Mkulima programme, Seeds of Gold, Smart Farmer • Workshops, Seminars, Meetings, trainings • Promotional materials (posters/brochures/leaflets/Variety catalogue) • Social Media platforms
Critical/essential factors for successful promotion	• Recruitment and support for SMEs for potato production • Field demonstrations on improved potato varieties alongside existing local varieties • funding by government to promote production and distribution of seed of selected potato varieties
Partners/stakeholders for scaling up and their roles	• Ministry of Agriculture Livestock Fisheries &Irrigation (MoALF&I)- Extension and Capacity Building • CIP – Collaborative research on potato variety development • ICIPE -Collaborative research on crop protection • FAO - Co-sharing of resources and networking and knowledge management • CIGs - back stopping the technologies at grass root levels • GIZ- Nutrition and potato utilization by the communities • NGOs (CARE Kenya)-Farmer Input Promotion
C: Current situation and future scaling up	
Counties where already promoted, if any	• Traditional potato producing counties -Nyandarua, Nyeri, Kiambu, Taita Taveta, Nakuru, Bomet, Narok, Elgeyo Marakwet, Uasin Gishu, Bungoma, West Pokot, Nandi, Kisii; Murang'a, Baringo, Nyamira, Kirinyaga, Laikipia, and Kericho • Eemerging potato producing counties in mid-altitude AEZ (Samburu, Trans-nzoia, Makueni, Embu, Tharaka Nithi, Machakos, Kajiado, and Nairobi
Counties where TIMPs will be upscaled	Elgeyo Marakwet, Nyandarua, Nyeri, Taita Taveta, Bomet and Uasin Gishu a
Challenges in dissemination	• Lack of information about the existence of variety/Non-exposure of the end-user to a technology • High marketing cost due to poor and undeveloped physical and marketing infrastructure
Suggestions for addressing the challenges	• Information dissemination - GAPs • Scaling up participation of end-user in on-farm activities/adaptive research/extension activities • Market promotions for new varieties targeting grain traders • Shortening the marketing chains – farm producer and marketing groups/cooperatives • Find innovations in reducing production costs to encourage further production.

Lessons learned in upscaling if any	• Adoption of FFBS effective in technology dissemination and adoption • Partnership is important in technology dissemination • Involvement of farmers alone is not enough to support adoption, need to involve traders, processors and exporters and other actors in the value chain
Social, environmental, policy and market conditions necessary for development and upscaling	• Important in the local diet • Environmentally friendly resilient and climate smart. • There is availability of market: domestic and regional
D: Economic, gender, vulnerable and marginalized groups (VMGs) considerations	
Basic costs	Cost of a bag of certified basic seed potato 50kg KES. 3,000 @ 16 bags per acre (KES 48,000) including other costs total **KES100,000** per acre
Estimated returns	Estimated output of 150 bags of 50kg @KES 1500; total revenue KES **225,000** less costs of KES 100,000=**KES 125,000**
Gender issues and concerns in development, dissemination, adoption and scaling up	• Land ownership mainly by men and therefore women are not involved in decision making on the varieties to grow • Most farmer groups are composed of women and this may leave out the opinion and interests of men • Production is done by youth and women but the money goes to the men
Gender related opportunities	• Since poverty affects women and children, weather changes exposes them to high risks of droughts and/or flooding. 80% of women are involved in production practices, therefore Kenya Karibu variety will easily be produced by women ensuring sustainable food source for their families • Kenya Karibu has potential for processing into crisps and therefore creates opportunity for women in production, retailing, value addition and marketing. Youth will be engaged in production & processing through mechanization and business incubation models and marketing • The variety cooks fast hence less fuel consumption. Savings made on energy can be utilized for other household priority needs such as medical care an school fees; time saved can be used for other economic activities
VMG issues and concerns in development, dissemination, adoption and scaling up.	• Fears on encroaching into their rights, values or environment and hence adversely affecting their livelihood and/or economic activities
VMG related opportunities	• There exists opportunities for people living with disabilities; SMEs in seed potato production, processing (whole peels, fresh cuts, crisps) and packaging • SMEs which are led by VMG especially people living of disabilities are preference in capacity building or business development services

	• Since potato is nutritious particularly with the skin, it is a dietary option for the VMGs. • Short cropping cycle allows production of several crops per year thus important in improving food and nutrition for the VMG • Production of Kenya Karibu offers business opportunities in retailing, distribution and processing into fresh crisps • Fits well in major cropping patterns • Capacity building for the VMGs in agri-business will ensure better participation in value addition and trade
E: Case studies/profiles of success stories	
Success stories from previous similar projects	Kenya Karibu has been promoted in all potato growing regions in Kenya. Adoption rates have been recorded high in Nyandarua, Kiambu, Meru, Nakuru, Uasin Gishu and Bungoma counties
Application guidelines for users	**Soil analysis for nutrients, bacterial wilt and potato cyst nematodes (PCN)should be done before site selection *Land should be ploughed and harrowed well to level the surface and enable good uniform seed germination and uniform maturity *Use certified seed from known seed merchants (seed retained on-farm may have deteriorated viability). *Early planting helps in avoiding infestation by insects (aphids) *correct spacing – 75cm by 30cm if using size II seed * Fertilizer application rates – 4 bags (50kg) per acre if using DAP *Crop management practices – weeding; earthing up/hilling; crop protection; water application; dehaulming *crop protection – protective fungicides at emergence and afterwards spraying every week with recommended fungicides *Harvesting done when the crop is physiologically mature/foliage begin to turn yellow *Storage – store in DLS after harvesting, sorting, grading, curing and cleaning if for seed and in ware store if potatoes for eating
F: Status of TIMP readiness (1-ready for up-scaling;, 2-requires validation; 3-requires further research**)**	Ready for up-scaling
G: Contacts	
Contacts	The Centre Director, KALRO-Tigoni P.O. Box 338-00217, Limuru, Kenya Telephone: 0202023213 Mobile: 0727031783 E-mail: kalro.tigoni@kalro.org
Lead organization and scientists	KALRO-Tigoni
Partner organizations	• Ministry of Agriculture, Livestock, Fisheries and Irrigation (MoALF&I) • International Potato Centre (CIP) • National Potato Centre of Kenya (NPCK) • International Centre for Insect Physiology and Ecology (ICIPE)

	• FAO (Food and Agriculture Organization) • Common Interest Groups (CIGs) • Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) • NGOs (CARE Kenya): (Farmer Input Promotion)

Gaps Kenya Karibu Variety:

1. Wastage due deep eyes, trait improvement needed to have a shallow eye variety
2. Accompanying innovation on spacing needed optimize yield

Technology name	**Potato variety: Dutch Robyjn**
Category (i.e. technology, innovation or management practice)	Technology
A: Description of the technology, innovation or management practice	
Problem to be addressed	• Lack of regular supply of raw potatoes for crisp production and poor quality of available raw potatoes • Low farm yields (below 7 tons/ha)
What is it? (TIMP description)	The variety has high yields of 30 tons/ha. It does well in a wide range of altitude; from 1500 to 2800m a.s.l. and temperature range of between 14 to 24^{o}C. Good soils are the sandy loams and alluvials with good draining capacity and high fertility. Its characteristic features include; rough pale red skin with white eyes, round shaped and shallow eyes
Justification	It is a farmer accepted variety especially in south rift parts of Kenya. The variety can be processed into crisps and can be stored for long. It is susceptible to late blight. Dutch robyjn is fairly stable to increased carbon concentration in the atmosphere and not sensitive to temperature changes
B: Assessment of dissemination and scaling up/out approaches	
Users of TIMP	• Farmers • Seed producing companies and SMEs • Other research organizations/institutions (universities)
Approaches used in dissemination	• Farmer Participatory Evaluation exercises • On-farm demonstration • Field days • Trade fair • Agricultural shows • MoALF&I/Extension officers • Partners (CIP, NPCK, FAO, ICIPE, GIZ) • Mobile phone text initiative- ICT platform (Viazi soko) • Farmer to farmer peer learning • Mass media- e.g. Mkulima programme, Seeds of Gold, Smart Farmer • Workshops, Seminars, Meetings, trainings • Promotional materials (posters/brochures/leaflets) • Social Media platforms

Critical/essential factors for successful promotion	• Adequate quantities of good quality seed • Recruitment and support for SMEs for potato production • Field demonstrations on improved potato varieties alongside existing local varieties • funding by government to promote production and distribution of seed of selected potato varieties
Partners/stakeholders for scaling up and their roles	• Ministry of Agriculture Livestock Fisheries &Irrigation (MoALF&I)- Extension and Capacity Building • CIP – Collaborative research on potato variety development • ICIPE – collaborative research on crop protection • FAO - co-sharing of resources and networking and knowledge management • CIGs - back stopping the technologies at grass root levels • GIZ- Nutrition and potato utilization by the communities • NGOs (CARE Kenya): (Farmer Input Promotion)
C: Current situation and future scaling up	
Counties where already promoted, if any	• Traditional potato producing counties- Nyandarua, Nyeri, Kiambu, Taita Taveta, Nakuru, Bomet, Narok, Elgeyo Marakwet, Uasin Gishu, Bungoma, West pokot, Nandi, Kisii; Murang'a, Baringo, Nyamira, Kirinyaga, Laikipia, and Kericho) • Emerging potato producing counties in mid-altitude AEZ (Samburu, Trans-nzoia, Makueni, Embu, Tharaka Nithi, Machakos, Kajiado, and Nairobi
Counties where TIMPs will be up-scaled	Elgeyo Marakwet, Nyandarua, Nyeri, Taita Taveta, Bomet and Uasin Gishu as prioritized by counties
Challenges in dissemination	• Lack of information about the existence of variety/Non-exposure of the end-user to a technology • High marketing cost due to poor and undeveloped physical and marketing infrastructure
Suggestions for addressing the challenges	• Information dissemination - GAPs • Scaling up participation of end-user in on-farm activities/adaptive research/extension activities • Market promotions for new varieties targeting grain traders • Shortening the marketing chains – form producer and marketing groups/cooperatives • Find innovations in reducing production costs to encourage further production.
Lessons learned in up-scaling, if any	• Adoption of FFBS effective in technology dissemination and adoption • Partnership is important in technology dissemination • Involvement of farmers alone is not enough to support adoption, need to involve traders, processors and exporters and other actors in the value chain
Social, environmental, policy and market conditions necessary for development and up-scaling	• Important in the local diet – • Environmentally friendly resilient and climate smart. • There is availability of market: domestic and regional
D: Economic, gender, vulnerable and marginalized groups (VMGs) considerations	

Basic costs	Cost of a bag of certified basic seed potato 50kg KES. 3,000 @ 16 bags per acre (KES 48,000) including other costs total **KES100,000** per acre
Estimated returns	Estimated output of 150 bags of 50kg @KES 1500; total revenue KES **225,000** less costs of KES 100,000=**KES 125,000**
Gender issues and concerns in development, dissemination, adoption and scaling up	• Land ownership mainly by men and therefore women are not involved in decision making on the varieties to grow • Most farmer groups are composed of women and this may leave out the opinion and interests of men • Production is done by youth and women but the money goes to the men
Gender related opportunities	• Women and youth friendly production techniques such as mechanization and business incubation models • Dutch robyjn has the potential for processing into crisps locally, creating employment for women in processing and marketing, youth in packing and distribution and ready snacks for all ages but mainly school going children in the community • Since it is highly demanded variety it creates opportunity for women in production, retailing, value addition and marketing
VMG issues and concerns in development and dissemination, adoption and scaling up	• Fears of isolation during decision making of key project activities to be implemented • Restricted ability to participate in and benefit from the project
VMG related opportunities	• Screening to determine if a proposed investment impacts adversely on vulnerable communities, the preparation of a VMGP including the social assessment process, consultation and stakeholder engagement, disclosure procedures, communication and grievances redress mechanism • There exists opportunities for people living with disabilities; SMEs in seed potato production, processing (whole peels, fresh cuts, crisps) and packaging • SMEs which are led by VMG especially people living of disabilities are preference in capacity building or business development services • Since potato is nutritious particularly with the skin, it is a dietary option for the VMGs • Short cropping cycle allows production of several crops per year thus important in improving food and nutrition for the VMG • Fits well in major cropping patterns • Capacity building for the VMGs in agri-business will ensure better participation in value addition and trade
E: Case studies/profiles of success stories	
Success stories from previous similar projects	Dutch robyjn is the only variety used in commercial processing of potatoes into ready to eat snacks like crisps, chevda and potato sticks. The crisps are sold in urban centres namely Nairobi, Mombasa, Kisumu, Eldoret, Nakuru, Thika, Meru amon others and exported to Tanzania, Uganda and Zimbabwe Majority of the farmers capacity

	built to produce Dutch robyjn are in Bomet county where the terms of engagement were contractual.
Application guidelines for users	* Selected land should not have been grown with potato crop or family in the last 4 seasons *Soil analysis for nutrients, bacterial wilt and potato cyst nematodes (PCN)should be done before site selection *Land should be ploughed and harrowed well to level the surface and enable good uniform seed germination and uniform maturity *Use certified seed from known seed merchants (seed retained on-farm may have deteriorated viability). *Early planting helps in avoiding infestation by insects (aphids) *correct spacing – 75cm by 30cm if using size II seed * Fertilizer application rates – 4 bags (50kg) per acre if using DAP *Crop management practices – weeding; earthing up/hilling; crop protection; water application; dehaulming *crop protection – protective fungicides at emergence and afterwards spraying every week with recommended fungicides *Harvesting done when the crop is physiologically mature/foliage begin to turn yellow *Storage – store in DLS after harvesting, sorting, grading, curing and cleaning if for seed and in ware store if potatoes for eating
F: Status of TIMP readiness (1-ready for up-scaling;, 2-requires validation; 3-requires further research**)**	Ready for up-scaling
F: Contacts	
Contacts	Centre Director, KALRO-Tigoni P.O. Box 338-00217, Limuru, Kenya Telephone: 0202023213 Mobile: 0727031783 E-mail: kalro.tigoni@kalro.org
Lead organization and scientists	KALRO-Tigoni,
Partner organizations	• Ministry of Agriculture, Livestock, Fisheries and Irrigation (MoALF&I) • International Potato Centre (CIP) • National Potato Centre of Kenya (NPCK) • International Centre for Insect Physiology and Ecology (ICIPE) • FAO (Food and Agriculture Organization) • Common Interest Groups (CIGs) • Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) • NGOs (CARE Kenya): (Farmer Input Promotion)

Technology name	**Potato variety: Sherekea**
Category (i.e. technology, innovation	Technology

or management practice)	
A: Description of the technology, innovation or management practice	
Problem to be addressed	Low farm yields (below 7 tons/ha) due to potato farmers not aware of available high yielding varieties. Low yields causes food insecurity in vulnerable communities especially if there's drought in subsequent seasons, affecting mainly women and children. Sherekea is a high yielding variety (45 tons/ha) and can be stored up to 5 months providing fresh potatoes for home consumption.
What is it? (TIMP description)	It is a high yielding variety (45 tons/ha), good storage and tolerant to late blight. The variety has a medium dormancy period up to 2 to 3 months. It is good for table consumption. Sherekea does well in altitudes from 1500 to 2800 m a.s.l. The soils should be fertile, well-draining with pH of 5.8 to 6.5. Sherekea requires sufficient soil moisture during its crop growth to yield well and suitable temperature range of 15 to 24^{o} C. Its characteristic features include; red skin with deep red eyes and round shaped
Justification	Sherekea is a farmer accepted variety especially in north rift parts of Kenya which can be stored for long. The Variety has very high yields of over 45 tons/ha and holds potential for processing into crisps
B: Assessment of dissemination and scaling up/out approaches	
Users of TIMP	• Farmers • Seed producing companies and SMEs • Other research organizations/institutions (universities)
Approaches used in dissemination	• Farmer Participatory Evaluation exercises • On-farm demonstration • Field days • Trade fair • Agricultural shows • MoALFI/Extension officers • Partners (CIP, NPCK, FAO, ICIPE, GIZ) • Mobile phone text initiative • Farmer to farmer peer learning • Mass media- e.g Mkulima programme, Seeds of Gold, Smart Farmer • Workshops, Seminars, Meetings, trainings • Promotional materials (posters/brochures/leaflets/variety catalogue) • Social platform
Critical/essential factors for successful promotion	• Recruitment and support for SMEs for potato production • Field demonstrations on improved potato varieties alongside existing local varieties • funding by government to promote production and distribution of seed of selected potato varieties
Partners/stakeholders for scaling up and their roles	• Ministry of Agriculture Livestock Fisheries &Irrigation (MoALF&I)- Extension and Capacity Building • CIP (International Potato Centre) – Collaborative research on potato variety development

	• ICIPE (International Centre for Insect Physiology and Ecology)– collaborative research on crop protection • FAO (Food and Agricultural Organization)- co-sharing of resources and networking and knowledge management • CIGs (Common Interest Groups)- back stopping the technologies at grass root levels • GIZ (Deutsche Gesellschaft für Internationale Zusammenarbeit) - Nutrition and potato utilization by the communities • NGOs (Non-governmental organization)(CARE Kenya): (Farmer Input Promotion)
C: Current situation and future scaling up	
Counties where already promoted, if any	• Traditional potato producing counties- Nyandarua, Nyeri, Kiambu, Taita Taveta, Nakuru, Bomet, Narok,Elgeyo Marakwet, Uasin Gishu, Bungoma, West pokot, Nandi, Kisii;Murang'a, Baringo, Nyamira, Kirinyaga, Laikipia, and Kericho • Emerging potato producing counties in mid-altitude AEZ (Samburu, Trans-nzoia, Makueni, Embu, Tharaka Nithi, Machakos, Kajiado, and Nairobi)
Counties where TIMPs will be up-scaled	Elgeyo Marakwet, Nyandarua, Nyeri, Taita Taveta, Bomet and Uasin Gishu as prioritized by counties
Challenges in dissemination	• Lack of information about the existence of variety/Non-exposure of the end-user to a technology • High marketing cost due to poor and undeveloped physical and marketing infrastructure
Suggestions for addressing the challenges	• Information dissemination - GAPs • Scaling up participation of end-user in on-farm activities/adaptive research/extension activities • Market promotions for new varieties targeting grain traders • Shortening the marketing chains – form producer and marketing groups/cooperatives • Find innovations in reducing production costs to encourage further production.
Lessons learned in up-scaling, if any	• Adoption of FFBS effective in technology dissemination and adoption • Partnership is important in technology dissemination • Involvement of farmers alone is not enough to support adoption, need to involve traders, processors and exporters and other actors in the value chain
Social, environmental, policy and market conditions necessary for development and up-scaling	• Important in the local diet – • Environmentally friendly resilient and climate smart. • There is availability of market: domestic and regional
D: Economic, gender, vulnerable and marginalized groups (VMGs) considerations	
Basic costs	Cost of a bag of certified basic seed potato 50kg KES. 3,000 @ 16 bags per acre (KES 48,000) including other costs total **KES100,000** per acre
Estimated returns	Estimated output of 150 bags of 50kg @KES 1500; total revenue KES **225,000** less costs of KES 100,000=**KES 125,000**

Gender issues and concerns in development, dissemination adoption and scaling up	• Land ownership mainly by men and therefore women are usually excluded in decision making or have no access to the land resources to produce the potatoes • Most farmer groups are composed of women and this may leave out the opinion and interests of men • Production is done by youth and women but marketing is done by the men so the money goes to the men
Gender related opportunities	• Women and youth friendly production techniques such as mechanization and business incubation models • Since it is highly demanded variety it creates opportunity for women in production, retailing, value addition and marketing • Sherekea has the potential for processing into crisps locally, creating employment for women in processing and marketing, youth in packing and distribution and ready snacks for all ages but mainly school going children in the community
VMG issues and concerns in development, dissemination adoption and scaling up	• There exists opportunities for people living with disabilities; SMEs in seed potato production, processing (whole peels, fresh cuts, crisps) and packaging • SMEs which are led by VMG especially people living of disabilities are preference in capacity building or business development services • Since potato is nutritious particularly with the skin, it is a dietary option for the VMGs
VMG related opportunities	• Short cropping cycle allows production of several crops per year thus important in improving food and nutrition for the VMG • Fits well in major cropping patterns • Capacity building for the VMGs in agri-business will ensure better participation in value addition and trade
E: Case studies/profiles of success stories	
Success stories from previous similar projects	It is a farmer accepted variety especially in north rift parts of Kenya
Application guidelines for users	*Selected land should not have been grown with potato crop or family for the last 4 seasons *Soil analysis for nutrients, bacterial wilt and potato cyst nematodes (PCN)should be done before site selection *Land should be ploughed and harrowed well to level the surface and enable good uniform seed germination and uniform maturity *Use certified seed from known seed merchants (seed retained on-farm may have deteriorated viability). *Early planting helps in avoiding infestation by insects (aphids) *correct spacing – 75cm by 30cm if using size II seed * Fertilizer application rates – 4 bags (50kg) per acre if using DAP *Crop management practices – weeding; earthing up/hilling; crop protection; water application; dehaulming *crop protection – protective fungicides at emergence and afterwards spraying every week with recommended fungicides

	*Harvesting done when the crop is physiologically mature/foliage begin to turn yellow *Storage – store in DLS after harvesting, sorting, grading, curing and cleaning if for seed and in ware store if potatoes for eating
F: Status of TIMP readiness (1-ready for up-scaling;, 2-requires validation; 3-requires further research**)**	Ready for up-scaling
G: Contacts	
Contacts	The Centre Director, KALRO-Tigoni P.O. Box 338-00217, Limuru, Kenya Telephone: 0202023213 Mobile: 0727031783 E-mail: kalro.tigoni@kalro.org
Lead organization and scientists	KALRO-Tigoni,
Partner organizations	• Ministry of Agriculture, Livestock, Fisheries and Irrigation (MoALF&I) • International Potato Centre (CIP) • National Potato Centre of Kenya (NPCK) • International Centre for Insect Physiology and Ecology (ICIPE) • FAO (Food and Agriculture Organization) • Common Interest Groups (CIGs) • Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) • NGOs (CARE Kenya): (Farmer Input Promotion)

Research Gaps- Sherekea Variety:

1. Long dormancy requires accompanying technology on sprouting technology for seed management

Technology name	**Potato variety: Asante**
Category (i.e. technology, innovation or management practice)	Technology
A: Description of the technology, innovation or management practice	
Problem to be addressed	Limited availability of high yielding varieties suitable for home consumption, tolerant to long distance transportation and long storage periods
What is it? (TIMP description)	It is a high yielding variety (45 tons/ha) and tolerant to late blight. The variety has a medium dormancy period up to 2 to 3 months. It is good for table consumption. It does well in altitudes from 1500 to 2800 m a.s.l., with a temperature range of between 14 to 24oC. Good soils are the sandy loams and alluvials with good draining capacity and high fertility, with a pH of 5.8 to 6.5. The variety requires sufficient soil moisture throughout its growing period to give a good yield. Asante

	not drought tolerant. Its characteristic features include; pale red skin with deep red eyes.
Justification	It is a farmer accepted variety especially in north rift parts of Kenya. The variety has very high yields of over 45 tons/ha and holds potential for processing into crisps. Asante does well in a wide range of environment and adaptable to wide range of temperatures. This variety can store for long hence a family may not be required to cultivate every season to have food. This will prevent the soil from being cultivated hence reduced carbon emissions.
B: Assessment of dissemination and scaling up/out approaches	
Users of TIMP	• Farmers • Seed producing companies and SMEs • Other research organizations/institutions (universities)
Approaches used in dissemination	• Farmer Participatory Evaluation exercises • On-farm demonstration • Field days • Agricultural shows • MoALF&I /Extension officers • Partners (CIP, NPCK, FAO, ICIPE, GIZ) • Mobile phone text initiative • Farmer to farmer peer learning • Mass media- e.g Mkulima programme, Seeds of Gold, Smart Farmer • ICT platform (Viazi soko) • Workshops • Seminars, Meetings, trainings • Promotional materials (posters/brochures/leaflets/Variety catalogue) • Social media platforms
Critical/essential factors for successful promotion	• Recruitment and support for SMEs for potato production • Field demonstrations on improved potato varieties alongside existing local varieties • funding by government to promote production and distribution of seed of selected potato varieties
Partners/stakeholders for scaling up and their roles	• Ministry of Agriculture Livestock Fisheries &Irrigation (MoALF&I)- Extension and capacity building • CIP (International Potato Centre) – Collaborative research on potato variety development • ICIPE (International Centre for Insect Physiology and Ecology)– collaborative research on crop protection • FAO (Food and Agricultural Organization)- co-sharing of resources and networking and knowledge management • CIGs (Common Interest Groups)- back stopping the technologies at grass root levels • GIZ- Nutrition and potato utilization by the communities • NGOs (Non-governmental organization)(CARE Kenya): (Farmer Input Promotion)
C: Current situation and future scaling up	

Counties where already promoted, if any	• Traditional potato producing counties (Nyandarua, Nyeri, Kiambu, Taita Taveta, Nakuru, Bomet, Narok, Elgeyo Marakwet, Uasin Gishu, Bungoma, West Pokot, Nandi, Kisii; Murang'a, Baringo, Nyamira, Kirinyaga, Laikipia, and Kericho) • Emerging potato producing counties in mid-altitude AEZ (Samburu, Trans Nzoia, Makueni, Embu, Tharaka Nithi, Machakos, Kajiado, and Nairobi
Counties where TIMPs will be up-scaled	Elgeyo Marakwet, Nyandarua, Nyeri, Taita Taveta, Bomet and Uasin Gishu as prioritized by counties
	•
Challenges in dissemination	• Lack of information about the existence of variety/Non-exposure of the end-user to a technology • High marketing cost due to poor and undeveloped physical and marketing infrastructure
Suggestions for addressing the challenges	• Information dissemination - GAPs • Scaling up participation of end-user in on-farm activities/adaptive research/extension activities • Market promotions for new varieties targeting grain traders • Shortening the marketing chains – form producer and marketing groups/cooperatives • Find innovations in reducing production costs to encourage further production.
Lessons learned in up-scaling, if any	• Adoption of FFBS effective in technology dissemination and adoption • Partnership is important in technology dissemination • Involvement of farmers alone is not enough to support adoption, need to involve traders, processors and exporters and other actors in the value chain
Social, environmental, policy and market conditions necessary for development and upscaling	• Important in the local diet • Environmentally friendly resilient and climate smart. • There is availability of market: domestic and regional
D: Economic, gender, vulnerable and marginalized groups (VMGs) considerations	
Basic costs	Cost of a bag of certified basic seed potato 50kg KES. 3,000 @ 16 bags per acre (KES 48,000) including other costs total **KES100,000** per acre
Estimated returns	Estimated output of 150 bags of 50kg @KES 1500; total revenue KES **225,000** less costs of KES 100,000=**KES 125,000**
Gender issues and concerns in development dissemination, adoption and scaling up	• women produce 50 to 60% of food crops and are gate keepers of household nutrition and health, though they do not benefit much from potato produced because marketing is mainly done by men • During training and capacity building, a greater percentage of men attend as women are left tending to the families. They do not receive the improved potato production technologies and knowledge and the men who attended do not pass the information to the women who are producers. • In case of climate change, women are more vulnerable because they constitute the majority of the world's poor and are more

	dependent on potato production for their livelihood which relies entirely on natural resources that are threatened by climate change • Most female potato growers have limited access to extension and advisory services, despite being the majority primary producers • Most women have poor access to production resources such as land. So women may not adopt the variety since they have no land to produce Asante for food or selling
Gender related opportunities	• Women will have the opportunity to store Asante so that their families are food secure • Youth friendly production techniques such as mechanization and business incubation models and marketing Asante will target the Youth • Business models in processing and capacity building targeting women and youth groups to enhance shelf life of Asante and avail ready snacks to the communities
VMG issues and concerns in development, dissemination. adoption and scaling up	• VMGs may not have access to production, financial or social resources to meet their food security requirements
VMG related opportunities	• There exists opportunities for people living with disabilities; SMEs in seed potato production, processing (whole peels, fresh cuts, crisps) and packaging • SMEs which are led by VMG especially people living of disabilities are preference in capacity building or business development services • Since potato is nutritious particularly with the skin, it is a dietary option for the VMGs • Culturally acceptable • Short cropping cycle allows production of several crops per year thus important in improving food and nutrition for the VMG • Availability of ready market • Fits well in major cropping patterns
E: Case studies/profiles of success stories	
Success stories	Asante was released in 1998 and since then it has been widely grown 90% in Eastern regions of Kenya in Meru, Timau areas for selling in Isiolo, Marsabit up to Somalia.
Application guidelines for users	*Selected land should not have been grown with potato crop or family for the last 4 seasons *Soil analysis for nutrients, bacterial wilt and potato cyst nematodes (PCN)should be done before site selection *Land should be ploughed and harrowed well to level the surface and enable good uniform seed germination and uniform maturity

	*Use certified seed from known seed merchants (seed retained on-farm may have deteriorated viability). *Early planting helps in avoiding infestation by insects (aphids) *correct spacing – 75cm by 30cm if using size II seed * Fertilizer application rates – 4 bags (50kg) per acre if using DAP *Crop management practices – weeding; earthing up/hilling; crop protection; water application; dehaulming *crop protection – protective fungicides at emergence and afterwards spraying every week with recommended fungicides *Harvesting done when the crop is physiologically mature/foliage begin to turn yellow *Storage – store in DLS after harvesting, sorting, grading, curing and cleaning if for seed and in ware store if potatoes for eating
F: Status of TIMP readiness (1-ready for up-scaling;, 2-requires validation; 3-requires further research**)**	Ready for up-scaling
F: Contacts	
Contacts	The Centre Director, KALRO-Tigoni P.O. Box 338-00217, Limuru, Kenya Telephone: 0202023213 Mobile: 0727031783 E-mail: kalro.tigoni@kalro.org
Lead organization and scientists	KALRO-Tigoni,
Partner organizations	• Ministry of Agriculture, Livestock, Fisheries and Irrigation (MoALF&I) • International Potato Centre (CIP) • National Potato Centre of Kenya (NPCK) • International Centre for Insect Physiology and Ecology (ICIPE) • FAO (Food and Agriculture Organization) • Common Interest Groups (CIGs) • Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) • NGOs (CARE Kenya): (Farmer Input Promotion)

Research Gaps-Asante variety

1. Long dormancy requires accompanying technology on seed sprouting in seed potato management
2. Mobile and web-based information portal/platform

Technology name	**Potato variety: Tigoni**
Category (i.e. technology, innovation or management practice)	Technology
A: Description of the technology, innovation or management practice	
Problem to be addressed	Non availability of suitable variety for processing into frozen and fresh chips and low farm yields (below 7 tons/ha)

What is it? (TIMP description)	It is a high yielding variety (35 to 40 tons/ha) and tolerant to late blight. It has a medium dormancy period. The variety is suitable for fresh chips, crisps and table consumption. Tigoni does well in high altitudes of above 2100m a.s.l, with optimal temperatures of 14 to 18oC. Tigoni requires sufficient rainfall to supply at least 25mm per week of moisture for production of high quality tubers. It has very poor in storage because of greening. Its characteristic features include; white skin with shallow white eyes, oval shaped and medium eye depth.
Justification	Tigoni is a farmer accepted, market demanded, and well adapted variety. It is a potential variety for processing into frozen fries and yields 35 to 40 tons/ha. Tigoni variety is high yielding and its tubers can be processed hence earning incomes to vulnerable families, making them to adapt to the risks of climate change
B: Assessment of dissemination and scaling up/out approaches	
Users of TIMP	• Farmers • Seed producing companies and SMEs • Other research organizations/institutions (universities)
Approaches used in dissemination	• Farmer Participatory Evaluation exercises • On-farm demonstration • Field days • Agricultural shows • MoA/Extension officers • Partners (CIP, NPCK, FAO, ICIPE, GIZ) • Mobile phone text initiative • Farmer to farmer peer learning • Mass media- e.g Mkulima programme, Seeds of Gold, Smart Farmer • Workshops, Seminars, Meetings, trainings • Promotional materials (posters/brochures/leaflets) • Social media platforms
Critical/essential factors for successful promotion	• Recruitment and support for SMEs for potato production • Field demonstrations on improved potato varieties alongside existing local varieties • funding by government to promote production and distribution of seed of selected potato varieties
Partners/stakeholders for scaling up and their roles	• Ministry of Agriculture Livestock Fisheries &Irrigation (MoALF&I)-Extension and Capacity Building • CIP (International Potato Centre) – Collaborative research on potato variety development • ICIPE (International Centre for Insect Physiology and Ecology)– collaborative research on crop protection • FAO (Food and Agricultural Organization)- co-sharing of resources and networking and knowledge management • CIGs (Common Interest Groups)- back stopping the technologies at grass root levels • GIZ- Nutrition and potato utilization by the communities • NGOs (Non-governmental organization)(CARE Kenya): (Farmer Input Promotion)

C: Current situation and future scaling up	
Counties where already promoted, if any	• Traditional potato producing counties- Nyandarua, Nyeri, Kiambu, Taita Taveta, Nakuru, Bomet, Narok,Elgeyo Marakwet, Uasin Gishu, Bungoma, West pokot, Nandi, Kisii;Murang'a, Baringo, Nyamira, Kirinyaga, Laikipia, and Kericho) • Emerging potato producing counties in mid-altitude AEZ (Samburu, Trans-nzoia, Makueni, Embu, Tharaka Nithi, Machakos, Kajiado, and Nairobi)
Counties where TIMPs will be up-scaled	Elgeyo Marakwet, Nyandarua, Nyeri, Taita Taveta, Bomet and Uasin Gishu
Challenges in dissemination	• Lack of information about the existence of variety/Non-exposure of the end-user to a technology • High marketing cost due to poor and undeveloped physical and marketing infrastructure
Suggestions for addressing the challenges	• Information dissemination - GAPs • Scaling up participation of end-user in on-farm activities/adaptive research/extension activities • Market promotions for new varieties targeting grain traders • Shortening the marketing chains – form producer and marketing groups/cooperatives • Find innovations in reducing production costs to encourage further production.
Lessons learned in upscaling, if any	• Adoption of FFBS effective in technology dissemination and adoption • Partnership is important in technology dissemination • Involvement of farmers alone is not enough to support adoption, need to involve traders, processors and exporters and other actors in the value chain
Social, environmental, policy and market conditions necessary for development and up-scaling	• Important in the local diet • Environmentally friendly, resilient and climate smart. • There is availability of market: domestic and regional
D: Economic, gender, vulnerable and marginalized groups (VMGs) considerations	
Basic costs	Cost of a bag of certified basic seed potato 50kg KES. 3,000 @ 16 bags per acre (KES 48,000) including other costs total **KES100,000** per acre
Estimated returns	Estimated output of 150 bags of 50kg @KES 1500; total revenue KES **225,000** less costs of KES 100,000=**KES 125,000**
Gender issues and concerns in development, dissemination, adoption and scaling up	• Limited access to production resources such as land since land ownership is mainly by men and therefore women are not involved in decision making on the varieties to grow • Most farmer groups are composed of women and this may leave out the opinion and interests of men • Women have limited access to advisory and extension services yet they are the majority primary producers because most trainings are attended by men as women are left at home to do house-keeping. • Production is done by youth and women but marketing is done by the men so the money goes to the men

Gender related opportunities	• Women and youth friendly production techniques such as mechanization and business incubation models • Since it is highly demanded variety it creates opportunity for women in production, retailing, value addition and marketing. • Tigoni has the potential for processing into frozen chips for export, creating employment for women in processing and marketing, youth in packing and distribution and ready snacks for all ages but mainly school going children in the community
VMG issues and concerns in development and dissemination	• VMGs may not have access to production, financial or social resources to meet their food security requirements
VMG related opportunities	• Short cropping cycle allows production of several crops per year thus important in improving food and nutrition for the VMG • Business opportunity in fresh market retailing and processing • Fits well in major cropping patterns • Capacity building for the VMGs in agri-business will ensure better participation in value addition and trade • There exists opportunities for people living with disabilities; SMEs in seed potato production, processing (whole peels, fresh cuts, crisps) and packaging, distribution, aggregation, trading and transporting • SMEs which are led by VMG especially people living of disabilities are preference in capacity building or business development services • Since potato is nutritious particularly with the skin, it is a good dietary option for the VMGs
E: Case studies/profiles of success stories	
Success stories from previous similar projects	Tigoni is well known countrywide. Farmers who grow it have obtained very high yields
Application guidelines for users	*Soil analysis for nutrients, bacterial wilt and potato cyst nematodes (PCN)should be done before site selection *Land should be ploughed and harrowed well to level the surface and enable good uniform seed germination and uniform maturity *Use certified seed from known seed merchants (seed retained on-farm may have deteriorated viability). *Early planting helps in avoiding infestation by insects (aphids) *correct spacing – 75cm by 30cm if using size II seed * Fertilizer application rates – 4 bags (50kg) per acre if using DAP *Crop management practices – weeding; earthing up/hilling; crop protection; water application; dehaulming *crop protection – protective fungicides at emergence and afterwards spraying every week with recommended fungicides *Harvesting done when the crop is physiologically mature/foliage begin to turn yellow

	*Storage – store in DLS after harvesting, sorting, grading, curing and cleaning if for seed and in ware store if potatoes for eating
F: Status of TIMP readiness (1-ready for up-scaling;, 2-requires validation; 3-requires further research)	Ready for up-scaling
F: Contacts	
Contacts	Centre Director, KALRO-Tigoni P.O. Box 338-00217, Limuru, Kenya Telephone: 0202023213 Mobile: 0727031783 E-mail: kalro.tigoni@kalro.org
Lead organization and scientists	KALRO-Tigoni,
Partner organizations	• Ministry of Agriculture, Livestock, Fisheries and Irrigation (MoALF&I) • International Potato Centre (CIP) • National Potato Centre of Kenya (NPCK) • International Centre for Insect Physiology and Ecology (ICIPE) • FAO (Food and Agriculture Organization) • Common Interest Groups (CIGs) • Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) • NGOs (CARE Kenya): (Farmer Input Promotion)

Gaps Tigoni variety:

1. Variety is prone to greening both in the field and storage hence requires trait improvement to reduce greening;
2. accompanying innovation on glycoalkaloid detection of accumulation and quantification
3. awareness creation on prevention of greening

Technology Name	**Potato variety: Lenana**
Category (i.e. technology, innovation or management practice)	Technology
A: Description of the technology, innovation or management practice	
Problem to be addressed	Low farm yields (below 7 tons/ha) due to changing climate and limited varieties available that are drought tolerant
What is it? (TIMP description)	• Lenana– shallow eyes, drought/heat tolerant, late maturing, high yielding, resistant to late blight, short dormancy period; suitable for fresh chips, french fries and table consumption
Justification	• Lenana – new introduction; well adapted; drought tolerant; shallow eyes; resistant to late blight, potato virus X (PVX) and potato leaf roll (PLRV)

B: Assessment of dissemination and scaling up/out approaches	
Users of TIMP	• Farmers • Seed producing companies and SMEs • Other research organizations/institutions (universities) • MoALF & I/Extension officers • Partners (CIP, NPCK, FAO, ICIPE, GIZ)
Approaches used in dissemination	• Farmer Participatory Evaluation exercises • On-farm demonstration • Field days • Agricultural shows • Mobile phone text initiative • Farmer to farmer peer learning • Mass media- e.g Mkulima programme, Seeds of Gold, Smart Farmer • Workshops, Seminars, Meetings, trainings • Promotional materials (posters/brochures/leaflets) • Social media platforms
Critical/essential factors for successful promotion	• Recruitment and support for SMEs for potato production • Field demonstrations on improved potato varieties alongside existing local varieties • funding by government to promote production and distribution of seed of selected potato varieties
Partners/stakeholders for scaling up and their roles	• Ministry of Agriculture Livestock Fisheries &Irrigation (MoALF&I)- Extension and Capacity Building • CIP (International Potato Centre) – Collaborative research on potato variety development • ICIPE (International Centre for Insect Physiology and Ecology)– collaborative research on crop protection • FAO (Food and Agricultural Organization)- co-sharing of resources and networking and knowledge management • CIGs (Common Interest Groups)- back stopping the technologies at grass root levels • GIZ- Nutrition and potato utilization by the communities • NGOs (Non-governmental organization)(CARE Kenya): (Farmer Input Promotion)
C: Current situation and future scaling up	
Counties where already promoted if any	Traditional potato producing counties (Nyandarua, Nyeri, Kiambu, Taita Taveta, Nakuru, Bomet, Narok, Elgeyo Marakwet, Uasin Gishu, Bungoma, West pokot, Nandi, Kisii;Murang'a, Baringo, Nyamira, Kirinyaga, Laikipia, and Kericho) emerging potato producing counties in mid-altitude AEZ (Samburu, Trans-nzoia, Makueni, Embu, Tharaka Nithi, Machakos, Kajiado, and Nairobi)
Counties Where TIMP will be up-scaled	Elgeyo Marakwet, Nyandarua, Nyeri, Taita Taveta, Bomet and Uasin Gishu as prioritized by counties
Challenges in dissemination	• Inadequate supply of certified seed • Sprouts quickly hence poses storage challenges to retailers and processors

	• High marketing cost due to poor and undeveloped physical and marketing infrastructure
Suggestions for addressing the challenges	• Shortening the marketing chains – form producer and marketing groups/cooperatives • Supporting SMEs to do seed potato business • Information dissemination - GAPs • Scaling up participation of end-user in on-farm activities/adaptive research/extension activities • Market promotions for new varieties targeting grain traders • Find innovations in reducing production costs to encourage further production.
Lessons learned in upscaling, if any	• Adoption of FFBS model is effective in dissemination and adoption of technologies • Partnership is important in technology dissemination • Involvement of farmers alone is not enough to support adoption, need to involve traders, processors and exporters and other actors in the value chain
Social, environmental, policy and market conditions necessary for development and up-scaling	• Important in the local diet • Environmentally friendly resilient and climate smart. • There is availability of market: domestic and regional • One of the key crops identified under the food security pillar in the Big Four Agenda
D: Economic, gender, vulnerable and marginalized groups (VMGs) considerations	
Basic costs	Cost of a bag of certified basic seed potato 50kg KES. 3,000 @ 16 bags per acre (KES 48,000) including other costs total **KES100,000** per acre
Estimated returns	Estimated output of 150 bags of 50kg @KES 1500; total revenue KES **225,000** less costs of KES 100,000=**KES 125,000**
Gender issues and concerns in development, dissemination, adoption and scaling up	• Land ownership mainly by men and therefore women are usually excluded in decision making or have no access to the land resources to produce the potatoes • Most farmer groups are composed of women and this may leave out the opinion and interests of men • Production is done by youth and women but marketing is done by the men so the money goes to the men
Gender related opportunities	• Women and youth friendly production techniques such as mechanization and business incubation models • Since it is highly demanded variety it creates opportunity for women in production, retailing, value addition and marketing • Lenana has the potential for processing into crisps locally, creating employment for women in processing and marketing, youth in packing and distribution and ready snacks for all ages but mainly school going children in the community
VMG issues and concerns in development, dissemination, adoption and scaling up	• There exists opportunities for people living with disabilities; SMEs in seed potato production, processing (whole peels, fresh cuts, crisps) and packaging

	• SMEs which are led by VMG especially people living of disabilities are preference in capacity building or business development services • Since potato is nutritious particularly with the skin, it is a dietary option for the VMGs • Short cropping cycle allows production of several crops per year thus important in improving food and nutrition for the VMG • Fits well in major cropping patterns • Capacity building for the VMGs in agri-business will ensure better participation in value addition and trade
VMG related opportunities	VMGs may not have access to production, financial or social resources to meet their food security requirements
E: Case studies/profiles of success stories	
Success stories from previous similar projects	This is an output of the ongoing collaboration between CGIAR (CIP) and NARS (KALRO) to avail varieties that respond to changing local conditions. This will be promoted in joint initiatives to upscale uptake and adoption
Application guidelines for users	* Selected land should have been grown with potato for the last 4 seasons * Soil analysis for nutrients, bacterial wilt and potato cyst nematodes (PCN)should be done before site selection *Land should be ploughed and harrowed well to level the surface and enable good uniform seed germination and uniform maturity *Use certified seed from known seed merchants (seed retained on-farm may have deteriorated viability). *Early planting helps in avoiding infestation by insects (aphids) *correct spacing – 75cm by 30cm if using size II seed * Fertilizer application rates – 4 bags (50kg) per acre if using DAP *Crop management practices – weeding; earthing up/hilling; crop protection; water application; dehaulming *crop protection – protective fungicides at emergence and afterwards spraying every week with recommended fungicides *Harvesting done when the crop is physiologically mature/foliage begin to turn yellow *Storage – store in DLS after harvesting, sorting, grading, curing and cleaning if for seed and in ware store if potatoes for eating
F: Status of TIMP readiness (1-ready for up-scaling;, 2-requires validation; 3-requires further research**)**	Ready for up-scaling
G: Contacts	
Contacts	Centre Director, KALRO-Tigoni P.O. Box 338-00217, Limuru, Kenya Telephone: 0202023213 Mobile: 0727031783 E-mail: kalro.tigoni@kalro.org
Lead organization and scientists	KALRO-Tigoni,

Partner organizations	• Ministry of Agriculture, Livestock, Fisheries and Irrigation (MoALF&I) • International Potato Centre (CIP) • National Potato Centre of Kenya (NPCK) • International Centre for Insect Physiology and Ecology (ICIPE) • FAO (Food and Agriculture Organization) • Common Interest Groups (CIGs) • Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) • NGOs (CARE Kenya): (Farmer Input Promotion))

Research Gaps- Lenana variety

1. Seed availability
2. Awareness creation through promotion

Technology Name	**Potato variety: Konjo**
Category (i.e. technology, innovation or management practice)	Technology
A: Description of the technology, innovation or management practice	
Problem to be addressed	Climate change has brought high risks in food production since there are usually delays in rains falling or periods of droughts. Most farm families are exposed to these high risks and food insecurity without any form of adaptation. Variety Konjo is an early maturing variety with high yields and well adapted to a wide environment hence assuring households and particularly women because they are gate keepers of food security, nutrition and health of their families, of food source.
What is it? (TIMP description)	• Konjo– cream white skin with red eyes, oval shaped; high yielding, resistant to late blight, PVX and PLRV , suitable for fresh chips, french fries and table consumption
Justification	• Konjo – well adapted; very early maturing variety; high yield and tuber number
Counties where TIMPs will be up-scaled	• Elgeyo Marakwet, Nyandarua, Nyeri, Taita Taveta, Bomet and Uasin Gishu as prioritized by counties
B: Assessment of dissemination and scaling up/out approaches	
Users of TIMP	• Farmers • Seed producing companies and SMEs • Other research organizations/institutions (universities) • MoALF & I/Extension officers • Partners (CIP, NPCK, FAO, ICIPE, GIZ)
Approaches used in dissemination	• Farmer Participatory Evaluation exercises • On-farm demonstration • Field days • Agricultural shows • Mobile phone text initiative • Farmer to farmer peer learning • Mass media- e.g Mkulima programme, Seeds of Gold, Smart Farmer

	• Workshops, Seminars, Meetings, trainings • Promotional materials (posters/brochures/leaflets) • Social media platforms
Critical/essential factors for successful promotion	• Recruitment and support for SMEs for potato production • Field demonstrations on improved potato varieties alongside existing local varieties • funding by government to promote production and distribution of seed of selected potato varieties
Partners/stakeholders for scaling up and their roles	• Ministry of Agriculture Livestock Fisheries &Irrigation (MoALF&I)-Extension and Capacity Building • CIP (International Potato Centre) – Collaborative research on potato variety development • ICIPE (International Centre for Insect Physiology and Ecology)– collaborative research on crop protection • FAO (Food and Agricultural Organization)- co-sharing of resources and networking and knowledge management • CIGs (Common Interest Groups)- back stopping the technologies at grass root levels • GIZ- Nutrition and potato utilization by the communities • NGOs (Non-governmental organization)(CARE Kenya): (Farmer Input Promotion)
C: Current situation and future scaling up	
Counties where already promoted if any	• Traditional potato producing counties- Nyandarua, Nyeri, Kiambu, Taita Taveta, Nakuru, Bomet, Narok,Elgeyo Marakwet, Uasin Gishu, Bungoma, West pokot, Nandi, Kisii;Murang'a, Baringo, Nyamira, Kirinyaga, Laikipia, and Kericho • Emerging potato producing counties in mid-altitude AEZ (Samburu, Trans-nzoia, Makueni, Embu, Tharaka Nithi, Machakos, Kajiado, and Nairobi
Counties where TIMP will be up-scaled	Elgeyo Marakwet, Nyandarua, Nyeri, Taita Taveta, Bomet and Uasin Gishu as prioritized by counties
Challenges in dissemination	• Inadequate supply of certified seed • Sprouts quickly hence poses storage challenges to retailers and processors • High marketing cost due to poor and undeveloped physical and marketing infrastructure
Suggestions for addressing the challenges	• Shortening the marketing chains – form producer and marketing groups/cooperatives • Supporting SMEs to do seed potato business • Information dissemination - GAPs • Scaling up participation of end-user in on-farm activities/adaptive research/extension activities • Market promotions for new varieties targeting grain traders • Find innovations in reducing production costs to encourage further production.
Lessons learned in upscaling, if any	• Adoption of FFBS model is effective in dissemination and adoption of technologies • Partnership is important in technology dissemination

	• Involvement of farmers alone is not enough to support adoption, need to involve traders, processors and exporters and other actors in the value chain
Social, environmental, policy and market conditions necessary for development and up-scaling	• Important in the local diet – • Environmentally friendly resilient and climate smart. • There is availability of market: domestic and regional • One of the key crops identified under the food security pillar in the Big Four Agenda
D: Economic, gender, vulnerable and marginalized groups (VMGs) considerations	
Basic costs	Cost of a bag of certified basic seed potato 50kg KES. 3,000 @ 16 bags per acre (KES 48,000) including other costs total **KES100,000** per acre
Estimated returns	Estimated output of 150 bags of 50kg @KES 1500; total revenue KES **225,000** less costs of KES 100,000=**KES 125,000**
Gender issues and concerns in development, dissemination, adoption and scaling up	• Land ownership mainly by men and therefore women are usually excluded in decision making or have no access to the land resources to produce the potatoes • Most farmer groups are composed of women and this may leave out the opinion and interests of men • Production is done by youth and women but marketing is done by the men so the money goes to the men
Gender related opportunities	• Women and youth friendly production techniques such as mechanization and business incubation models • Since it is highly demanded variety it creates opportunity for women in production, retailing, value addition and marketing • Konjo has the potential for processing into crisps locally, creating employment for women in processing and marketing, youth in packing and distribution and ready snacks for all ages but mainly school going children in the community
VMG issues and concerns in development, dissemination, adoption and scaling up	VMGs may not have access to production, financial or social resources to meet their food security requirements
VMG issues and concerns in adoption and scaling up	• There exists opportunities for people living with disabilities; SMEs in seed potato production, processing (whole peels, fresh cuts, crisps) and packaging • SMEs which are led by VMG especially people living of disabilities are preference in capacity building or business development services • Since potato is nutritious particularly with the skin, it is a dietary option for the VMGs • Short cropping cycle allows production of several crops per year thus important in improving food and nutrition for the VMG • Fits well in major cropping patterns Capacity building for the VMGs in agri-business will ensure better participation in value addition and trade

VMG related opportunities	• There exists opportunities for people living with disabilities; SMEs in seed potato production, processing (whole peels, fresh cuts, crisps) and packaging • SMEs which are led by VMG especially people living of disabilities are preference in capacity building or business development services • Since potato is nutritious particularly with the skin, it is a dietary option for the VMGs • Short cropping cycle allows production of several crops per year thus important in improving food and nutrition for the VMG • Fits well in major cropping patterns • Capacity building for the VMGs in agri-business will ensure better participation in value addition and trade
E: Case studies/profiles of success stories	
Success stories from previous similar projects	-
Application guidelines for users	* Selected land should have been grown with potato for the last 4 seasons * Soil analysis for nutrients, bacterial wilt and potato cyst nematodes (PCN)should be done before site selection *Land should be ploughed and harrowed well to level the surface and enable good uniform seed germination and uniform maturity *Use certified seed from known seed merchants (seed retained on-farm may have deteriorated viability). *Early planting helps in avoiding infestation by insects (aphids) *correct spacing – 75cm by 30cm if using size II seed * Fertilizer application rates – 4 bags (50kg) per acre if using DAP *Crop management practices – weeding; earthing up/hilling; crop protection; water application; dehaulming *crop protection – protective fungicides at emergence and afterwards spraying every week with recommended fungicides *Harvesting done when the crop is physiologically mature/foliage begin to turn yellow *Storage – store in DLS after harvesting, sorting, grading, curing and cleaning if for seed and in ware store if potatoes for eating
F: Status of TIMP readiness (1-ready for up-scaling;, 2-requires validation; 3-requires further research**)**	Ready for up-scaling
G: Contacts	KALRO-Tigoni,
Contacts	Centre Director, KALRO-Tigoni P.O. Box 338-00217, Limuru, Kenya Telephone: 0202023213 Mobile: 0727031783 E-mail: kalro.tigoni@kalro.org

Lead organization and scientists	KALRO-Tigoni,
Partner organizations	• Ministry of Agriculture, Livestock, Fisheries and Irrigation (MoALF&I) • International Potato Centre (CIP) • National Potato Centre of Kenya (NPCK) • International Centre for Insect Physiology and Ecology (ICIPE) • FAO (Food and Agriculture Organization) • Common Interest Groups (CIGs) • Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) • NGOs (CARE Kenya): (Farmer Input Promotion)

Gaps Konjo variety

1. Seed availability
2. Awareness creation through promotion

Technology Name	**Potato variety: Wanjiku**
Category (i.e. technology, innovation or management practice)	Technology
A: Description of the technology, innovation or management practice	
Problem to be addressed	Low adoption of potato varieties and low farm yields (below 7 tons/ha)
What is it? (TIMP description)	• Wanjiku–drought/heat tolerant, late maturing; very high yielding, resistant to late blight and PVX, exhibits early resistance to PVY suitable for fresh chips and table consumption
Justification	• Wanjiku – drought tolerant, high yields, resistant to late blight and PVX and PLRV
B: Assessment of dissemination and scaling up/out approaches	
Users of TIMP	• Farmers • Seed producing companies and SMEs • Other research organizations/institutions (universities) • MoALF & I/Extension officers • Partners (CIP, NPCK, FAO, ICIPE, GIZ)
Approaches used in dissemination	• Farmer Participatory Evaluation exercises • On-farm demonstration • Field days • Agricultural shows • Mobile phone text initiative • Farmer to farmer peer learning • Mass media- e.g Mkulima programme, Seeds of Gold, Smart Farmer • Workshops, Seminars, Meetings, trainings • Promotional materials (posters/brochures/leaflets) • Social media platforms
Critical/essential factors for successful promotion	• Recruitment and support for SMEs for potato production • Field demonstrations on improved potato varieties alongside existing local varieties

	• funding by government to promote production and distribution of seed of selected potato varieties
Partners/stakeholders for scaling up and their roles	• Ministry of Agriculture Livestock Fisheries &Irrigation (MoALF&I)- Extension and Capacity Building • CIP (International Potato Centre) – Collaborative research on potato variety development • ICIPE (International Centre for Insect Physiology and Ecology)– collaborative research on crop protection • FAO (Food and Agricultural Organization)- co-sharing of resources and networking and knowledge management • CIGs (Common Interest Groups)- back stopping the technologies at grass root levels • GIZ- Nutrition and potato utilization by the communities • NGOs (Non-governmental organization)(CARE Kenya): (Farmer Input Promotion)
C: Current situation and future scaling up	
Counties where already promoted, if any	Traditional potato producing counties- Nyandarua, Nyeri, Kiambu, Taita Taveta, Nakuru, Bomet, Narok,Elgeyo Marakwet, Uasin Gishu, Bungoma, West pokot, Nandi, Kisii;Murang'a, Baringo, Nyamira, Kirinyaga, Laikipia, and Kericho merging potato producing counties in mid-altitude AEZ (Samburu, Trans-nzoia, Makueni, Embu, Tharaka Nithi, Machakos, Kajiado, and Nairobi
Counties where TIMPs will be up-scaled	Elgeyo Marakwet, Nyandarua, Nyeri, Taita Taveta, Bomet and Uasin Gishu
Challenges in dissemination	• Inadequate supply of certified seed • Sprouts quickly hence poses storage challenges to retailers and processors • High marketing cost due to poor and undeveloped physical and marketing infrastructure
Suggestions for addressing the challenges	• Shortening the marketing chains – form producer and marketing groups/cooperatives • Supporting SMEs to do seed potato business • Information dissemination - GAPs • Scaling up participation of end-user in on-farm activities/adaptive research/extension activities • Market promotions for new varieties targeting grain traders • Find innovations in reducing production costs to encourage further production.
Lessons learned in upscaling, if any	• Adoption of FFBS model is effective in dissemination and adoption of technologies • Partnership is important in technology dissemination • Involvement of farmers alone is not enough to support adoption, need to involve traders, processors and exporters and other actors in the value chain
Social, environmental, policy and market conditions necessary for	• Important in the local diet • Environmentally friendly resilient and climate smart. • There is availability of market: domestic and regional

development and up-scaling	• One of the key crops identified under the food security pillar in the Big Four Agenda
D: Economic, gender, vulnerable and marginalized groups (VMGs) considerations	
Basic costs	Cost of a bag of certified basic seed potato 50kg KES. 3,000 @ 16 bags per acre (KES 48,000) including other costs total **KES100,000** per acre
Estimated returns	Estimated output of 150 bags of 50kg @KES 1500; total revenue KES **225,000** less costs of KES 100,000=**KES 125,000**
Gender issues and concerns in development, dissemination, adoption and scaling up	• Land ownership mainly by men and therefore women are usually excluded in decision making or have no access to the land resources to produce the potatoes • Most farmer groups are composed of women and this may leave out the opinion and interests of men • Production is done by youth and women but marketing is done by the men so the money goes to the men
Gender related opportunities	• Women and youth friendly production techniques such as mechanization and business incubation models • Since it is highly demanded variety it creates opportunity for women in production, retailing, value addition and marketing • Wanjiku has the potential for processing into crisps locally, creating employment for women in processing and marketing, youth in packing and distribution and ready snacks for all ages but mainly school going children in the community
VMG issues and concerns in development, dissemination adoption and scaling up	VMGs may not have access to production, financial or social resources to meet their food security requirements
VMG related opportunities	• Short cropping cycle allows production of several crops per year thus important in improving food and nutrition for the VMG • Fits well in major cropping patterns • Capacity building for the VMGs in agri-business will ensure better participation in value addition and trade • There exists opportunities for people living with disabilities; SMEs in seed potato production, processing (whole peels, fresh cuts, crisps) and packaging • SMEs which are led by VMG especially people living of disabilities are preference in capacity building or business development services • Since potato is nutritious particularly with the skin, it is a dietary option for the VMGs
E: Case studies/profiles of success stories	
Success stories from previous similar projects	-
Application guidelines for users	* Selected land should have been grown with potato for the last 4 seasons

	* Soil analysis for nutrients, bacterial wilt and potato cyst nematodes (PCN)should be done before site selection *Land should be ploughed and harrowed well to level the surface and enable good uniform seed germination and uniform maturity *Use certified seed from known seed merchants (seed retained on-farm may have deteriorated viability). *Early planting helps in avoiding infestation by insects (aphids) *correct spacing – 75cm by 30cm if using size II seed * Fertilizer application rates – 4 bags (50kg) per acre if using DAP *Crop management practices – weeding; earthing up/hilling; crop protection; water application; dehaulming *crop protection – protective fungicides at emergence and afterwards spraying every week with recommended fungicides *Harvesting done when the crop is physiologically mature/foliage begin to turn yellow *Storage – store in DLS after harvesting, sorting, grading, curing and cleaning if for seed and in ware store if potatoes for eating
F: Status of TIMP readiness (1-ready for up-scaling;, 2-requires validation; 3-requires further research**)**	Ready for up-scaling
G: Contacts	KALRO-Tigoni,
Contacts	The Centre Director, KALRO-Tigoni P.O. Box 338-00217, Limuru, Kenya Telephone: 0202023213 Mobile: 0727031783 E-mail: kalro.tigoni@kalro.org
Lead organization and scientists	KALRO-Tigoni,
Partner organizations	• Ministry of Agriculture, Livestock, Fisheries and Irrigation (MoALF&I) • International Potato Centre (CIP) • National Potato Centre of Kenya (NPCK) • International Centre for Insect Physiology and Ecology (ICIPE) • FAO (Food and Agriculture Organization) • Common Interest Groups (CIGs) • Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) • NGOs (CARE Kenya): (Farmer Input Promotion)

Research Gaps-Wanjiku variety

1. Seed availability
2. Awareness creation through promotion

Technology Name	**Potato Variety Nyota**
Category (i.e. technology, innovation	Technology

or management practice)	
A: Description of the technology, innovation or management practice	
Problem to be addressed	Low adoption of potato varieties and low farm yields (below 7 tons/ha)
What is it? (TIMP description)	Nyota– cream white skin with red eyes, oval shaped; drought/heat tolerant early maturing; high yielding, susceptible to late blight, , short dormancy period; suitable for fresh chips, crisps and table consumption, medium eye depth, poor storage, not preferred by processors except during acute shortage of ware potato
Justification	Nyota – farmer accepted variety countrywide; market demanded variety; well adapted; very early maturing variety; has very short dormancy period hence cannot store for long
B: Assessment of dissemination and scaling up/out approaches	
Users of TIMP	• Farmers • Seed producing companies and SMEs • Other research organizations/institutions (universities) • MoALF & I/Extension officers • Partners (CIP, NPCK, FAO, ICIPE, GIZ)
Approaches used in dissemination	• Farmer Participatory Evaluation exercises • On-farm demonstration • Field days • Agricultural shows • Mobile phone text initiative • Farmer to farmer peer learning • Mass media- e.g Mkulima programme, Seeds of Gold, Smart Farmer • Workshops, Seminars, Meetings, trainings • Promotional materials (posters/brochures/leaflets) • Social media platforms
Critical/essential factors for successful promotion	• Recruitment and support for SMEs for potato production • Field demonstrations on improved potato varieties alongside existing local varieties • funding by government to promote production and distribution of seed of selected potato varieties
Partners/stakeholders for scaling up and their roles	• Ministry of Agriculture Livestock Fisheries &Irrigation (MoALF&I)- Extension and Capacity Building • CIP (International Potato Centre) – Collaborative research on potato variety development • ICIPE (International Centre for Insect Physiology and Ecology)– collaborative research on crop protection • FAO (Food and Agricultural Organization)- co-sharing of resources and networking and knowledge management • CIGs (Common Interest Groups)- back stopping the technologies at grass root levels • GIZ- Nutrition and potato utilization by the communities • NGOs (Non-governmental organization)(CARE Kenya): (Farmer Input Promotion)

C: Current situation and future scaling up	
Counties where already promoted, if any	• Traditional potato producing counties- Nyandarua, Nyeri, Kiambu, Taita Taveta, Nakuru, Bomet, Narok,Elgeyo Marakwet, Uasin Gishu, Bungoma, West pokot, Nandi, Kisii;Murang'a, Baringo, Nyamira, Kirinyaga, Laikipia, and Kericho) • Emerging potato producing counties in mid-altitude AEZ (Samburu, Trans-nzoia, Makueni, Embu, Tharaka Nithi, Machakos, Kajiado, and Nairobi)
Counties where TIMPs will be up-scaled	Elgeyo Marakwet, Nyandarua, Nyeri, Taita Taveta, Bomet and Uasin Gishu
Challenges in dissemination	• Inadequate supply of certified seed • Sprouts quickly hence poses storage challenges to retailers and processors • High marketing cost due to poor and undeveloped physical and marketing infrastructure
Suggestions for addressing the challenges	• Shortening the marketing chains – form producer and marketing groups/cooperatives • Supporting SMEs to do seed potato business • Information dissemination - GAPs • Scaling up participation of end-user in on-farm activities/adaptive research/extension activities • Market promotions for new varieties targeting grain traders • Find innovations in reducing production costs to encourage further production.
Lessons learned in upscaling, if any	• Adoption of FFBS model is effective in dissemination and adoption of technologies • Partnership is important in technology dissemination • Involvement of farmers alone is not enough to support adoption, need to involve traders, processors and exporters and other actors in the value chain
Social, environmental, policy and market conditions necessary for development and up-scaling	• Important in the local diet – • Environmentally friendly resilient and climate smart. • There is availability of market: domestic and regional • One of the key crops identified under the food security pillar in the Big Four Agenda
D: Economic, gender, vulnerable and marginalized groups (VMGs) considerations	
Basic costs	Cost of a bag of certified basic seed potato 50kg KES. 3,000 @ 16 bags per acre (KES 48,000) including other costs total **KES100,000** per acre
Estimated returns	Estimated output of 150 bags of 50kg @KES 1500; total revenue KES **225,000** less costs of KES 100,000=**KES 125,000**
Gender issues and concerns in development, dissemination, adoption and scaling up	• Land ownership mainly by men and therefore women are usually excluded in decision making or have no access to the land resources to produce the potatoes • Most farmer groups are composed of women and this may leave out the opinion and interests of men

	• Production is done by youth and women but marketing is done by the men so the money goes to the men
Gender related opportunities	• Women and youth friendly production techniques such as mechanization and business incubation models • Since it is highly demanded variety it creates opportunity for women in production, retailing, value addition and marketing • Nyota has the potential for processing into crisps locally, creating employment for women in processing and marketing, youth in packing and distribution and ready snacks for all ages but mainly school going children in the community
VMG issues and concerns in development, dissemination, adoption and scaling up	VMGs may not have access to production, financial or social resources to meet their food security requirements
VMG related opportunities	• There exists opportunities for people living with disabilities; SMEs in seed potato production, processing (whole peels, fresh cuts, crisps) and packaging • SMEs which are led by VMG especially people living of disabilities are preference in capacity building or business development services • Since potato is nutritious particularly with the skin, it is a dietary option for the VMGs • Short cropping cycle allows production of several crops per year thus important in improving food and nutrition for the VMG • Fits well in major cropping patterns • Capacity building for the VMGs in agri-business will ensure better participation in value addition and trade
E: Case studies/profiles of success stories	
Success stories from previous similar projects	-
Application guidelines for users	* Selected land should have been grown with potato for the last 4 seasons * Soil analysis for nutrients, bacterial wilt and potato cyst nematodes (PCN)should be done before site selection *Land should be ploughed and harrowed well to level the surface and enable good uniform seed germination and uniform maturity *Use certified seed from known seed merchants (seed retained on-farm may have deteriorated viability). *Early planting helps in avoiding infestation by insects (aphids) *correct spacing – 75cm by 30cm if using size II seed * Fertilizer application rates – 4 bags (50kg) per acre if using DAP *Crop management practices – weeding; earthing up/hilling; crop protection; water application; dehaulming *crop protection – protective fungicides at emergence and afterwards spraying every week with recommended fungicides *Harvesting done when the crop is physiologically mature/foliage begin to turn yellow

	*Storage – store in DLS after harvesting, sorting, grading, curing and cleaning if for seed and in ware store if potatoes for eating
F: Status of TIMP readiness (1-ready for up-scaling;, 2-requires validation; 3-requires further research**)**	Ready for up-scaling
G: Contacts	KALRO-Tigoni,
Contacts	Centre Director, KALRO-Tigoni P.O. Box 338-00217, Limuru, Kenya Telephone: 0202023213 Mobile: 0727031783 E-mail: kalro.tigoni@kalro.org
Lead organization and scientists	KALRO-Tigoni,
Partner organizations	• Ministry of Agriculture, Livestock, Fisheries and Irrigation (MoALF&I) • International Potato Centre (CIP) • National Potato Centre of Kenya (NPCK) • International Centre for Insect Physiology and Ecology (ICIPE) • FAO (Food and Agriculture Organization) • Common Interest Groups (CIGs) • Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) • NGOs (CARE Kenya): (Farmer Input Promotion)

Research Gaps- Nyota variety

1. Seed availability
2. Awareness creation through promotion

Technology Name	**Potato variety Chyulu**
Category (i.e. technology, innovation or management practice)	Technology
A: Description of the technology, innovation or management practice	
Problem to be addressed	Low adoption of potato varieties and low farm yields (below 7 tons/ha)
What is it? (TIMP description)	• Chyulu–drought/heat tolerant early maturing; high yielding, resistant to late blight, suitable for table consumption,
Justification	• Chulu –well adapted; very early maturing variety; resistant to late blight
B: Assessment of dissemination and scaling up/out approaches	
Users of TIMP	• Farmers • Seed producing companies and SMEs • Other research organizations/institutions (universities) • MoALF & I/Extension officers • Partners (CIP, NPCK, FAO, ICIPE, GIZ)
Approaches used in dissemination	• Farmer Participatory Evaluation exercises

	• On-farm demonstration • Field days • Agricultural shows • Mobile phone text initiative • Farmer to farmer peer learning • Mass media- e.g Mkulima programme, Seeds of Gold, Smart Farmer • Workshops, Seminars, Meetings, trainings • Promotional materials (posters/brochures/leaflets) • Social media platforms
Critical/essential factors for successful promotion	• Recruitment and support for SMEs for potato production • Field demonstrations on improved potato varieties alongside existing local varieties • funding by government to promote production and distribution of seed of selected potato varieties
Partners/stakeholders for scaling up and their roles	• Ministry of Agriculture Livestock Fisheries &Irrigation (MoALF&I)-Extension and Capacity Building • CIP (International Potato Centre) – Collaborative research on potato variety development • ICIPE (International Centre for Insect Physiology and Ecology)– collaborative research on crop protection • FAO (Food and Agricultural Organization)- co-sharing of resources and networking and knowledge management • CIGs (Common Interest Groups)- back stopping the technologies at grass root levels • GIZ- Nutrition and potato utilization by the communities • NGOs (Non-governmental organization)(CARE Kenya): (Farmer Input Promotion)
C: Current situation and future scaling up	
Counties where already promoted if any	• Traditional potato producing counties- Nyandarua, Nyeri, Kiambu, Taita Taveta, Nakuru, Bomet, Narok,Elgeyo Marakwet, Uasin Gishu, Bungoma, West pokot, Nandi, Kisii, Murang'a, Baringo, Nyamira, Kirinyaga, Laikipia, and Kericho) • Emerging potato producing counties in mid-altitude AEZ (Samburu, Trans-nzoia, Makueni, Embu, Tharaka Nithi, Machakos, Kajiado, and Nairobi
Counties where TIMP will be up-scaled	Elgeyo Marakwet, Nyandarua, Nyeri, Taita Taveta, Bomet and Uasin Gishu as prioritized by counties
Challenges in dissemination	• Inadequate supply of certified seed • Sprouts quickly hence poses storage challenges to retailers and processors • High marketing cost due to poor and undeveloped physical and marketing infrastructure
Recommendations for addressing the challenges	• Shortening the marketing chains – form producer and marketing groups/cooperatives • Supporting SMEs to do seed potato business • Information dissemination - GAPs

	• Scaling up participation of end-user in on-farm activities/adaptive research/extension activities • Market promotions for new varieties targeting grain traders • Find innovations in reducing production costs to encourage further production.
Lessons learned in upscaling if any	• Adoption of FFBS model is effective in dissemination and adoption of technologies • Partnership is important in technology dissemination • Involvement of farmers alone is not enough to support adoption, need to involve traders, processors and exporters and other actors in the value chain
Social, environmental, policy and market conditions necessary for development and upscaling	• Important in the local diet – • Environmentally friendly resilient and climate smart. • There is availability of market: domestic and regional • One of the key crops identified under the food security pillar in the Big Four Agenda
D: Economic, gender, vulnerable and marginalized groups (VMGs) considerations	
Basic costs	Cost of a bag of certified basic seed potato 50kg KES. 3,000 @ 16 bags per acre (KES 48,000) including other costs total **KES100,000** per acre
Estimated returns	Estimated output of 150 bags of 50kg @KES 1500; total revenue KES **225,000** less costs of KES 100,000=**KES 125,000**
Gender issues and concerns in development, dissemination, adoption and scaling up	• Land ownership mainly by men and therefore women are usually excluded in decision making or have no access to the land resources to produce the potatoes • Most farmer groups are composed of women and this may leave out the opinion and interests of men • Production is done by youth and women but marketing is done by the men so the money goes to the men
Gender related opportunities	• Women and youth friendly production techniques such as mechanization and business incubation models • Chyulu has the potential for processing into crisps locally, creating employment for women in processing and marketing, youth in packing and distribution and ready snacks for all ages but mainly school going children in the community
VMG issues and concerns in development, adoption and scaling up	VMGs may not have access to production, financial or social resources to meet their food security requirements
VMG related opportunities	• There exists opportunities for people living with disabilities; SMEs in seed potato production, processing (whole peels, fresh cuts, crisps) and packaging • SMEs which are led by VMG especially people living of disabilities are preference in capacity building or business development services • Since potato is nutritious particularly with the skin, it is a dietary option for the VMGs

	• Short cropping cycle allows production of several crops per year thus important in improving food and nutrition for the VMG • Fits well in major cropping patterns • Capacity building for the VMGs in agri-business will ensure better participation in value addition and trade
E: Case studies/profiles of success stories	
Success stories from previous similar projects	-
Application guidelines for users	* Selected land should have been grown with potato for the last 4 seasons * Soil analysis for nutrients, bacterial wilt and potato cyst nematodes (PCN)should be done before site selection *Land should be ploughed and harrowed well to level the surface and enable good uniform seed germination and uniform maturity *Use certified seed from known seed merchants (seed retained on-farm may have deteriorated viability). *Early planting helps in avoiding infestation by insects (aphids) *correct spacing – 75cm by 30cm if using size II seed * Fertilizer application rates – 4 bags (50kg) per acre if using DAP *Crop management practices – weeding; earthing up/hilling; crop protection; water application; dehaulming *crop protection – protective fungicides at emergence and afterwards spraying every week with recommended fungicides *Harvesting done when the crop is physiologically mature/foliage begin to turn yellow *Storage – store in DLS after harvesting, sorting, grading, curing and cleaning if for seed and in ware store if potatoes for eating
F: Status of TIMP readiness (1-ready for up-scaling;, 2-requires validation; 3-requires further research**)**	Ready for up-scaling
G: Contacts	KALRO-Tigoni,
Contacts	Centre Director, KALRO-Tigoni P.O. Box 338-00217, Limuru, Kenya Telephone: 0202023213 Mobile: 0727031783 E-mail: kalro.tigoni@kalro.org
Lead organization and scientists	KALRO-Tigoni,
Partner organizations	• Ministry of Agriculture, Livestock, Fisheries and Irrigation (MoALF&I) • International Potato Centre (CIP) • National Potato Centre of Kenya (NPCK) • International Centre for Insect Physiology and Ecology (ICIPE) • FAO (Food and Agriculture Organization) • Common Interest Groups (CIGs) • Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)

	• NGOs (CARE Kenya): (Farmer Input Promotion)

Research Gaps- Chyulu

1. Seed availability
2. Awareness creation through promotion

Technology Name	**Potato variety/line 3H17**
Category (i.e. technology, innovation or management practice)	Technology
A: Description of the technology, innovation or management practice	
Problem to be addressed	Low farm productivity (below 7 tons/ha) and shortage of varieties for mid altitude and processing
What is it? (TIMP description)	3H17
Justification	Adoption of new varieties will expand potato production into non-traditional potato producing areas. Increasing the basket of choices for the consumer and growing the industry for processing
B: Assessment of dissemination and scaling up/out approaches	
Users of TIMP	• Farmers • Seed producing companies and SMEs • Other research organizations/institutions (universities)
Approaches to be used in dissemination	• ToTs • Farmer Participatory Evaluation exercises • On-farm demonstration • Field days • Agricultural shows • MoA/Extension officers • Partners (CIP, NPCK, FAO, ICIPE, GIZ) • Mobile phone text initiative • Farmer to farmer peer learning • Mass media- e.g Mkulima programme, Seeds of Gold, Smart Farmer • Workshops, Seminars, Meetings, trainings • Extension publications (posters/brochures/leaflets) • Social platforms • Farmer Field and Business Schools (FFBS) • Fairs and exhibitions
Critical/essential factors for successful promotion	• Functioning seed system • Adequate quantities of good quality seed • Recruitment and support for SMEs for potato production • Field demonstrations on potato variety Shangi alongside existing local varieties • use of good agricultural practices • Effective agricultural extension services • Variety descriptors

Partners/stakeholders for scaling up and their roles	• Ministry of Agriculture Livestock Fisheries &Irrigation (MoALF&I) • CIP (International Potato Centre) – Collaborative research on potato variety development • ICIPE (International Centre for Insect Physiology and Ecology)– collaborative research on crop protection • FAO (Food and Agricultural Organization)- co-sharing of resources and networking and knowledge management • CIGs (Common Interest Groups)- back stopping the technologies at grass root levels • GIZ- Nutrition and potato utilization by the communities • NGOs (Non-governmental organization)(CARE Kenya): (Farmer Input Promotion)Private investors
C: Current situation and future scaling up	
Counties where already promoted, if any	• None
Counties where TIMP will be up-scaled	Elgeyo Marakwet, Nyandarua, Nyeri, Taita Taveta, Bomet and Uasin Gishu as prioritized by counties
Challenges in dissemination	• Lack of information about the existence of the variety/Non-exposure of the end-user to a technology • High marketing costs due to poor and undeveloped physical and marketing infrastructure • Selling by weight • Packaging seed potato in smaller units such as 10 or 20kg for women, elderly and children • Limited CIG based supportive seed system • Limited publicity about varieties • Weak research- extension- farmer linkage to support dissemination
Suggestions for addressing the challenges	• Information dissemination through public forums such as fairs, exhibitions, field day, road shows and FFBS • Scaling up participation of end-user in on-farm activities/adaptive research/extension activities • Market promotions for variety Shangi targeting grain traders through road shows • Shortening the marketing chains by – forming producer and marketing groups/cooperatives • Find innovations in reducing production costs to encourage further production • Capacity building of all value chain actors
Lessons learned in upscaling, if any	• Use of FFBS is effective in technology dissemination and adoption • Involvement of farmers alone is not enough to support adoption, need to involve traders, processors and exporters and other actors in the value chain, Partnership is important in technology dissemination • Use of roadshows and mass media communication will upscale the awareness creation of the variety

Social, environmental, policy and market conditions necessary for development and upscaling	• Important in the local diet • Environmentally friendly, resilient and climate smart • There is availability of market: domestic and regional • Reliable markets • Favourable weather • Awareness and acceptability of the variety by target communities. • Enabling policy framework (Seed, Horticulture, Policies)
D: Economic, gender, vulnerable and marginalized groups (VMGs) considerations	
Basic costs	Cost of a bag of certified basic seed potato 50kg KES. 3,000 @ 16 bags per acre (KES 48,000) including other costs total **KES100,000** per acre
Estimated returns	Estimated output of 150 bags of 50kg @KES 1500; total revenue KES **225,000** less costs of KES 100,000=**KES 125,000**
Gender issues and concerns in development, dissemination, adoption and scaling up	• Land ownership mainly by men and therefore women are usually excluded in decision making or have no access to the land resources to produce the potatoes • Most farmer groups are composed of women and this may leave out the opinion and interests of men • Production is done by youth and women but marketing is done by the men so the money goes to the men • Pessimism expressed by farmers of new technology and the associated risks
Gender related opportunities	• Women and youth friendly production and processing techniques in fabrication of processing equipment, mechanization and business incubation models • This variety creates opportunity for women in production, retailing, value addition and marketing • 3H17 has the potential for processing into crisps locally, creating employment for women in processing and marketing, youth in packing and distribution and ready snacks for all ages but mainly school going children in the community
VMG issues and concerns in development, dissemination, adoption and scaling up	• VMGs may not have access to production, financial or social resources to meet their food security requirements • Inaccessibility of poor and marginalized groups and weak delivery systems for provision of social and economic inclusion services
VMG related opportunities	• Short cropping cycle allows production of several crops per year thus important in improving food and nutrition for the VMG • Fits well in major cropping patterns • Capacity building for the VMGs in agri-business will ensure better participation in value addition and trade

	• There exists opportunities for people living with disabilities; SMEs in seed potato production, processing (whole peels, fresh cuts, crisps) and packaging • SMEs which are led by VMG especially people living of disabilities are preference in capacity building or business development services • Since potato is nutritious particularly with the skin, it is a dietary option for the VMGs
E: Case studies/profiles of success stories	
Success stories from previous similar projects	When it was officially released in 2013, Shangi variety became widely adopted and has increased to occupy 80% of the market share in Kenya
Application guidelines for users	* Selected land should have been grown with potato for the last 4 seasons * Soil analysis for nutrients, bacterial wilt and potato cyst nematodes (PCN)should be done before site selection *Land should be ploughed and harrowed well to level the surface and enable good uniform seed germination and uniform maturity *Use certified seed from known seed merchants (seed retained on-farm may have deteriorated). *Early planting helps in avoiding infestation by insects (aphids) *correct spacing – 75cm by 30cm if using size II seed * Fertilizer application rates – 4 bags (50kg) per acre if using DAP *Crop management practices – weeding; earthing up/hilling; crop protection; water application; dehaulming *crop protection – protective fungicides at emergence and afterwards spraying every week with recommended fungicides *Harvesting done when the crop is physiologically mature/foliage begin to turn yellow *Storage – store in DLS after harvesting, sorting, grading, curing and cleaning if for seed and in ware store if potatoes for eating
F: Status of TIMP readiness (1-ready for upscaling;, 2-requires validation; 3-requires further research**)**	Requires further research
G: Contacts	
Contacts	The Cenre Director, KALRO-Tigoni P.O. Box 338-00217, Limuru, Kenya Telephone: 0202023213 Mobile: 0727031783 E-mail: kalro.tigoni@kalro.org
Lead organization and scientists	KALRO-Tigoni,
Partner organizations	• Ministry of Agriculture, Livestock, Fisheries and Irrigation (MoALF&I) • International Potato Centre (CIP) • National Potato Centre of Kenya (NPCK)

	• International Centre for Insect Physiology and Ecology (ICIPE) • FAO (Food and Agriculture Organization) • Common Interest Groups (CIGs) • Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) • NGOs (CARE Kenya): (Farmer Input Promotion)

Research Gaps -3H17

1. Requires processing through the national performance trials
2. Production of the breeder seed potatoes

Technology Name	**Potato variety/Line 1HD1**
Category (i.e. technology, innovation or management practice)	Technology
A: Description of the technology, innovation or management practice	
Problem to be addressed	Low farm productivity (below 7 tons/ha) and shortage of varieties for mid altitude and processing
What is it? (TIMP description)	1HD1
Justification	Adoption of new varieties will expand potato production into non-traditional potato producing areas. Increasing the basket of choices for the consumer and growing the industry for processing
B: Assessment of dissemination and scaling up/out approaches	
Users of TIMP	• Farmers • Seed producing companies and SMEs • Other research organizations/institutions (universities)
Approaches to be used in dissemination	• ToTs • Farmer Participatory Evaluation exercises • On-farm demonstration • Field days • Agricultural shows • MoA/Extension officers • Partners (CIP, NPCK, FAO, ICIPE, GIZ) • Mobile phone text initiative • Farmer to farmer peer learning • Mass media – "Mkulima programme" • Workshops • Seminars, Meetings, trainings • Extension publications (posters/brochures/leaflets) • Social platforms • Farmer Field and Business Schools (FFBS) • Fairs and exhibitions

Critical/essential factors for successful promotion	• Functioning seed system • Adequate quantities of good quality seed • Recruitment and support for SMEs for potato production • Field demonstrations on potato variety Shangi alongside existing local varieties • use of good agricultural practices • Effective agricultural extension services • Variety descriptors
Partners/stakeholders for scaling up and their roles	• Ministry of Agriculture Livestock Fisheries &Irrigation (MoALF&I)-Extension and Capacity Building • CIP (International Potato Centre) – Collaborative research on potato variety development • ICIPE (International Centre for Insect Physiology and Ecology)– collaborative research on crop protection • FAO (Food and Agricultural Organization)- co-sharing of resources and networking and knowledge management • CIGs (Common Interest Groups)- back stopping the technologies at grass root levels • GIZ- Nutrition and potato utilization by the communities • NGOs (Non-governmental organization)(CARE Kenya): (Farmer Input Promotion)Private investors
C: Current situation and future scaling up	
Counties where already promoted, if any	• None
Counties where TIMP will be up-scaled	Elgeyo Marakwet, Nyandarua, Nyeri, Taita Taveta, Bomet and Uasin Gishu as prioritized by counties
Challenges in dissemination	• Lack of information about the existence of the variety/Non-exposure of the end-user to a technology • High marketing costs due to poor and undeveloped physical and marketing infrastructure • Selling by weight • Packaging seed potato in smaller units such as 10 or 20kg for women, elderly and children • Limited CIG based supportive seed system • Limited publicity about varieties • Weak research- extension- farmer linkage to support dissemination
Suggestions for addressing the challenges	• Information dissemination through public forums such as fairs, exhibitions, field day, road shows and FFBS • Scaling up participation of end-user in on-farm activities/adaptive research/extension activities • Market promotions targeting grain traders through road shows • Shortening the marketing chains by – forming producer and marketing groups/cooperatives • Find innovations in reducing production costs to encourage further production • Capacity building of all value chain actors

Lessons learned in up-scaling, if any	• Use of FFBS is effective in technology dissemination and adoption • Involvement of farmers alone is not enough to support adoption, need to involve traders, processors and exporters and other actors in the value chain, Partnership is important in technology dissemination • Use of roadshows and mass media communication will upscale the awareness creation of the variety
Social, environmental, policy and market conditions necessary for development and up-scaling	• Important in the local diet • Environmentally friendly, resilient and climate smart • There is availability of market: domestic and regional • Reliable markets • Favourable weather • Awareness and acceptability of the variety by target communities. • Enabling policy framework (Seed, Horticulture, Policies)
D: Economic, gender, vulnerable and marginalized groups (VMGs) considerations	
Basic costs	Cost of a bag of certified basic seed potato 50kg KES. 3,000 @ 16 bags per acre (KES 48,000) including other costs total **KES100,000** per acre
Estimated returns	Estimated output of 150 bags of 50kg @KES 1500; total revenue KES **225,000** less costs of KES 100,000=**KES 125,000**
Gender issues and concerns in development, dissemination, adoption and scaling up	• Land ownership mainly by men and therefore women are usually excluded in decision making or have no access to the land resources to produce the potatoes • Most farmer groups are composed of women and this may leave out the opinion and interests of men • Production is done by youth and women but marketing is done by the men so the money goes to the men • Pessimism expressed by farmers of new technology and the associated risks
Gender related opportunities	• Women and youth friendly production and processing techniques in fabrication of processing equipment, mechanization and business incubation models • This variety creates opportunity for women in production, retailing, value addition and marketing • 1HD1 has the potential for processing into crisps locally, creating employment for women in processing and marketing, youth in packing and distribution and ready snacks for all ages but mainly school going children in the community
VMG issues and concerns in development, dissemination, adoption and scaling up	Inaccessibility of poor and marginalized groups and weak delivery systems for provision of social and economic inclusion services
VMG related opportunities	• There exists opportunities for people living with disabilities; SMEs in seed potato production, processing (whole peels, fresh cuts, crisps) and packaging

	• SMEs which are led by VMG especially people living of disabilities are preference in capacity building or business development services • Since potato is nutritious particularly with the skin, it is a dietary option for the VMGs • Short cropping cycle allows production of several crops per year thus important in improving food and nutrition for the VMG • Fits well in major cropping patterns • Capacity building for the VMGs in agri-business will ensure better participation in value addition and trade
E: Case studies/profiles of success stories	
Success stories from previous similar projects	yet to be released
Application guidelines for users	* Selected land should have been grown with potato for the last 4 seasons * Soil analysis for nutrients, bacterial wilt and potato cyst nematodes (PCN)should be done before site selection *Land should be ploughed and harrowed well to level the surface and enable good uniform seed germination and uniform maturity *Use certified seed from known seed merchants (seed retained on-farm may have deteriorated). *Early planting helps in avoiding infestation by insects (aphids) *correct spacing – 75cm by 30cm if using size II seed * Fertilizer application rates – 4 bags (50kg) per acre if using DAP *Crop management practices – weeding; earthing up/hilling; crop protection; water application; dehaulming *crop protection – protective fungicides at emergence and afterwards spraying every week with recommended fungicides *Harvesting done when the crop is physiologically mature/foliage begin to turn yellow *Storage – store in DLS after harvesting, sorting, grading, curing and cleaning if for seed and in ware store if potatoes for eating
F: Status of TIMP readiness (1-ready for up-scaling;, 2-requires validation; 3-requires further research**)**	Requires further research
G: Contacts	
Contacts	Centre Director, KALRO-Tigoni P.O. Box 338-00217, Limuru, Kenya Telephone: 0202023213 Mobile: 0727031783 E-mail: kalro.tigoni@kalro.org
Lead organization and scientists	KALRO-Tigoni,

Partner organizations	• Ministry of Agriculture, Livestock, Fisheries and Irrigation (MoALF&I) • International Potato Centre (CIP) • National Potato Centre of Kenya (NPCK) • International Centre for Insect Physiology and Ecology (ICIPE) • FAO (Food and Agriculture Organization) • Common Interest Groups (CIGs) • Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) • NGOs (CARE Kenya): (Farmer Input Promotion)

Technology Name	**Potato variety/line 6B170**
Category (i.e. technology, innovation or management practice)	Technology
A: Description of the technology, innovation or management practice	
Problem to be addressed	Low farm productivity (below 7 tons/ha) and shortage of varieties for mid altitude and processing
What is it? (TIMP description)	6B170
Justification	Adoption of new varieties will expand potato production into non-traditional potato producing areas. Increasing the basket of choices for the consumer and growing the industry for processing
B: Assessment of dissemination and scaling up/out approaches	
Users of TIMP	• Farmers • Seed producing companies and SMEs • Other research organizations/institutions (universities)
Approaches to be used in dissemination	• ToTs • Farmer Participatory Evaluation exercises • On-farm demonstration • Field days • Agricultural shows • MoA/Extension officers • Partners (CIP, NPCK, FAO, ICIPE, GIZ) • Mobile phone text initiative • Farmer to farmer peer learning • Mass media- e.g. Mkulima programme, Seeds of Gold, Smart Farmer • Workshops • Seminars, Meetings, trainings • Extension publications (posters/brochures/leaflets) • Social platforms • Farmer Field and Business Schools (FFBS) • Fairs and exhibitions

Critical/essential factors for successful promotion	• Functioning seed system • Adequate quantities of good quality seed • Recruitment and support for SMEs for potato production • Field demonstrations • use of good agricultural practices • Effective agricultural extension services • Variety descriptors
Partners/stakeholders for scaling up and their roles	• Ministry of Agriculture Livestock Fisheries &Irrigation (MoALF&I)-Extension and Capacity Building • CIP (International Potato Centre) – Collaborative research on potato variety development • ICIPE (International Centre for Insect Physiology and Ecology)– collaborative research on crop protection • FAO (Food and Agricultural Organization)- co-sharing of resources and networking and knowledge management • CIGs (Common Interest Groups)- back stopping the technologies at grass root levels • GIZ- Nutrition and potato utilization by the communities • NGOs (Non-governmental organization)(CARE Kenya): (Farmer Input Promotion)Private investors
C: Current situation and future scaling up	
Counties where already promoted, if any	• none
Counties where TIMP will be up-scaled	Elgeyo Marakwet, Nyandarua, Nyeri, Taita Taveta, Bomet and Uasin Gishu as prioritized by counties
Challenges in dissemination	• Lack of information about the existence of the variety/Non-exposure of the end-user to a technology • High marketing costs due to poor and undeveloped physical and marketing infrastructure • Selling by weight • Packaging seed potato in smaller units such as 10 or 20kg for women, elderly and children • Limited CIG based supportive seed system • Limited publicity about varieties • Weak research- extension- farmer linkage to support dissemination
Suggestions for addressing the challenges	• Information dissemination through public forums such as fairs, exhibitions, field day, road shows and FFBS • Scaling up participation of end-user in on-farm activities/adaptive research/extension activities • Market promotions • Shortening the marketing chains by – forming producer and marketing groups/cooperatives • Find innovations in reducing production costs to encourage further production • Capacity building of all value chain actors
Lessons learned in up-scaling, if any	• Use of FFBS is effective in technology dissemination and adoption

	• Involvement of farmers alone is not enough to support adoption, need to involve traders, processors and exporters and other actors in the value chain, Partnership is important in technology dissemination • Use of roadshows and mass media communication will upscale the awareness creation of the variety
Social, environmental, policy and market conditions necessary for development and up-scaling	• Important in the local diet • Environmentally friendly, resilient and climate smart • There is availability of market: domestic and regional • Reliable markets • Favourable weather • Awareness and acceptability of the variety by target communities. • Enabling policy framework (Seed, Horticulture, Policies)
D: Economic, gender, vulnerable and marginalized groups (VMGs) considerations	
Basic costs	Cost of a bag of certified basic seed potato 50kg KES. 3,000 @ 16 bags per acre (KES 48,000) including other costs total **KES100,000** per acre
Estimated returns	Estimated output of 150 bags of 50kg @KES 1500; total revenue KES **225,000** less costs of KES 100,000=**KES 125,000**
Gender issues and concerns in development, dissemination, adoption and scaling up	• Land ownership mainly by men and therefore women are usually excluded in decision making or have no access to the land resources to produce the potatoes • Most farmer groups are composed of women and this may leave out the opinion and interests of men • Production is done by youth and women but marketing is done by the men so the money goes to the men • Pessimism expressed by farmers of new technology and the associated risks
Gender related opportunities	• Women and youth friendly production and processing techniques in fabrication of processing equipment, mechanization and business incubation models • This variety creates opportunity for women in production, retailing, value addition and marketing • 6B170 has the potential for processing into crisps locally, creating employment for women in processing and marketing, youth in packing and distribution and ready snacks for all ages but mainly school going children in the community
VMG issues and concerns in development, dissemination, adoption and scaling up	Inaccessibility of poor and marginalized groups and weak delivery systems for provision of social and economic inclusion services
VMG related opportunities	• There exists opportunities for people living with disabilities; SMEs in seed potato production, processing (whole peels, fresh cuts, crisps) and packaging

	• SMEs which are led by VMG especially people living of disabilities are preference in capacity building or business development services • Since potato is nutritious particularly with the skin, it is a dietary option for the VMGs • Short cropping cycle allows production of several crops per year thus important in improving food and nutrition for the VMG • Fits well in major cropping patterns • Capacity building for the VMGs in agri-business will ensure better participation in value addition and trade
E: Case studies/profiles of success stories	
Success stories from previous similar projects	Yet to be released
Application guidelines for users	* Selected land should have been grown with potato for the last 4 seasons * Soil analysis for nutrients, bacterial wilt and potato cyst nematodes (PCN)should be done before site selection *Land should be ploughed and harrowed well to level the surface and enable good uniform seed germination and uniform maturity *Use certified seed from known seed merchants (seed retained on-farm may have deteriorated). *Early planting helps in avoiding infestation by insects (aphids) *correct spacing – 75cm by 30cm if using size II seed * Fertilizer application rates – 4 bags (50kg) per acre if using DAP *Crop management practices – weeding; earthing up/hilling; crop protection; water application; dehaulming *crop protection – protective fungicides at emergence and afterwards spraying every week with recommended fungicides *Harvesting done when the crop is physiologically mature/foliage begin to turn yellow *Storage – store in DLS after harvesting, sorting, grading, curing and cleaning if for seed and in ware store if potatoes for eating
G: Status of TIMP readiness (1-ready for up-scaling;, 2-requires validation; 3-requires further research**)**	Requires further research
G: Contacts	
Contacts	Centre Director, KALRO-Tigoni P.O. Box 338-00217, Limuru, Kenya Telephone: 0202023213 Mobile: 0727031783 E-mail: kalro.tigoni@kalro.org
Lead organization and scientists	KALRO-Tigoni,

Partner organizations	• Ministry of Agriculture, Livestock, Fisheries and Irrigation (MoALF&I) • International Potato Centre (CIP) • National Potato Centre of Kenya (NPCK) • International Centre for Insect Physiology and Ecology (ICIPE) • FAO (Food and Agriculture Organization) • Common Interest Groups (CIGs) • Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) • NGOs (CARE Kenya): (Farmer Input Promotion)

Technology Name	**Potato variety/line 1G70**
Category (i.e. technology, innovation or management practice)	Technology
A: Description of the technology, innovation or management practice	
Problem to be addressed	Low farm productivity (below 7 tons/ha) and shortage of varieties for mid altitude and processing
What is it? (TIMP description)	1G70
Justification	Adoption of new varieties will expand potato production into non-traditional potato producing areas. Increasing the basket of choices for the consumer and growing the industry for processing
B: Assessment of dissemination and scaling up/out approaches	
Users of TIMP	• Farmers • Seed producing companies and SMEs • Other research organizations/institutions (universities)
Approaches to be used in dissemination	• ToTs • Farmer Participatory Evaluation exercises • On-farm demonstration • Field days • Agricultural shows • MoALF&I /Extension officers • Partners (CIP, NPCK, FAO, ICIPE, GIZ) • Mobile phone text initiative • Farmer to farmer peer learning • Mass media- e.g Mkulima programme, Seeds of Gold, Smart Farmer • Workshops • Seminars, Meetings, trainings • Extension publications (posters/brochures/leaflets) • Social media platforms • Farmer Field and Business Schools (FFBS) • Fairs and exhibitions

Critical/essential factors for successful promotion	• Functioning seed system • Adequate quantities of good quality seed • Recruitment and support for SMEs for potato production • Field demonstrations on potato variety Shangi alongside existing local varieties • use of good agricultural practices • Effective agricultural extension services • Variety descriptors
Partners/stakeholders for scaling up and their roles	• Ministry of Agriculture Livestock Fisheries &Irrigation (MoALF&I)-Extension and Capacity Building • CIP (International Potato Centre) – Collaborative research on potato variety development • ICIPE (International Centre for Insect Physiology and Ecology)– collaborative research on crop protection • FAO (Food and Agricultural Organization)- co-sharing of resources and networking and knowledge management • CIGs (Common Interest Groups)- back stopping the technologies at grass root levels • GIZ- Nutrition and potato utilization by the communities • NGOs (Non-governmental organization)-CARE Kenya (Farmer Input Promotion), Private investors
C: Current situation and future scaling up	
Counties where already promoted, if any	• None
Counties where TIMP will be up-scaled	Elgeyo Marakwet, Nyandarua, Nyeri, Taita Taveta, Bomet and Uasin Gishu as prioritized by counties
Challenges in dissemination	• Lack of information about the existence of the variety/Non-exposure of the end-user to a technology • High marketing costs due to poor and undeveloped physical and marketing infrastructure • Selling by weight • Packaging seed potato in smaller units such as 10 or 20kg for women, elderly and children • Limited CIG based supportive seed system • Limited publicity about varieties • Weak research- extension- farmer linkage to support dissemination
Suggestions for addressing the challenges	• Information dissemination through public forums such as fairs, exhibitions, field day, road shows and FFBS • Scaling up participation of end-user in on-farm activities/adaptive research/extension activities • Market promotions for variety • Shortening the marketing chains by – forming producer and marketing groups/cooperatives • Find innovations in reducing production costs to encourage further production • Capacity building of all value chain actors

Lessons learned in up-scaling, if any	• Use of FFBS is effective in technology dissemination and adoption • Involvement of farmers alone is not enough to support adoption, need to involve traders, processors and exporters and other actors in the value chain, Partnership is important in technology dissemination • Use of roadshows and mass media communication will upscale the awareness creation of the variety
Social, environmental, policy and market conditions necessary for development and up-scaling	• Important in the local diet • Environmentally friendly, resilient and climate smart • There is availability of market: domestic and regional • Reliable markets • Favourable weather • Awareness and acceptability of the variety by target communities. • Enabling policy framework (Seed, Horticulture, Policies)
D: Economic, gender, vulnerable and marginalized groups (VMGs) considerations	
Basic costs	Cost of a bag of certified basic seed potato 50kg KES. 3,000 @ 16 bags per acre (KES 48,000) including other costs total **KES100,000** per acre
Estimated returns	Estimated output of 150 bags of 50kg @KES 1500; total revenue KES **225,000** less costs of KES 100,000=**KES 125,000**
Gender issues and concerns in development, dissemination, adoption and scaling up	• Land ownership mainly by men and therefore women are usually excluded in decision making or have no access to the land resources to produce the potatoes • Most farmer groups are composed of women and this may leave out the opinion and interests of men • Production is done by youth and women but marketing is done by the men so the money goes to the men • Pessimism expressed by farmers of new technology and the associated risks
Gender related opportunities	• Women and youth friendly production and processing techniques in fabrication of processing equipment, mechanization and business incubation models • This variety creates opportunity for women in production, retailing, value addition and marketing • 1G70 has the potential for processing into crisps locally, creating employment for women in processing and marketing, youth in packing and distribution and ready snacks for all ages but mainly school going children in the community
VMG issues and concerns in development, dissemination, adoption and scaling up	Inaccessibility of poor and marginalized groups and weak delivery systems for provision of social and economic inclusion services
VMG related opportunities	• There exists opportunities for people living with disabilities; SMEs in seed potato production, processing (whole peels, fresh cuts, crisps) and packaging

	• SMEs which are led by VMG especially people living of disabilities are preference in capacity building or business development services • Since potato is nutritious particularly with the skin, it is a dietary option for the VMGs • Short cropping cycle allows production of several crops per year thus important in improving food and nutrition for the VMG • Fits well in major cropping patterns • Capacity building for the VMGs in agri-business will ensure better participation in value addition and trade
E: Case studies/profiles of success stories	
Success stories from previous similar projects	Yet to be released
Application guidelines for users	* Selected land should have been grown with potato for the last 4 seasons * Soil analysis for nutrients, bacterial wilt and potato cyst nematodes (PCN)should be done before site selection *Land should be ploughed and harrowed well to level the surface and enable good uniform seed germination and uniform maturity *Use certified seed from known seed merchants (seed retained on-farm may have deteriorated). *Early planting helps in avoiding infestation by insects (aphids) *correct spacing – 75cm by 30cm if using size II seed * Fertilizer application rates – 4 bags (50kg) per acre if using DAP *Crop management practices – weeding; earthing up/hilling; crop protection; water application; dehaulming *crop protection – protective fungicides at emergence and afterwards spraying every week with recommended fungicides *Harvesting done when the crop is physiologically mature/foliage begin to turn yellow *Storage – store in DLS after harvesting, sorting, grading, curing and cleaning if for seed and in ware store if potatoes for eating
F: Status of TIMP readiness (1-ready for up-scaling;, 2-requires validation; 3-requires further research**)**	Requires further research
G: Contacts	
Contacts	Centre Director, KALRO-Tigoni P.O. Box 338-00217, Limuru, Kenya Telephone: 0202023213 Mobile: 0727031783 E-mail: kalro.tigoni@kalro.org
Lead organization and scientists	KALRO-Tigoni,
Partner organizations	• Ministry of Agriculture, Livestock, Fisheries and Irrigation (MoALF&I)

	• International Potato Centre (CIP) • National Potato Centre of Kenya (NPCK) • International Centre for Insect Physiology and Ecology (ICIPE) • FAO (Food and Agriculture Organization) • Common Interest Groups (CIGs) • Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) • NGOs (CARE Kenya): (Farmer Input Promotion)

Technology Name	**Potato variety/line 3C22**
Category (i.e. technology, innovation or management practice)	Technology
A: Description of the technology, innovation or management practice	
Problem to be addressed	Low farm productivity (below 7 tons/ha) and shortage of varieties for mid altitude and processing
What is it? (TIMP description)	3C22
Justification	Adoption of new varieties will expand potato production into non-traditional potato producing areas. Increasing the basket of choices for the consumer and growing the industry for processing
B: Assessment of dissemination and scaling up/out approaches	
Users of TIMP	• Farmers • Seed producing companies and SMEs • Other research organizations/institutions (universities)
Approaches to be used in dissemination	• ToTs • Farmer Participatory Evaluation exercises • On-farm demonstration • Field days • Agricultural shows • MoALF&I /Extension officers • Partners (CIP, NPCK, FAO, ICIPE, GIZ) • Mobile phone text initiative • Farmer to farmer peer learning • Mass media- e.g Mkulima programme, Seeds of Gold, Smart Farmer • Workshops • Seminars, Meetings, trainings • Extension publications (posters/brochures/leaflets) • Social platforms • Farmer Field and Business Schools (FFBS) • Fairs and exhibitions
Critical/essential factors for successful promotion	• Functioning seed system • Adequate quantities of good quality seed • Recruitment and support for SMEs for potato production

	• Field demonstrations • use of good agricultural practices • Effective agricultural extension services • Variety descriptors
Partners/stakeholders for scaling up and their roles	• Ministry of Agriculture Livestock Fisheries &Irrigation (MoALF&I)-Extension and Capacity Building • CIP (International Potato Centre) – Collaborative research on potato variety development • ICIPE (International Centre for Insect Physiology and Ecology)– collaborative research on crop protection • FAO (Food and Agricultural Organization)- co-sharing of resources and networking and knowledge management • CIGs (Common Interest Groups)- back stopping the technologies at grass root levels • GIZ- Nutrition and potato utilization by the communities • NGOs (Non-governmental organization)(CARE Kenya): (Farmer Input Promotion)Private investors
C: Current situation and future scaling up	
Counties where already promoted, if any	• None
Counties where TIMP will be upscaled	Elgeyo Marakwet, Nyandarua, Nyeri, Taita Taveta, Bomet and Uasin Gishu as prioritized by counties
Challenges in dissemination	• Lack of information about the existence of the variety/Non-exposure of the end-user to a technology • High marketing costs due to poor and undeveloped physical and marketing infrastructure • Selling by weight • Packaging seed potato in smaller units such as 10 or 20kg for women, elderly and children • Limited CIG based supportive seed system • Limited publicity about varieties • Weak research- extension- farmer linkage to support dissemination
Suggestions for addressing the challenges	• Information dissemination through public forums such as fairs, exhibitions, field day, road shows and FFBS • Scaling up participation of end-user in on-farm activities/adaptive research/extension activities • Market promotions for variety • Shortening the marketing chains by – forming producer and marketing groups/cooperatives • Find innovations in reducing production costs to encourage further production • Capacity building of all value chain actors
Lessons learned in up-scaling, if any	• Use of FFBS is effective in technology dissemination and adoption • Involvement of farmers alone is not enough to support adoption, need to involve traders, processors and exporters

	and other actors in the value chain, Partnership is important in technology dissemination • Use of roadshows and mass media communication will upscale the awareness creation of the variety
Social, environmental, policy and market conditions necessary for development and up-scaling	• Important in the local diet • Environmentally friendly, resilient and climate smart • There is availability of market: domestic and regional • Reliable markets • Favourable weather • Awareness and acceptability of the variety by target communities. • Enabling policy framework (Seed, Horticulture, Policies)
D: Economic, gender, vulnerable and marginalized groups (VMGs) considerations	
Basic costs	Cost of a bag of certified basic seed potato 50kg KES. 3,000 @ 16 bags per acre (KES 48,000) including other costs total **KES100,000** per acre
Estimated returns	Estimated output of 150 bags of 50kg @KES 1500; total revenue KES **225,000** less costs of KES 100,000=**KES 125,000**
Gender issues and concerns in development, dissemination, adoption and scaling up	• Land ownership mainly by men and therefore women are usually excluded in decision making or have no access to the land resources to produce the potatoes • Most farmer groups are composed of women and this may leave out the opinion and interests of men • Production is done by youth and women but marketing is done by the men so the money goes to the men • Pessimism expressed by farmers of new technology and the associated risks
Gender related opportunities	• Women and youth friendly production and processing techniques in fabrication of processing equipment, mechanization and business incubation models • This variety creates opportunity for women in production, retailing, value addition and marketing • 3C22 has the potential for processing into crisps locally, creating employment for women in processing and marketing, youth in packing and distribution and ready snacks for all ages but mainly school going children in the community community
VMG issues and concerns in development and dissemination	• Inaccessibility of poor and marginalized groups and weak delivery systems for provision of social and economic inclusion services
VMG related opportunities	• There exists opportunities for people living with disabilities; SMEs in seed potato production, processing (whole peels, fresh cuts, crisps) and packaging • SMEs which are led by VMG especially people living of disabilities are preference in capacity building or business development services

	• Since potato is nutritious particularly with the skin, it is a dietary option for the VMGs • Short cropping cycle allows production of several crops per year thus important in improving food and nutrition for the VMG • Fits well in major cropping patterns • Capacity building for the VMGs in agri-business will ensure better participation in value addition and trade
E: Case studies/profiles of success stories	
Success stories from previous similar projects	yet to be released
Application guidelines for users	* Selected land should have been grown with potato for the last 4 seasons * Soil analysis for nutrients, bacterial wilt and potato cyst nematodes (PCN)should be done before site selection *Land should be ploughed and harrowed well to level the surface and enable good uniform seed germination and uniform maturity *Use certified seed from known seed merchants (seed retained on-farm may have deteriorated). *Early planting helps in avoiding infestation by insects (aphids) *correct spacing – 75cm by 30cm if using size II seed * Fertilizer application rates – 4 bags (50kg) per acre if using DAP *Crop management practices – weeding; earthing up/hilling; crop protection; water application; dehaulming *crop protection – protective fungicides at emergence and afterwards spraying every week with recommended fungicides *Harvesting done when the crop is physiologically mature/foliage begin to turn yellow *Storage – store in DLS after harvesting, sorting, grading, curing and cleaning if for seed and in ware store if potatoes for eating
F: Status of TIMP readiness (1-ready for up-scaling;, 2-requires validation; 3-requires further research**)**	Requires further research
G: Contacts	
Contacts	Centre Director, KALRO-Tigoni P.O. Box 338-00217, Limuru, Kenya Telephone: 0202023213 Mobile: 0727031783 E-mail: kalro.tigoni@kalro.org
Lead organization and scientists	KALRO-Tigoni,
Partner organizations	• Ministry of Agriculture, Livestock, Fisheries and Irrigation (MoALF&I) • International Potato Centre (CIP) • National Potato Centre of Kenya (NPCK)

	• International Centre for Insect Physiology and Ecology (ICIPE) • FAO (Food and Agriculture Organization) • Common Interest Groups (CIGs) • Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) • NGOs (CARE Kenya): (Farmer Input Promotion)

Technology Name	**Potato variety/line: 3C48**
Category (i.e. technology, innovation or management practice)	Technology
A: Description of the technology, innovation or management practice	
Problem to be addressed	Low farm productivity (below 7 tons/ha) and shortage of varieties for mid altitude and processing
What is it? (TIMP description)	35C89
Justification	Adoption of new varieties will expand potato production into non-traditional potato producing areas. Increasing the basket of choices for the consumer and growing the industry for processing
B: Assessment of dissemination and scaling up/out approaches	
Users of TIMP	• Farmers • Seed producing companies and SMEs • Other research organizations/institutions (universities)
Approaches to be used in dissemination	• ToTs • Farmer Participatory Evaluation exercises • On-farm demonstration • Field days • Agricultural shows • MoALF&I /Extension officers • Partners (CIP, NPCK, FAO, ICIPE, GIZ) • Mobile phone text initiative • Farmer to farmer peer learning • Mass media- e.g Mkulima programme, Seeds of Gold, Smart Farmer • Workshops • Seminars, Meetings, trainings • Extension publications (posters/brochures/leaflets) • Social platforms • Farmer Field and Business Schools (FFBS) • Fairs and exhibitions
Critical/essential factors for successful promotion	• Functioning seed system • Adequate quantities of good quality seed • Recruitment and support for SMEs for potato production • Field demonstrations on potato variety

	• use of good agricultural practices • Effective agricultural extension services • Variety descriptors
Partners/stakeholders for scaling up and their roles	• Ministry of Agriculture Livestock Fisheries &Irrigation (MoALF&I) • CIP (International Potato Centre) – Collaborative research on potato variety development • ICIPE (International Centre for Insect Physiology and Ecology)– collaborative research on crop protection • FAO (Food and Agricultural Organization)- Co-sharing of resources and networking and knowledge management • CIGs (Common Interest Groups)- back stopping the technologies at grass root levels • GIZ- Nutrition and potato utilization by the communities • NGOs (Non-governmental organization) • CARE Kenya-Farmer Input Promotion • Private investors
C: Current situation and future scaling up	
Counties where already promoted, if any	• None
Counties where TIMP will be up-scaled	Elgeyo Marakwet, Nyandarua, Nyeri, Taita Taveta, Bomet and Uasin Gishu as prioritized by counties
Challenges in dissemination	• Lack of information about the existence of the variety/Non-exposure of the end-user to a technology • High marketing costs due to poor and undeveloped physical and marketing infrastructure • Selling by weight • Packaging seed potato in smaller units such as 10 or 20kg for women, elderly and children • Limited CIG based supportive seed system • Limited publicity about varieties • Weak research- extension- farmer linkage to support dissemination
Suggestions for addressing the challenges	• Information dissemination through public forums such as fairs, exhibitions, field day, road shows and FFBS • Scaling up participation of end-user in on-farm activities/adaptive research/extension activities • Market promotions for variety • Shortening the marketing chains by – forming producer and marketing groups/cooperatives • Find innovations in reducing production costs to encourage further production • Capacity building of all value chain actors
Lessons learned in up-scaling, if any	• Use of FFBS is effective in technology dissemination and adoption • Involvement of farmers alone is not enough to support adoption, need to involve traders, processors and exporters

	and other actors in the value chain, Partnership is important in technology dissemination • Use of roadshows and mass media communication will upscale the awareness creation of the variety
Social, environmental, policy and market conditions necessary for development and up-scaling	• Important in the local diet • Environmentally friendly, resilient and climate smart • There is availability of market: domestic and regional • Reliable markets • Favourable weather • Awareness and acceptability of the variety by target communities. • Enabling policy framework (Seed, Horticulture, Policies)
D: Economic, gender, vulnerable and marginalized groups (VMGs) considerations	
Basic costs	Cost of a bag of certified basic seed potato 50kg KES. 3,000 @ 16 bags per acre (KES 48,000) including other costs total **KES100,000** per acre
Estimated returns	Estimated output of 150 bags of 50kg @KES 1500; total revenue KES **225,000** less costs of KES 100,000=**KES 125,000**
Gender issues and concerns in development, dissemination, adoption and scaling up	• Land ownership mainly by men and therefore women are usually excluded in decision making or have no access to the land resources to produce the potatoes • Most farmer groups are composed of women and this may leave out the opinion and interests of men • Production is done by youth and women but marketing is done by the men so the money goes to the men • Pessimism expressed by farmers of new technology and the associated risks
Gender related opportunities	• Women and youth friendly production and processing techniques in fabrication of processing equipment, mechanization and business incubation models • This variety creates opportunity for women in production, retailing, value addition and marketing • 3C48 has the potential for processing into crisps locally, creating employment for women in processing and marketing, youth in packing and distribution and ready snacks for all ages but mainly school going children in the community
VMG issues and concerns in development, dissemination, adoption and scaling up	• Inaccessibility of poor and marginalized groups and weak delivery systems for provision of social and economic inclusion services
VMG related opportunities	• There exists opportunities for people living with disabilities; SMEs in seed potato production, processing (whole peels, fresh cuts, crisps) and packaging • SMEs which are led by VMG especially people living of disabilities are preference in capacity building or business development services • Since potato is nutritious particularly with the skin, it is a dietary option for the VMGs

	• Short cropping cycle allows production of several crops per year thus important in improving food and nutrition for the VMG • Fits well in major cropping patterns • Capacity building for the VMGs in agri-business will ensure better participation in value addition and trade
E: Case studies/profiles of success stories	
Success stories from previous similar projects	yet to be released
Application guidelines for users	* Selected land should have been grown with potato for the last 4 seasons * Soil analysis for nutrients, bacterial wilt and potato cyst nematodes (PCN)should be done before site selection *Land should be ploughed and harrowed well to level the surface and enable good uniform seed germination and uniform maturity *Use certified seed from known seed merchants (seed retained on-farm may have deteriorated). *Early planting helps in avoiding infestation by insects (aphids) *correct spacing – 75cm by 30cm if using size II seed * Fertilizer application rates – 4 bags (50kg) per acre if using DAP *Crop management practices – weeding; earthing up/hilling; crop protection; water application; dehaulming *crop protection – protective fungicides at emergence and afterwards spraying every week with recommended fungicides *Harvesting done when the crop is physiologically mature/foliage begin to turn yellow *Storage – store in DLS after harvesting, sorting, grading, curing and cleaning if for seed and in ware store if potatoes for eating
F: Status of TIMP readiness (1-ready for up-scaling;, 2-requires validation; 3-requires further research**)**	Requires further research
G: Contacts	
Contacts	Centre Director, KALRO-Tigoni P.O. Box 338-00217, Limuru, Kenya Telephone: 0202023213 Mobile: 0727031783 E-mail: kalro.tigoni@kalro.org
Lead organization and scientists	KALRO-Tigoni,
Partner organizations	• Ministry of Agriculture, Livestock, Fisheries and Irrigation (MoALF&I) • International Potato Centre (CIP) • National Potato Centre of Kenya (NPCK) • International Centre for Insect Physiology and Ecology (ICIPE)

	• FAO (Food and Agriculture Organization) • Common Interest Groups (CIGs) • Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) • NGOs (CARE Kenya)-Farmer Input Promotion

Technology Name	**Potato variety/line 1HG**
Category (i.e. technology, innovation or management practice)	Technology
A: Description of the technology, innovation or management practice	
Problem to be addressed	Low farm productivity (below 7 tons/ha) and shortage of varieties for mid altitude and processing
What is it? (TIMP description)	1HG
Justification	Adoption of new varieties will expand potato production into non-traditional potato producing areas. Increasing the basket of choices for the consumer and growing the industry for processing
B: Assessment of dissemination and scaling up/out approaches	
Users of TIMP	• Farmers • Seed producing companies and SMEs • Other research organizations/institutions (universities)
Approaches to be used in dissemination	• ToTs • Farmer Participatory Evaluation exercises • On-farm demonstration • Field days • Agricultural shows • MoA/Extension officers • Partners (CIP, NPCK, FAO, ICIPE, GIZ) • Mobile phone text initiative • Farmer to farmer peer learning • Mass media- e.g Mkulima programme, Seeds of Gold, Smart Farmer • Workshops • Seminars, Meetings, trainings • Extension publications (posters/brochures/leaflets) • Social platforms • Farmer Field and Business Schools (FFBS) • Fairs and exhibitions
Critical/essential factors for successful promotion	• Functioning seed system • Adequate quantities of good quality seed • Recruitment and support for SMEs for potato production • Field demonstrations on potato variety • use of good agricultural practices • Effective agricultural extension services • Variety descriptors

Partners/stakeholders for scaling up and their roles	• Ministry of Agriculture Livestock Fisheries &Irrigation (MoALF&I) • CIP (International Potato Centre) – Collaborative research on potato variety development • ICIPE (International Centre for Insect Physiology and Ecology)– collaborative research on crop protection • FAO (Food and Agricultural Organization)- co-sharing of resources and networking and knowledge management • CIGs (Common Interest Groups)- back stopping the technologies at grass root levels • GIZ- Nutrition and potato utilization by the communities • NGOs (Non-governmental organization)- CARE Kenya: Farmer Input Promotion • Private investors
C: Current situation and future scaling up	
Counties where already promoted, if any	• none
Counties where TIMP will be up-scaled	Elgeyo Marakwet, Nyandarua, Nyeri, Taita Taveta, Bomet and Uasin Gishu as prioritized by counties
Challenges in dissemination	• Lack of information about the existence of the variety/Non-exposure of the end-user to a technology • High marketing costs due to poor and undeveloped physical and marketing infrastructure • Selling by weight • Packaging seed potato in smaller units such as 10 or 20kg for women, elderly and children • Limited CIG based supportive seed system • Limited publicity about varieties • Weak research- extension- farmer linkage to support dissemination
Suggestions for addressing the challenges	• Information dissemination through public forums such as fairs, exhibitions, field day, road shows and FFBS • Scaling up participation of end-user in on-farm activities/adaptive research/extension activities • Market promotions for variety • Shortening the marketing chains by – forming producer and marketing groups/cooperatives • Find innovations in reducing production costs to encourage further production • Capacity building of all value chain actors
Lessons learned in up-scaling, if any	• Use of FFBS is effective in technology dissemination and adoption • Involvement of farmers alone is not enough to support adoption, need to involve traders, processors and exporters and other actors in the value chain, Partnership is important in technology dissemination • Use of roadshows and mass media communication will upscale the awareness creation of the variety

Social, environmental, policy and market conditions necessary for development and up-scaling	• Important in the local diet • Environmentally friendly, resilient and climate smart • There is availability of market: domestic and regional • Reliable markets • Favourable weather • Awareness and acceptability of the variety by target communities. • Enabling policy framework (Seed, Horticulture, Policies)
D: Economic, gender, vulnerable and marginalized groups (VMGs) considerations	
Basic costs	Cost of a bag of certified basic seed potato 50kg KES. 3,000 @ 16 bags per acre (KES 48,000) including other costs total **KES100,000** per acre
Estimated returns	Estimated output of 150 bags of 50kg @KES 1500; total revenue KES **225,000** less costs of KES 100,000=**KES 125,000**
Gender issues and concerns in development, dissemination, adoption and scaling up	• Land ownership mainly by men and therefore women are usually excluded in decision making or have no access to the land resources to produce the potatoes • Most farmer groups are composed of women and this may leave out the opinion and interests of men • Production is done by youth and women but marketing is done by the men so the money goes to the men • Pessimism expressed by farmers of new technology and the associated risks
Gender related opportunities	• Women and youth friendly production and processing techniques in fabrication of processing equipment, mechanization and business incubation models • This variety creates opportunity for women in production, retailing, value addition and marketing • 1HG has the potential for processing into fresh chips and crisps locally, creating employment for women in processing and marketing, youth in packing and distribution and ready snacks for all ages but mainly school going children in the community
VMG issues and concerns in development and dissemination	Inaccessibility of poor and marginalized groups and weak delivery systems for provision of social and economic inclusion services
VMG related opportunities	• There exists opportunities for people living with disabilities; SMEs in seed potato production, processing (whole peels, fresh cuts, crisps) and packaging • SMEs which are led by VMG especially people living of disabilities are prefered in capacity building or business development services • Since potato is nutritious particularly with the skin, it is a dietary option for the VMGs • Culturally acceptable

	• Short cropping cycle allows production of several crops per year thus important in improving food and nutrition for the VMG • Availability of ready market • Fits well in major cropping patterns • Capacity building for the VMGs in agri-business will ensure better participation in value addition and trade
E: Case studies/profiles of success stories	
Success stories from previous similar projects	yet to be released
Application guidelines for users	* Selected land should have been grown with potato for the last 4 seasons * Soil analysis for nutrients, bacterial wilt and potato cyst nematodes (PCN)should be done before site selection *Land should be ploughed and harrowed well to level the surface and enable good uniform seed germination and uniform maturity *Use certified seed from known seed merchants (seed retained on-farm may have deteriorated). *Early planting helps in avoiding infestation by insects (aphids) *correct spacing – 75cm by 30cm if using size II seed * Fertilizer application rates – 4 bags (50kg) per acre if using DAP *Crop management practices – weeding; earthing up/hilling; crop protection; water application; dehaulming *crop protection – protective fungicides at emergence and afterwards spraying every week with recommended fungicides *Harvesting done when the crop is physiologically mature/foliage begin to turn yellow *Storage – store in DLS after harvesting, sorting, grading, curing and cleaning if for seed and in ware store if potatoes for eating
F: Status of TIMP readiness (1-ready for up-scaling;, 2-requires validation; 3-requires further research**)**	Requires further research
G: Contacts	
Contacts	Centre Director, KALRO-Tigoni P.O. Box 338-00217, Limuru, Kenya Telephone: 0202023213 Mobile: 0727031783 E-mail: kalro.tigoni@kalro.org
Lead organization and scientists	KALRO-Tigoni,
Partner organizations	• Ministry of Agriculture, Livestock, Fisheries and Irrigation (MoALF&I) • International Potato Centre (CIP) • National Potato Centre of Kenya (NPCK)

	• International Centre for Insect Physiology and Ecology (ICIPE) • FAO (Food and Agriculture Organization) • Common Interest Groups (CIGs) • Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) • NGOs (CARE Kenya): (Farmer Input Promotion)

2. Appropriate good agricultural practices for achieving high potato yields

Technology Name	**Drip irrigation system for potato production**
Category (i.e. technology, innovation or management practice)	Technology
A: Description of the technology, innovation or management practice	
Problem to be addressed	• Climate change leading to prolonged drought resulting to food scarcity/insecurity • Increased crop water stress caused by seasonal rainfall variability in rain-fed production leading to low yield or crop failure • Low productivity due to scarcity of water
What is it? (TIMP description)	• It is a type of micro-irrigation system that allows optimal usage of limited water resource by controlled delivery of the water to the plant root zone at low pressure using drip lines and emitters to minimize water loss. • The layout is above surface and is easy to design and operate. • It can be used to apply fertilizer efficiently through fertigation • It Provides the opportunity for farmers to increase crop yields
Justification	Kenya is generally a water-deficient country yet almost all crop production is rain fed. The impacts of climate change (seasonal rainfall variability and drought) to crop production is a real threat to food security. The drip irrigation offers an opportunity to produce food with limited water. Mainstreaming drip irrigation systems into crop production therefore provides the opportunity for farmers to enhance crop resilience, increase yields and incomes. Increased water saving means more water are available for other competing needs (domestic, livestock or industrial)
B: Assessment of dissemination and scaling up/out approaches	
Users of TIMP	Farmers
Approaches used in dissemination	Field demonstrations, farmer field schools, ASK trade and exhibition fairs
Critical/essential factors for successful promotion	• Availability of clean quality water • Access to finances to procure the system

	• Awareness of the benefits of the systems • Correct field design (system installation) of the drip system to minimize water inefficiencies • Training of farmers and extension workers • Drip system management skills
Partners/stakeholders for scaling up and their roles	• Extension service providers (private and public and County government- Trainers of Tainers • Private sector- supply of equipment - • NGOs (Kenya Red Cross, Action Aid, World Vision, OXFAM etc.) – Offer extension services, Train trainers • KALRO - Technical backstopping
C: Current situation and future scaling up	
Counties where promoted, if any	Kajiado Marsabit Kiambu Makueni …
Counties where TIMP will be up-scaled	Elgeyo Marakwet, Nyandarua, Nyeri, Taita Taveta, Bomet and Uasin Gishu as prioritized by counties
Challenges in dissemination	• Relatively high cost of drip kits for majority of poor resource farmers in ASALs • High temperatures experienced in ASALs cause water salinity challenges • Drip poly tubing also tend to collapse causing inadequate water conveyance along the tube. • Limited awareness of the benefits of the TIMP • Water scarcity
Suggestions for addressing the challenges	• Model farmer demonstration would create awareness and willingness to invest in the system • Modification of drip system tubes in ASAL areas is required (use of PVC pipes) to manage clogging and allow free flow of water • Regular maintenance of the system especially the drip filters is required to flush out accumulated salts that tend to clog emitters • Awareness creation and farmer training is required on the management of drip irrigation system. • Build capacity on water harvesting and storage
Lessons learned in up-scaling, if any	• Drip system increases yield, incomes and food security. • Linking farmers to markets is critical for enhancing sustainability. • Soil mulching (crop residue or green manures) in a drip systems help preserve moisture and add nutrients to the soil • Linking farmers to financial institutions enables them to purchase systems

Social, environmental, policy and market conditions necessary for development and up-scaling	• Drip systems are environmentally friendly agricultural investments. They are water-saving • Enabling policy frameworks to support development and adoption of the TIMP in place • Availability of markets
D: Economic, gender, vulnerable and marginalized groups (VMGs) considerations	
Basic costs	• Inputs materials include water source, drip lines, drippers, pumping unit, filtering and fertilizing systems • ¼ acre costs between KES. 50, 000 to 100,000
Estimated returns	• Income from drip system rises by as much as 35% above that from conventional production systems.
Gender issues and concerns in development, dissemination, adoption and upscaling	• Women and youth face the barrier of accessing the irrigation systems due to lack of finances and the decision making system • Women's triple role may hinder them from attending training sessions • The technology may not be adopted by if the gender targeted is overburdened
Gender related opportunities	• The technology is acceptable and easy to upscale by both males and females • Drip systems tend to reduce women's workload and provide significant positive impacts on family food and nutritional intake. • Women are extensively involved in most horticultural farming enterprises (i.e. vegetable farming) under the drip-irrigation systems • Drip systems are easily installed and therefore are gender sensitive. • Women and youth empowerment through increased production and income • Enhanced product diversity of value chains hence increased resilience
VMG issues and concerns in development, dissemination, adoption and upscaling	• Due to their social status VMGs are often excluded from decision making in development and dissemination • VMGs face the barrier of accessing irrigation systems due to inadequate of resources • Drip line technologies is not easily adoptable by the VMGs due to their social status
VMG related opportunities	• The technology fits well with the VMGs and easily installed and manageable, thus improving nutrition for the VMG • Affirmative action, capacity building and practical support to be provided

	• The technology can provide food and nutrition security and a window for increased income.
E: Case studies/profiles of success stories	
Success stories from previous similar projects	• Drip technology has been successfully applied in many parts of the country over a considerable period of time. Many examples of success especially in horticulture can be cited.
Application guidelines for users	• Refer to Drip irrigation technical handbook No. 24 "DRIP IRRIGATION: Options for smallholder farmers in eastern and southern Africa"
F: Status of TIMP readiness (1-ready for up-scaling;, 2-requires validation; 3-requires further research)	Ready for up-scaling
G: Contacts	
Contacts	Centre Director, KALRO-Tigoni P.O. Box 338-00217, Limuru, Kenya Telephone: 0202023213 Mobile: 0727031783 E-mail: kalro.tigoni@kalro.org
Lead organization and scientists	KALRO-Tigoni,
Partner organizations	• AMIRAN Kenya, HortiPro, Agro-Irrigation, Aqua-Valley Services Ltd, Davis & Shirtliff, and many Micro finance institutions (MFIs), MoALF&I • CIP • NPCK • ICIPE • FAO • CIGs • GIZ

Technology name	**Good agricultural practices for Potato production**
Category (i.e. technology, innovation or management practice)	Technology
A: Description of the technology, innovation or management practice	
Problem to be addressed	Low yields due to inadequate and limited access to knowledge and information on improved potato technologies, knowledge and management practices
What is it? (TIMP description)	• Site selection – altitude ranges from 1500 to 3000 m a.s.l; temperatures between 15 to 24 degrees centigrade; soils should be alluvial loam soils, well-draining, deep and fertile with soil pH between 5.5 to 6.5; not grown with potato crop or family for the last 4 seasons • Soil testing – mandatory to be done annually

	• Sanitation – remove all plant remains, potatoes from previous seasons or harvest, volunteers and possible plants related to potato. In addition, disinfect tools and equipment to be used in your farm • Source of seed – obtain seed from registered seed merchants; ensure KEPHIS label is inside the bag of seed purchased • Seed handling – ensure bags of seed potato are not carelessly thrown during loading and off-loading; upon arrival, open the bags and spread the seed potato on shelves or crates in the DLS for proper sprouting, if the seed potatoes are not yet sprouted • Land preparation – be done before onset of rains; for virgin land-2-3 ploughings and 2-3 harrowings while for cultivated land,1 ploughing and 1 harrowing • Seed rate – size I (28-35mm) – 14 to 16 bags/acre; size II (36-45mm) – 18 to 25 bags/acre and size III (46 to55mm) – 24 to 26 bags/acre • Planting – spacing is 75cm by 30cm; prepare furrows 15 to20cm deep; apply recommended fertilizers (potato blend); mix well with soil; plant seed tuber with sprouts facing up • Weeding – done after emergence to remove unwanted plants that will compete with your potato • Spraying against late blight – scouting should be regularly done to monitor your crop; observing weather is also important. After emergence, spraying with protective fungicide • Earthing up/hilling – done during weeding; it is piling of soil around the plant roots to boost good stolon formation • Dehaulming – done by slashing the top part of the plants. Herbicides may also be used • Harvesting – should be done when it is dry. Harvested tubers should not be exposed in the sun but quickly transferred to shade area. • Postharvest handling – harvested tubers should be sorted to remove soil, stones, mother tubers and plant remains. Afterwards, grading is done to separate big tubers (above 46mm) from smaller tuber sizes and packaged. • Storage – in absence of ready market. Store in ware potato store which should be very dark inside but well ventilated
Justification	Potato is a climate smart crop that has a short growing cycle, early maturing and high water use efficiency producing more food per unit area compared to other staple food. In addition, potato produces more nutritious food on less land and in harsher climate hence has the potential to reduce risks associated with climate change and mitigate vulnerable communities against drought or floods. Potato has also been identified under the big four agenda for attainment of food security needs in Kenya. Good agricultural practices in potato production will lead to high yields of acceptable quality which will enable the county achieve its big four agenda, Kenya Vision 2030 and Sustainable Development Goals (SDGs)
B: Assessment of dissemination and scaling up/out approaches	
Users of TIMP	• Ware Potato growers

	• SMEs • Other research organizations/institutions (universities) • County extension officers
Approaches used in dissemination	• Farmer Participatory Evaluation exercises • On-farm demonstration • Field days • Agricultural shows • MoALFI/Extension officers • Partners (CIP, NPCK, FAO, ICIPE, GIZ) • Mobile phone text initiative • Farmer to farmer peer learning • Mass media – "Mkulima programme" • Workshops • Seminars, Meetings, trainings • Promotional materials (posters/brochures/leaflets) • Social platform
Critical/essential factors for successful promotion	• Recruitment and support for SMEs for potato production • Field demonstrations on improved potato varieties alongside existing local varieties • funding by government to promote production and distribution of seed of selected potato varieties
Partners/stakeholders for scaling up and their roles	• Ministry of Agriculture Livestock Fisheries &Irrigation (MoALF&I) • CIP (International Potato Centre) – Collaborative research on potato variety development • ICIPE (International Centre for Insect Physiology and Ecology)– collaborative research on crop protection • FAO (Food and Agricultural Organization)- co-sharing of resources and networking and knowledge management • CIGs (Common Interest Groups)- back stopping the technologies at grass root levels • GIZ- Nutrition and potato utilization by the communities • NGOs (Non-governmental organization)-CARE Kenya: Farmer Input Promotion
C: Current situation and future scaling up	
Counties where already promoted if any	• Traditional potato producing counties-Nyandarua, Nyeri, Kiambu, Taita Taveta, Nakuru, Bomet, Narok,Elgeyo Marakwet, Uasin Gishu, Bungoma, West pokot, Nandi, Kisii;Murang'a, Baringo, Nyamira, Kirinyaga, Laikipia, and Kericho • Emerging potato producing counties in mid-altitude AEZ (Samburu, Trans-nzoia, Makueni, Embu, Tharaka Nithi, Machakos, Kajiado, and Nairobi
Counties where TIMP will be up-scaled	Elgeyo Marakwet, Nyandarua, Nyeri, Taita Taveta, Bomet and Uasin Gishu as prioritized by counties
Challenges in dissemination	• Lack of information on appropriate management practices for attainment of high yields

Recommendations for addressing the challenges	• Scaling up participation of end-user in on-farm activities/adaptive research/extension activities • Shortening the marketing chains – form producer and marketing groups/cooperatives • Find innovations in reducing production costs to encourage further production. • Capacity building end-users for adoption of these management practices
Lessons learned in upscaling	• Adoption of FFBS effective in technology dissemination and adoption • Partnership is important in technology dissemination • Involvement of farmers alone is not enough to support adoption, need to involve traders, processors and exporters and other actors in the value chain
Social, environmental, policy and market conditions necessary for development and upscaling	• Important in the local diet – • Environmentally friendly resilient and climate smart. • There is availability of market: domestic and regional
D: Economic, gender, vulnerable and marginalized groups (VMGs) considerations	
Basic costs	Cost of a bag of certified basic seed potato 50kg KES. 3,000 @ 16 bags per acre (KES 48,000) including other costs total **KES100,000** per acre
Estimated returns	Estimated output of 150 bags of 50kg @KES 1500; total revenue KES **225,000** less costs of KES 100,000=**KES 125,000**
Gender issues and concerns in development, dissemination, adoption and scaling up	• Land ownership mainly by men and therefore women are not involved in decision making on the varieties to grow • Most farmer groups are composed of women and this may leave out the opinion and interests of men • Production is done by youth and women but marketing is done by the men so the money goes to the men
Gender related opportunities	• Women and youth friendly production techniques such as mechanization and business incubation models • Since potato is highly demanded, it creates opportunity for women in production, retailing, value addition and marketing • Potato is processed into fresh chips and crisps locally and frozen fries for export, creating employment for women in processing and marketing, youth in packing and distribution and ready snacks for all ages but mainly school going children in the community • SMEs which are led by women especially people living of disabilities are preferred in capacity building or business development services
VMG issues and concerns in development,	Inaccessibility of poor and marginalized groups and weak delivery systems for provision of social and economic inclusion services

dissemination, adoption and scaling up	
VMG related opportunities	• Short cropping cycle allows production of several crops per year thus important in improving food and nutrition for the VMG • Business opportunity in retailing in fresh tubers for the fresh markets and processing • Fits well in major cropping patterns • Capacity building for the VMGs in agri-business will ensure better participation in value addition and trade • Since potato is nutritious particularly with the skin, it is a dietary option for the lactating mothers and growing children • There exists opportunities for people living with disabilities; SMEs in seed potato production, processing (whole peels, fresh cuts, crisps) and packaging
E: Case studies/profiles of success stories	
Success stories from previous similar projects	-
Application guidelines for users	*Selected land should not have been grown with potato crop or family in the last 4 seasons *Soil analysis for nutrients, bacterial wilt and potato cyst nematodes (PCN) is mandatory *Land should be well ploughed and harrowed to level the surface and enable good uniform seed germination *Use certified seed from known seed merchants (seed retained on-farm may have deteriorated viability). *Early planting helps in avoiding infestation by insects (aphids) *correct spacing –should be followed * Fertilizer application rates – 4 bags (50kg) per acre if using DAP *Crop management practices – weeding; earthing up/hilling; crop protection; water application; dehaulming should be done when required *crop protection – protective fungicides at emergence and afterwards spraying every week with recommended fungicides either protective or curative depending on the situation *Dehaulming done when the crop is physiologically mature/foliage begin to turn yellow. Alternatively the foliage can be left to dry completely before harvesting is done *Harvesting should be done 10 to 14 days after dehaulming *Storage – store in DLS after harvesting, sorting, grading, curing and cleaning if for seed and in ware store if potatoes for eating
F: Status of TIMP readiness (1-ready for up-scaling;, 2-requires validation; 3-requires further research)	Ready for up-scaling
G: Contacts	

Contacts	Centre Director, KALRO-Tigoni P.O. Box 338-00217, Limuru, Kenya Telephone: 0202023213 Mobile: 0727031783 E-mail: kalro.tigoni@kalro.org
Lead organization and scientists	KALRO-Tigoni,
Partner organizations	• Ministry of Agriculture, Livestock, Fisheries and Irrigation (MoALF&I) • International Potato Centre (CIP) • National Potato Centre of Kenya (NPCK) • International Centre for Insect Physiology and Ecology (ICIPE) • FAO (Food and Agriculture Organization) • Common Interest Groups (CIGs) • Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) • NGOs (CARE Kenya): (Farmer Input Promotion)

3. Seed Potato production technologies for improved potato yields

Technology name	**Rooted Apical cuttings technology**
Category (i.e. technology, innovation or management practice)	Technology
A: Description of the technology, innovation or management practice	
Problem to be addressed	Acute seed potato shortage for popular varieties leading to recycling of seed potato of undetermined quality at farm level
What is it? (TIMP description)	Rooted apical cuttings - is a technology of increasing high quality seed potato at farm level within a short period through use of seedlings obtained from apical shoots from tissue culture plantlets which have been rooted in sterile media.
Justification	It is a market demanded technology; farmer accepted; climate smart technology for increasing high quality seed potato at farm level; potential system for rapidly increasing high quality seed potato in a short period compared to the period required to obtain certified seed; high opportunity for business incubations.
B: Assessment of dissemination and scaling up/out approaches	
Users of TIMP	• Farmers • Seed producing companies and SMEs • Other research organizations/institutions (universities)
Approaches used in dissemination	• Farmer Participatory Evaluation exercises • MoALFI/Extension officers • Partners (CIP, NPCK, FAO, ICIPE, GIZ) • Mobile phone text initiative • Small seed pack model • Farmer to farmer peer learning

	• ICT platform (Viazi soko) • Trade fair • Mass media – "Mkulima programme" • Workshops • Seminars, Meetings, trainings • Promotional material (posters/brochures/leaflets/Variety catalogue)
Critical/essential factors for successful promotion	• Recruitment and support for private seed companies and SMEs to enter seed production; value addition and product diversification • Decentralized/satellite seed bulking system • Seed unavailability and inaccessibility • funding by government to promote production and distribution of seed of selected potato varieties
Partners/stakeholders for scaling up and their roles	• Ministry of Agriculture Livestock Fisheries &Irrigation (MoALF&I)-Extension and Capacity Building • CIP (International Potato Centre) – Collaborative research on potato variety development • ICIPE (International Centre for Insect Physiology and Ecology)– collaborative research on crop protection • FAO (Food and Agricultural Organization)- co-sharing of resources and networking and knowledge management • CIGs (Common Interest Groups)- back stopping the technologies at grass root levels • GIZ- Nutrition and potato utilization by the communities • NGOs (Non-governmental organization)(CARE Kenya): (Farmer Input Promotion) • KEPHIS (Kenya Plant Health Inspectorate Services) – regulate and certify seed potato produced • Private seed growers – to grow and multiply certified seed potato
C: Current situation and future scaling up	
Counties where already promoted if any	-
Counties where TIMP will be upscaled	Elgeyo Marakwet, Nyandarua, Nyeri, Taita Taveta, Bomet and Uasin Gishu as prioritized by counties
Challenges in dissemination	• Inadequate supply of certified seed potato of preferred varieties in sufficient quantities at the right time and place. Very limited numbers of seed enterprises hinder farmers from obtaining seed for improved potato varieties at affordable prices at the right place and time • Weakening seed potato sector in seed multiplication, distribution and extension services. • High seed potato cost; KES 3,000 (USD 30) per 50kg bag • Lengthy process of producing seed which takes quite a long time of obtaining certified seed potato • Bulky packaging of seed in 50 kg bag as the smallest unit not preferred by end-user

Recommendations for addressing the challenges	• Scaling up participation of end-user in technology development, on-farm activities/adaptive research/extension activities • Promoting awareness among farmers about the loss of varietal vigor associated with recycling of saved seed for many generations can also increase demand for certified seed. • Good seed potato system • Well organized farmer groups/CIGs • Good marketing models for seed potato • Support and good will from national and county governments • Strong collaborative links between stakeholders in Potato value chain • Trained and experienced staff/manpower
Lessons learned in upscaling if any	• Growing demand for basic and certified seed due to expanding potato production • Partnership is important in technology dissemination • Involvement of farmers alone is not enough to support adoption, need to involve traders, processors and exporters and other actors in the value chain • Prospects in employment
Social, environmental, policy and market conditions necessary	• Potatoes are important in the local diet; changing eating habit in favor of potato and potato products • Environmentally friendly resilient and climate smart. • There is availability of seed potato market: domestic and regional
D: Economic, gender, vulnerable and marginalized groups (VMGs) considerations	
Basic costs	Cost of a bag of certified basic seed potato 50kg KES. 3,000 @ 16 bags per acre (KES 48,000) including other costs total **KES120,000** per acre
Estimated returns	Estimated output of 200 bags of 50kg @KES 1500; total revenue KES 300,000 less costs =**KES 180,000**
Gender issues and concerns in development ,dissemination, adoption and scaling up	• Land ownership mainly by men and therefore women are not involved in decision making on the enterprises to do • Most farmer groups are composed of women and this may leave out the opinion and interests of men • Seed potato production is done by youth and women but marketing is done by the men so the money goes to the men
Gender related opportunities	• The technology provides quality seed, hence providing opportunity for women in production, retailing, value addition and marketing • Seed potato has the potential to create employment for women and youth in harvesting, sorting, grading, packing and marketing • Trading in seed potato is profitable since seed potato has very high demand every season for potato production
VMG issues and concerns in development, dissemination, adoption and scaling up	• Lack of participation by some VMGs in decision making hence not benefitting from the project • Insecurity • Land –related conflicts • Access to the technology-Some VMGs may find it difficulty to access the technology depending on their proximity to the project

VMG related opportunities	• There exists opportunities for people living with disabilities; SMEs in seed potato production • SMEs which are led by VMG especially people living of disabilities are preference in capacity building or business development services • Since VMGs have conducive policy environment supported by the government, establishment of seed potato business incubation models will target them • Short cropping cycle allows production of several crops per year thus important in improving food and nutrition for the VMG • Potato fits well in major cropping patterns hence growing it will create demand for high quality seed potato • Capacity building for the VMGs in agri-business will ensure better participation in value addition and trade
E: Case studies/profiles of success stories	
Success stories from previous similar projects	In August 2018, KALRO Tigoni distributed at least 275 apical cuttings of variety Shangi to farmer groups in 3 wards in Bungoma and Meru counties, towards improving availability and accessibility of high quality seed potato at farm level. The cuttings were spaced at 75cm by 30cm and normal crop management practices done, with more emphasis on water application and shading. The groups planted the cuttings which established very well and some have been harvested and ready for further bulking. A cutting costs Ksh 15, hence amounting to **KES 2,175.**
Application guidelines for users	*Soil analysis for nutrients, bacterial wilt and potato cyst nematodes (PCN)should be done before site selection *Land should be ploughed and harrowed well to level the surface and enable good uniform seed germination and uniform maturity *Use certified seed from known seed merchants (seed retained on-farm may have deteriorated viability). *Early planting helps in avoiding infestation by insects (aphids) *correct spacing – 75cm by 30cm if using size II seed * Fertilizer application rates – 4 bags (50kg) per acre if using DAP *Crop management practices – weeding; earthing up/hilling; crop protection; water application; dehaulming
F: Status of TIMP readiness (1-ready for up-scaling;, 2-requires validation; 3-requires further research)	Ready for up-scaling
G: Contacts	
Contacts	Centre Director, KALRO-Tigoni P.O. Box 338-00217, Limuru, Kenya Telephone: 0202023213 Mobile: 0727031783 E-mail: kalro.tigoni@kalro.org
Lead organization and scientists	KALRO-Tigoni,

Partner organizations	• Ministry of Agriculture, Livestock, Fisheries and Irrigation (MoALF&I) • International Potato Centre (CIP) • National Potato Centre of Kenya (NPCK) • International Centre for Insect Physiology and Ecology (ICIPE) • FAO (Food and Agriculture Organization) • Common Interest Groups (CIGs) • Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) • NGOs (CARE Kenya)

Technology Name	**Tissue culture**
Category (i.e. technology, innovation or management practice)	Technology
A: Description of the technology, innovation or management practice	
Problem to be addressed	Inadequate supply of breeder seed potato of improved varieties
What is it? (TIMP description)	Tissue culture –involves *in vitro* aseptic culture of plant cells, plant tissues and organs for the purpose of obtaining growth.
Justification	This innovation enables achievement of rapid multiplication of early generation seed (breeder seed) of newly released varieties. It has potential to shorten the period in which good quality seed is available to the farmer. This innovation allows production of disease free seed potato of greater quantities in a short period of time.
B: Assessment of dissemination and scaling up/out approaches	
Users of TIMP	• Farmers • Seed producing companies and SMEs • Other research organizations/institutions (universities)
Approaches to be used in dissemination	• ToT • Specialized training of technologists • Workshops • Seminars, Meetings, trainings • FFBS • Promotional materials (posters/brochures/leaflets)
Critical/essential factors for successful promotion	• Recruitment and support for private seed companies and SMEs to enter seed production; value addition and product diversification • Demand for early generation seed • funding by government/development partners to promote production and distribution of seed of selected potato varieties
Partners/stakeholders for scaling up and their roles	• MoALF&I • CIP • Development partners • County governments (CGs) • NGOs (CARE Kenya): (Farmer Input Promotion) • Universities

	• Regulatory agencies • Private seed growers
C: Current situation and future scaling up	
Counties where already promoted, if any	• Not widely distributed; only 6 companies (3 public; 3 private) currently involved in potato TC in Kenya
Counties where TIMPs will be up-scaled	• Elgeyo Marakwet, Nyandarua, Nyeri, Taita Taveta, Bomet and Uasin Gishu as prioritized by counties
Challenges in dissemination	• Inadequate supply of certified seed potato of preferred varieties in sufficient quantities at the right time and place. Very limited numbers of seed enterprises hinder farmers from obtaining seed for improved potato varieties at affordable prices at the right place and time • Weakening seed potato sector in seed multiplication, distribution and extension services. • High seed potato cost; KES 3,000 (USD 30) per 50kg bag • Lengthy process of producing seed which takes quite a long time of obtaining certified seed potato • Bulky packaging of seed in 50 kg bag as the smallest unit not preferred by end-user
Suggestions for addressing the challenges	• Scaling up participation of end-user in technology development, on-farm activities/adaptive research/extension activities • Promoting awareness among farmers about the loss of varietal vigor associated with recycling of saved seed for many generations can also increase demand for certified seed. • Good seed potato system • Well organized farmer groups/CGs • Good marketing models for seed potato • Support and good will from national and county governments • Strong collaborative links between stakeholders in Potato value chain • Trained and experienced staff/manpower
Lessons learned in up-scaling, if any	• Growing demand for basic and certified seed due to expanding potato production • Partnership is important in technology dissemination • Involvement of farmers alone is not enough to support adoption, need to involve traders, processors and exporters and other actors in the value chain • Prospects in employment
Social, environmental, policy and market conditions necessary for development and up-scaling	• Potatoes are important in the local diet; changing eating habit in favor of potato and potato products • Environmentally friendly resilient and climate smart. • There is availability of seed potato market: domestic and regional
D: Economic, gender, vulnerable and marginalized groups (VMGs) considerations	
Basic costs	Cost of a bag of certified basic seed potato 50kg KES 3,000 @ 16 bags per acre (KES 48,000) including other costs total **KES120,000** per acre
Estimated returns	Estimated output of 200 bags of 50kg @KES 1500; total revenue KES 300,000 less costs =**KES 180,000**

Gender issues and concerns in development, dissemination, adoption and scaling up	• Exclusion of women from decision making due to social barriers • Negative impact of the exclusion because women are the major primary producers of potatoes • Inaccessibility of women to land resources hence not able to make decisions on what to grow in their land
Gender related opportunities	• Women and youth friendly production techniques such as mechanization and business incubation models
VMG issues and concerns in development, dissemination, adoption and scaling	• Inaccessibility of poor and marginalized groups and weak delivery systems for provision of social and economic inclusion services
VMG related opportunities	• There exists opportunities for people living with disabilities; SMEs in seed potato production, processing (whole peels, fresh cuts, crisps) and packaging • SMEs which are led by VMG especially people living of disabilities are preference in capacity building or business development services • Since potato is nutritious particularly with the skin, it is a dietary option for the VMGs Culturally acceptable • Short cropping cycle allows production of several crops per year thus important in improving food and nutrition for the VMG • Availability of ready market • Fits well in major cropping patterns
E: Case studies/profiles of success stories	
Success stories from previous similar projects	Several public and private institutions have invested in the technology and are receiving technical support from NARS (KALRO, JKUAT, KEPHIS)
Application guidelines for users	1. Construction of TC unit and ensuring it's fully functional 2. Obtaining propagation materials 3. Acquire of germplasm from breeder, seed multiplier, farmers in tuber form or invitro 4. Plant the tuber / invitro received in the green house for virus eradication 5. Heat treat the 1 month potted tuber in thermotherapy chamber 6. Meristem culture the material for virus elimination 7. Micropropagate the meristem cultured plants t 8. Harden invitro plantlets in the green house 9. Transfer hardened plants to pots, aeroponic and sand hydroponic 10. Carry the ELISA test to confirm disease status 11. Reject and destroy the virused marterial 12. Harvest the minitubers disease free material 13. Store the mini tubers harvested
F: Status of TIMP readiness (1-ready for	Ready for up-scaling

up-scaling; 2-requires validation; 3-requires further research**)**	
G: Contacts	
Contacts	Centre Director, KALRO-Tigoni P.O. Box 338-00217, Limuru, Kenya Telephone: 0202023213 Mobile: 0727031783 E-mail: kalro.tigoni@kalro.org
Lead organization and scientists	KALRO-Tigoni,
Partner organizations	• MoALF&I • CIP • FAO • CIGs • USAID FtF • GIZ • NGOs (CARE Kenya): (Farmer Input Promotion)

Technology name	**Aeroponics**
Category (i.e. technology, innovation or management practice)	Technology
A: Description of the technology, innovation or management practice	
Problem to be addressed	Non availability of seed potato producing technique that is efficient and time saving
What is it? (TIMP description)	Aeroponics - production in a soil-less culture. The system ensures production of disease free tubers by eliminating contact between plants with soil. The *in-vitro* plant lets produced through tissue culture are suspended on specially designed support structures which encloses roots in dark chambers. The nutrients in solution form are supplied to plants by way of misters from a nutrient tank in an automated system
Justification	The system ensures production of disease free tubers by eliminating contact between plants with soil. It is a climate smart technology which promotes water use efficiency; water recycling done; system is in an enclosure hence evaporation is significantly reduced; farmer accepted; market demand; high opportunity for business incubation
B: Assessment of dissemination and scaling up/out approaches	
Users of TIMP	• Farmers • Seed producing companies and SMEs • Other research organizations/institutions (universities)
Approaches used in dissemination	• Farmer Participatory Evaluation exercises • MoALFI/Extension officers • Partners (CIP, NPCK, FAO, ICIPE, GIZ) • Mobile phone text initiative • Small seed pack model

	• Farmer to farmer peer learning • Mass media – "Mkulima programme" • Workshops • Seminars, Meetings, trainings • Promotional materials (posters/brochures/leaflets)
Critical/essential factors for successful promotion	• Recruitment and support for private seed companies and SMEs to enter seed production; value addition and product diversification • Decentralized/satellite seed bulking system • Seed unavailability and inaccessibility • funding by government to promote production and distribution of seed of selected potato varieties
Partners/stakeholders for scaling up	• Ministry of Agriculture, Livestock, Fisheries & Irrigation (MoALF & I)-Extension and Capacity Building • CIP (International Potato Centre) – Collaborative research on potato variety development • ICIPE (International Centre for Insect Physiology and Ecology)– collaborative research on crop protection • FAO (Food and Agricultural Organization)- co-sharing of resources and networking and knowledge management • CIGs (Common Interest Groups)- back stopping the technologies at grass root levels • GIZ- Nutrition and potato utilization by the communities • NGOs (Non-governmental organization)(CARE Kenya): (Farmer Input Promotion) • KEPHIS (Kenya Plant Health Inspectorate Services) – regulate and certify seed potato produced. • Private seed growers – to grow and multiply certified seed potato
C: Current situation and future scaling up	
Counties where already promoted if any	• Not widely distributed
Counties where TIMP will be upsacles	Elgeyo Marakwet, Nyandarua, Nyeri, Taita Taveta, Bomet and Uasin Gishu as prioritized by counties
Challenges in dissemination	• Inadequate supply of certified seed potato of preferred varieties in sufficient quantities at the right time and place. Very limited numbers of seed enterprises hinder farmers from obtaining seed for improved potato varieties at affordable prices at the right place and time • Weakening seed potato sector in seed multiplication, distribution and extension services. • High seed potato cost; KES 3,000 (USD 30) per 50kg bag • Lengthy process of producing seed which takes quite a long time of obtaining certified seed potato • Bulky packaging of seed in 50 kg bag as the smallest unit not preferred by end-user
Recommendations for addressing the challenges	• Scaling up participation of end-user in technology development, on-farm activities/adaptive research/extension activities

	• Promoting awareness among farmers about the loss of varietal vigor associated with recycling of saved seed for many generations can also increase demand for certified seed. • Good seed potato system • Well organized farmer groups/CIGs • Good marketing models for seed potato • Support and good will from national and county governments • Strong collaborative links between stakeholders in Potato value chain • Trained and experienced staff/manpower
Lessons learned in upscaling if any	• Growing demand for basic and certified seed due to expanding potato production • Partnership is important in technology dissemination • Involvement of farmers alone is not enough to support adoption, need to involve traders, processors and exporters and other actors in the value chain • Prospects in employment
Social, environmental, policy and market conditions necessary for development and upsacling	• Potatoes are important in the local diet; changing eating habit in favor of potato and potato products • Environmentally friendly resilient and climate smart. • There is availability of seed potato market: domestic and regional
D: Economic, gender, vulnerable and marginalized groups (VMGs) considerations	
Basic costs	Cost of a bag of certified basic seed potato 50kg KES 3,000 @ 16 bags per acre (KES 48,000) including other costs total **KES120,000** per acre
Estimated returns	Estimated output of 200 bags of 50kg @KES 1500; total revenue KES 300,000 less costs =**KES 180,000**
Gender issues and concerns in development, dissemination, adoption and upscaling	• Limited access by women to land ownership • Lack of financial resources to buy or lease land or initial capital to start due to lack of collaterals • Most farmer groups are composed of women and this may leave out the opinion and interests of men
Gender related opportunities	• Along the Potato value chain, all gender will be able to access opportunities in production, marketing and processing, with capacity building targeting women and youth in processing and marketing
VMG issues and concerns in development, dissemination adoption and scaling up	• Insecurities in the VMG areas • Language barriers to communicate • Land conflicts
VMG related opportunities	• There exists opportunities for people living with disabilities; SMEs in seed potato production • SMEs which are led by VMG especially people living of disabilities are preference in capacity building or business development services

	• Since VMGs have conducive policy environment supported by the government, establishment of seed potato business incubation models will target them • Short cropping cycle allows production of several crops per year thus important in improving food and nutrition for the VMG • Potato fits well in major cropping patterns hence growing it will create demand for high quality seed potato • Capacity building for the VMGs in agri-business will ensure better participation in value addition and trade
E: Case studies/profiles of success stories	
Success stories	
Application guidelines for users	* Construction of aeroponics unit and ensuring it's fully functional *Obtaining hardened in-vitro plant lets * Establishing the plant lets into the aeroponics units * Misting the roots at timed intervals with nutrient solutions *monitoring the crop and spraying when pests or diseases are seen with recommended chemicals * Regular checking on tuberization and harvesting minitubers that are 4 g and above. Harvesting may go on up to 6 months depending on the variety * Store the minitubers and wait for them to break dormancy * Select site for field multiplication *Soil analysis for nutrients, bacterial wilt and potato cyst nematodes (PCN) should be done before site selection *Land should be ploughed and harrowed well to level the surface and enable good uniform seed germination and uniform maturity *Early planting helps in avoiding infestation by insects (aphids) *correct spacing – 75cm by 30cm if using size II seed * Fertilizer application rates – 4 bags (50kg) per acre if using DAP * Register the crop with KEPHIS for inspection *Crop management practices – weeding; earthing up/hilling; crop protection; water application; dehaulming * Harvest, and wait for KEPHIS inspection again before sorting and grading * After being cleared by KEPHIS, sort, grade and package into polyethylene bags, put labels inside and sew the mouth of the bag
F: Status of TIMP readiness (1-ready for up-scaling; 2-requires validation; 3-requires further research**)**	Ready for up-scaling
F: Contacts	
Contacts	Centre Director, KALRO-Tigoni P.O. Box 338-00217, Limuru, Kenya Telephone: 0202023213 Mobile: 0727031783 E-mail: kalro.tigoni@kalro.org
Lead organization and scientists	KALRO-Tigoni,

Partner organizations	• Ministry of Agriculture, Livestock, Fisheries and Irrigation (MoALF&I) • International Potato Centre (CIP) • National Potato Centre of Kenya (NPCK) • International Centre for Insect Physiology and Ecology (ICIPE) • FAO (Food and Agriculture Organization) • Common Interest Groups (CIGs) • Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) • NGOs (CARE Kenya)

Technology name	**Satellite seed potato business incubation centres**
Category (i.e. technology, innovation or management practice)	Technology
A: Description of the technology, innovation or management practice	
Problem to be addressed	Acute seed potato shortage for popular varieties Weak partnership linkages in seed potato value chain
What is it? (TIMP description)	• Seed potato bulking sites
Justification	• Seed potato bulking satellite centres – a business incubation hub aimed at recruiting potato farmers to produce seed potato at county level. The farmers are recruited by the county, trained by KALRO who are master trainers accredited by NITA, registered by the county government and either licensed by KEPHIS to be seed potato growers or apply to be licensed seed potato growers.
B: Assessment of dissemination and scaling up/out approaches	
Users of TIMP	• Farmers • Seed producing companies and SMEs • Other research organizations/institutions (universities) • Processors (Deeper Industries ltd; Propac Ltds, Sereni Fries Ltds)
Approaches used in dissemination	• Farmer Participatory Evaluation exercises • MoALFI/Extension officers • Partners (CIP, NPCK, FAO, ICIPE, GIZ) • Mobile phone text initiative • Small seed pack model • Farmer to farmer peer learning • Mass media – "Mkulima programme" • Workshops • Seminars, Meetings, trainings • Promotional materials (posters/brochures/leaflets)

Critical/essential factors for successful promotion	• Recruitment and support for private seed companies and SMEs to enter seed production; value addition and product diversification • Decentralized/satellite seed bulking system • Seed unavailability and inaccessibility • funding by government to promote production and distribution of seed of selected potato varieties
Partners/stakeholders for scaling up	• Ministry of Agriculture, Livestock, Fisheries & Irrigation (MoALF & I)-Extension and Capacity Building • CIP (International Potato Centre) – Collaborative research on potato variety development • ICIPE (International Centre for Insect Physiology and Ecology)– collaborative research on crop protection • FAO (Food and Agricultural Organization)- co-sharing of resources and networking and knowledge management • CIGs (Common Interest Groups)- back stopping the technologies at grass root levels • GIZ- Nutrition and potato utilization by the communities • NGOs (Non-governmental organization)(CARE Kenya): (Farmer Input Promotion) • KEPHIS (Kenya Plant Health Inspectorate Services) – regulate and certify seed potato produced. • Private seed growers – to grow and multiply certified seed potato
C: Current situation and future scaling up	
Counties where already promoted if any	• Not widely distributed
Counties where TIMP will be upscaled	Elgeyo Marakwet, Nyandarua, Nyeri, Taita Taveta, Bomet and Uasin Gishu as prioritized by counties
Challenges in dissemination	• Inadequate supply of certified seed potato of preferred varieties in sufficient quantities at the right time and place. Very limited numbers of seed enterprises hinder farmers from obtaining seed for improved potato varieties at affordable prices at the right place and time • Weakening seed potato sector in seed multiplication, distribution and extension services. • High seed potato cost; KES 3,000 (USD 30) per 50kg bag • Lengthy process of producing seed which takes quite a long time of obtaining certified seed potato • Bulky packaging of seed in 50 kg bag as the smallest unit not preferred by end-user
Recommendations for addressing the challenges	• Scaling up participation of end-user in technology development, on-farm activities/adaptive research/extension activities • Promoting awareness among farmers about the loss of varietal vigor associated with recycling of saved seed for many generations can also increase demand for certified seed. • Good seed potato system • Well organized farmer groups/CIGs • Good marketing models for seed potato • Support and good will from national and county governments

	• Strong collaborative links between stakeholders in Potato value chain • Trained and experienced staff/manpower
Lessons learned in upscaling if any	• Growing demand for basic and certified seed due to expanding potato production • Partnership is important in technology dissemination • Involvement of farmers alone is not enough to support adoption, need to involve traders, processors and exporters and other actors in the value chain • Prospects in employment
Social, environmental, policy and market conditions necessary for development and upscaling	• Potatoes are important in the local diet; changing eating habit in favor of potato and potato products • Environmentally friendly resilient and climate smart. • There is availability of seed potato market: domestic and regional
D: Economic, gender, vulnerable and marginalized groups (VMGs) considerations	
Basic costs	Cost of a bag of certified basic seed potato 50kg KES. 3,000 @ 16 bags per acre (KES 48,000) including other costs total **KES120,000** per acre
Estimated returns	Estimated output of 200 bags of 50kg @KES 1500; total revenue KES 300,000 less costs =**KES 180,000**
Gender issues and concerns in development, dissemination, adoption and scaling up	• Land ownership mainly by men and therefore women are not involved in decision making on the enterprises to do • Most farmer groups are composed of women and this may leave out the opinion and interests of men • Seed potato production is done by youth and women but marketing is done by the men so the money goes to the men
Gender related opportunities	• Women and youth friendly production techniques such as mechanization and business incubation models • Since it is highly demanded variety it creates opportunity for women in production, retailing, value addition and marketing • Seed potato has the potential to create employment for women and youth in harvesting, sorting, grading, packing and marketing
VMG issues and concerns in development, dissemination, adoption and scaling up	• Inaccessibility of poor and marginalized groups and weak delivery systems for provision of social and economic inclusion services
VMG related opportunities	• Short cropping cycle allows production of several crops per year thus important in improving food and nutrition for the VMG • Trading in seed potato is profitable since seed potato has very high demand every season for potato production • Potato fits well in major cropping patterns hence growing it will create demand for high quality seed potato • Capacity building for the VMGs in agri-business will ensure better participation in value addition and trade • There exists opportunities for people living with disabilities; SMEs in seed potato production

	• SMEs which are led by VMG especially people living of disabilities are preference in capacity building or business development services • Since VMGs have conducive policy environment supported by the government, establishment of seed potato business incubation models will target them
E: Case studies/profiles of success stories	
Success stories	**Milestone 1:** During 2018, mid rain season in August 2018, KALRO Tigoni (USAID FtF project) is collaborating with county government of Meru, Elgeyo Marakwet and Bungoma distributed 2 bags each of potato varieties Shangi to 3 farmer groups in 3 Wards in Meru and Bungoma and Elgeyo Marakwet which was planted in eighth acre plots towards promoting availability of high quality planting material at farm level. These groups will further bulk these materials during the Long rains 2019 and distribute high quality materials to farmer members. **Milestone 2:** KALRO Tigoni collaborating with National Research fund (NRF) and county government of West pokot, trained 20 prospective seed potato growers and county extension officers during the short rain season 2018/19 on seed potato production guidelines. From each county an average of 20 potato farmers have been trained on Seed potato Production Guidelines. After that, initial 5 acres is underway for seed potato production with the trained farmers who have been licensed by KEPHIS to be seed growers. **Milestone 3:** In January 2019, KALRO Tigoni under USAID Ftf project in collaboration with Bungoma county, have trained over 20 farmers to be prospective seed growers. The county is proposing 20 acres (5 acres each season) on government land under seed potato production and further 10 acres on farmers' fields. These farmers are registered with the county /national government and have applied for licenses with KEPHIS.
Application guidelines for users	*Recruitment of farmer groups by county government *One day training on 'Seed Potato production guidelines' *Application of license to produce seed potato from KEPHIS if the groups are not licensed growers *Land selection be done; land should be able to sustain 4 season rotation plan *Land should not have been grown with potato crop or family in the last 4 seasons Soil analysis should be done before fertilizer application. *Land should be ploughed and harrowed well to level the surface and enable good uniform seed germination and uniform maturity *Use certified seed from known seed merchants (seed retained on-farm may have deteriorated viability). *Early planting helps in avoiding infestation by insects (aphids)
F: Status of TIMP readiness (1-ready for up-scaling; 2-requires	Ready for upscaling

validation; 3-requires further research**)**	
F: Contacts	
Contacts	Centre Director, KALRO-Tigoni P.O. Box 338-00217, Limuru, Kenya Telephone: 0202023213 Mobile: 0727031783 E-mail: kalro.tigoni@kalro.org
Lead organization and scientists	KALRO-Tigoni,
Partner organizations	• Ministry of Agriculture, Livestock, Fisheries and Irrigation (MoALF&I) • International Potato Centre (CIP) • National Potato Centre of Kenya (NPCK) • International Centre for Insect Physiology and Ecology (ICIPE) • FAO (Food and Agriculture Organization) • Common Interest Groups (CIGs) • Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) • NGOs (CARE Kenya): (Farmer Input Promotion) • County governments (CGs) • USAID FtF (United States Agency for International Agriculture-Feed the Future) • NGOs (CARE Kenya): (Farmer Input Promotion)

Technology name	**Sand ponics**
Category (i.e. technology, innovation or management practice)	Technology
A: Description of the technology, innovation or management practice	
Problem to be addressed	Acute seed potato shortage for popular varieties
What is it? (TIMP description)	Sand ponics - production of tubers in a sterilized sand medium. The system involves use of river sand which has been sterilized and thoroughly cleaned with clean water, placed in a specially designed support structures The *in-vitro* plant lets produced through tissue culture are planted in these structures. The nutrients in solution form are supplied to plants by way of misters from a nutrient tank in an automated system
Justification	The system ensures production of disease free tubers by eliminating pathogens in the growth medium. This is a climate smart technology which promotes efficient use of water because water is recycled; use of timers ensures right amount of water is applied to the crop and wastage is avoided; the system is enclosed hence water loss is reduced; farmer accepted; market demand; high opportunity for business incubation
B: Assessment of dissemination and scaling up/out approaches	

Users of TIMP	• Farmers • Seed producing companies and SMEs • Other research organizations/institutions (universities)
Approaches used in dissemination	• Farmer Participatory Evaluation exercises • MoAFLI/Extension officers • Partners (CIP, NPCK, FAO, ICIPE, GIZ) • Mobile phone text initiative • Small seed pack model • Farmer to farmer peer learning • Mass media – "Mkulima programme" • Workshops • Seminars, Meetings, trainings • Promotional materials (posters/brochures/leaflets)
Critical/essential factors for successful promotion	• Recruitment and support for private seed companies and SMEs to enter seed production; value addition and product diversification • Decentralized/satellite seed bulking system • Seed unavailability and inaccessibility • funding by government to promote production and distribution of seed of selected potato varieties
Partners/stakeholders for scaling up and their role	• Ministry of Agriculture, Livestock, Fisheries & Irrigation (MoALF & I) • CIP (International Potato Centre) – Collaborative research on potato variety development • ICIPE (International Centre for Insect Physiology and Ecology)– collaborative research on crop protection • FAO (Food and Agricultural Organization)- co-sharing of resources and networking and knowledge management • CIGs (Common Interest Groups)- back stopping the technologies at grass root levels • GIZ- Nutrition and potato utilization by the communities • NGOs (Non-governmental organization)(CARE Kenya): (Farmer Input Promotion) • KEPHIS (Kenya Plant Health Inspectorate Services) – regulate and certify seed potato produced. • Private seed growers – to grow and multiply certified seed potato
C: Current situation and future scaling up	
Counties where already promoted if any	Not widely distributed
Counties where TIMP will be upsacled	Elgeyo Marakwet, Nyandarua, Nyeri, Taita Taveta, Bomet and Uasin Gishu as prioritized by counties
Challenges in dissemination	• Inadequate supply of certified seed potato of preferred varieties in sufficient quantities at the right time and place. Very limited numbers of seed enterprises hinder farmers from obtaining seed for improved potato varieties at affordable prices at the right place and time • Weakening seed potato sector in seed multiplication, distribution and extension services. • High seed potato cost; KES 3,000 (USD 30) per 50kg bag

Recommendations for addressing the challenges	• Scaling up participation of end-user in technology development, on-farm activities/adaptive research/extension activities • Promoting awareness among farmers about the loss of varietal vigor associated with recycling of saved seed for many generations can also increase demand for certified seed. • Good seed potato system • Well organized farmer groups/CIGs • Good marketing models for seed potato • Support and good will from national and county governments • Strong collaborative links between stakeholders in Potato value chain • Trained and experienced staff/manpower
Lessons learned in upscaling	• Growing demand for basic and certified seed due to expanding potato production • Partnership is important in technology dissemination • Involvement of farmers alone is not enough to support adoption, need to involve traders, processors and exporters and other actors in the value chain • Prospects in employment
Social, environmental, policy and market conditions necessary for development and upscaling	• Potatoes are important in the local diet; changing eating habit in favor of potato and potato products • Environmentally friendly resilient and climate smart. • There is availability of seed potato market: domestic and regional
D: Economic, gender, vulnerable and marginalized groups (VMGs) considerations	
Basic costs	Cost of a bag of certified basic seed potato 50kg KES. 3,000 @ 16 bags per acre (KES 48,000) including other costs total **KES120,000** per acre
Estimated returns	Estimated output of 200 bags of 50kg @KES 1500; total revenue KES 300,000 less costs =**KES 180,000**
Gender issues and concerns in development, dissemination, adoption and scaling up	• Land ownership mainly by men and therefore women are not involved in decision making on the enterprises to do • Most farmer groups are composed of women and this may leave out the opinion and interests of men • Seed potato production is done by youth and women but marketing is done by the men so the money goes to the men
Gender related opportunities	• Since seed potato is highly demanded it creates opportunity for women in potato production, retailing, value addition and marketing • Seed potato has the potential to create employment for women and youth in harvesting, sorting, grading, packing and marketing • Women and youth friendly production techniques such as mechanization and business incubation models
VMG issues and concerns in development, dissemination, adoption and scaling up	• Inaccessibility of poor and marginalized groups and weak delivery systems for provision of social and economic inclusion services

VMG related opportunities	• There exists opportunities for people living with disabilities; SMEs in seed potato production • SMEs which are led by VMG especially people living of disabilities are preference in capacity building or business development services • Since VMGs have conducive policy environment supported by the government, establishment of seed potato business incubation models will target them • Trading in seed potato is profitable since seed potato has very high demand every season for potato production • Potato fits well in major cropping patterns hence growing it will create demand for high quality seed potato • Capacity building for the VMGs in agri-business will ensure better participation in value addition and trade
E: Case studies/profiles of success stories	
Success stories from previous similar projects	-
Application guidelines for users	*Construction of hydroponics * Testing of water quality * Obtaining river sand and sterilizing using sodium hypochlorite, then thoroughly washing off the sodium hypochlorite * obtaining hardened in-vitro plantlets * planting the plant lets at the spacing of 15 cm by 15cm * Monitoring growth of the plan lets *Store the mini-tubers after harvesting wait for them to break dormancy * Select site for field multiplication *Soil analysis for nutrients, bacterial wilt and potato cyst nematodes (PCN) should be done before site selection *Land should be ploughed and harrowed well to level the surface and enable good uniform seed germination and uniform maturity *Early planting helps in avoiding infestation by insects (aphids) *correct spacing – 75cm by 30cm if using size II seed * Fertilizer application rates – 4 bags (50kg) per acre if using DAP * Register the crop with KEPHIS for inspection *Crop management practices – weeding; earthing up/hilling; crop protection; water application; dehaulming * Harvest, and wait for KEPHIS inspection again before sorting and grading * After being cleared by KEPHIS, sort, grade and package into polyethylene bags, put labels inside and sew the mouth of the bag
G: Status of TIMP readiness (1-ready for up-scaling; 2-requires validation; 3-requires further research**)**	Ready for up-scaling
F: Contacts	

Contacts	Centre Director, KALRO-Tigoni P.O. Box 338-00217, Limuru, Kenya Telephone: 0202023213 Mobile: 0727031783 E-mail: kalro.tigoni@kalro.org
Lead organization and scientists	KALRO-Tigoni,
Partner organizations	• Ministry of Agriculture, Livestock, Fisheries and Irrigation (MoALF&I) • International Potato Centre (CIP) • National Potato Centre of Kenya (NPCK) • International Centre for Insect Physiology and Ecology (ICIPE) • FAO (Food and Agriculture Organization) • Common Interest Groups (CIGs) • Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) • NGOs (CARE Kenya): (Farmer Input Promotion) • USAID FtF (United States Agency for International Agriculture-Feed the Future)

Technology name	**Positive seed selection**
Category (i.e. technology, innovation or management practice)	Technology
A: Description of the technology, innovation or management practice	
Problem to be addressed	Low potato production due use of farm-saved seed potato of undetermined quality
What is it? (TIMP description)	Positive seed selection- is selection of the healthy looking plants exhibiting vigorous growth to be the source of seed potato for the next season. By doing so, the number of sick plants in the next crop is reduced significantly.
Justification	• Potato is among the key food security crops alongside rice, maize, wheat and beans identified under the big four agenda. • Increasing population pressure demand more food to eat, with changing habits to potato and potato products, hence offering ready market • Potato has a short cropping cycle, high water use efficiency leading to high production per unit area compared to other food crops; makes it suitable as a climate smart crop • High production within a short period of time, can be cropped several seasons per year • Positive seed selection ensures timely availability and accessibility of high quality seed potato at farm level, ensuring reduced spread of diseases and pests, leading to high yields, making the country food secure and able to attain the big four agenda, Kenya Vision 2030 and SGDs.
B: Assessment of dissemination and scaling up/out approaches	

Users of TIMP	• Potato farmers • Other research organizations/institutions (universities) • Processors (Deeper Industries ltd; Propac Ltd, Sereni Fries Ltd, Twiga foods) • Agro-input dealers
Approaches used in dissemination	• Farmer Participatory Evaluation exercises • On-farm demonstration • Field days • Agricultural shows • MoA/Extension officers • Partners (CIP, NPCK, FAO, ICIPE, GIZ) • Mobile phone text initiative • Farmer to farmer peer learning • Mass media- e.g. Mkulima programme, Smart Farmer, seeds of Gold • Workshops, Seminars, Meetings, trainings • Promotional materials (posters/brochures/leaflets) • Social platform – twitter, google apps, Facebook
Critical/essential factors for successful promotion	• Capacity building of farmers, extension officers and other stakeholder on integrated management practices of positive seed selection • Establishment of FFBS on Positive seed selection
Partners/stakeholders for scaling up and their roles	• Ministry of Agriculture, Livestock, Fisheries & Irrigation (MoALF & I) • CIP (International Potato Centre) – Collaborative research on potato variety development • ICIPE (International Centre for Insect Physiology and Ecology)– collaborative research on crop protection • FAO (Food and Agricultural Organization)- co-sharing of resources and networking and knowledge management • CIGs (Common Interest Groups)- back stopping the technologies at grass root levels • GIZ- Nutrition and potato utilization by the communities • NGOs (Non-governmental organization)(CARE Kenya): (Farmer Input Promotion)
C: Current situation and future scaling up	
Counties where already promotes if any	• Traditional potato producing counties-Nyandarua, Nyeri, Kiambu, Taita Taveta, Nakuru, Bomet, Narok, Elgeyo Marakwet, Uasin Gishu, Bungoma, West Pokot, Nandi, Kisii; Murang'a, Baringo, Nyamira, Kirinyaga, Laikipia, and Kericho • Emerging potato producing counties in mid-altitude AEZ (Samburu, Trans Nzoia, Makueni, Embu, Tharaka Nithi, Machakos, Kajiado, and Nairobi
Counties where TIMP will be promoted	Elgeyo Marakwet, Nyandarua, Nyeri, Taita Taveta, Bomet and Uasin Gishu as prioritized by counties
Challenges in dissemination	• Big challenge between information availability and accessibility

	• Non-exposure of the end-user to positive seed selection
Suggestions for addressing the challenges	• Information dissemination – positive seed selection • Scaling up participation of end-user in on-farm activities/adaptive research/extension activities • Find innovations in reducing integrated management practices costs to encourage more potato production.
Lessons learned in upscaling if any	• Adoption of FFBS effective in technology dissemination and adoption • Strong PPP-Partnership is important in technology dissemination
Social, environmental, policy and market conditions necessary for development and upscaling	• Important in the local diet – • Environmentally friendly resilient and climate smart. • There is availability of market: domestic and regional
D: Economic, gender, vulnerable and marginalized groups (VMGs) considerations	
Basic costs	-
Estimated returns	-
Gender issues and concerns in development, dissemination, adoption and upscaling	• Land ownership mainly by men and therefore women are not involved in decision making on the enterprises to do • Most farmer groups are composed of women and this may leave out the opinion and interests of men • Seed potato production is done by youth and women but marketing is done by the men so the money goes to the men
Gender related opportunities	• Seed potato has the potential to create employment for women and youth in harvesting, sorting, grading, packing and marketing • Since it is highly demanded variety it creates opportunity for women in production, retailing, value addition and marketing • Short cropping cycle allows production of several crops per year thus important in improving food and nutrition for the VMG • Trading in seed potato is profitable since seed potato has very high demand every season for potato production • Potato fits well in major cropping patterns hence growing it will create demand for high quality seed potato • Capacity building for the VMGs in agri-business will ensure better participation in value addition and trade Women and youth friendly production techniques such as mechanization and business incubation models
VMG issues and concerns in development, dissemination, adoption and up-scaling	• Lack of participation by all VMGS hence exclusion in decision making hence no benefits will accrue due to the project intervention • Negative impact of interventions from the inadequate intervention which include conflicts and elite capture in form of employment, grants or access to benefits that accrue from the proximity to the project, which isolates the needy communities

	• Communication barriers through language or non-availability of an expert in sign language interpretation
VMG related opportunities	• There exists opportunities for people living with disabilities; SMEs in seed potato production • SMEs which are led by VMG especially people living of disabilities are preference in capacity building or business development services • Since VMGs have conducive policy environment supported by the government, establishment of seed potato business incubation models will target them
E: Case studies/profiles of success stories	
Success stories from previous similar project	-
Application guidelines for users	*Minimize pest entry through strict adherence to regulatory and quarantine measures. Practice crop rotation for over 5 years with non-Solanaceous crops e.g. cereal, legumes, cabbage & leafy vegetables. *Destroy all off-season Solanaceous volunteer plants. *Plant clean seed potato *Minimize disease and pest spread by thoroughly cleaning farm tools, machinery and foot wear. *Plough early to expose and desiccate weeds through solar heat. * During the actively growing vegetative and flowering stages, scout your field and peg healthy looking plants to be mother plants for new source of seed * At harvest, harvest these pegged plants first and store the new tubers well, then harvest the entire crop
G: Status of TIMP readiness (1-ready for up-scaling; 2-requires validation; 3-requires further research**)**	Ready for up-scaling
F: Contacts	
Contacts	Centre Director, KALRO-Tigoni P.O. Box 338-00217, Limuru, Kenya Telephone: 0202023213 Mobile: 0727031783 E-mail: kalro.tigoni@kalro.org
Lead organization and scientists	KALRO-Tigoni,
Partner organizations	• Ministry of Agriculture, Livestock, Fisheries and Irrigation (MoALF&I) • National Potato Centre of Kenya (NPCK) • International Centre for Insect Physiology and Ecology (ICIPE) • FAO (Food and Agriculture Organization) • Common Interest Groups (CIGs) • Bayer Crop science

4. Pests and disease management in Potato production

Technology name	**Integrated management of Potato cyst Nematode (PCN)**
Category (i.e. technology, innovation or management practice)	Technology
A: Description of the technology, innovation or management practice	
Problem to be addressed	Low potato production due to potato cyst nematode infestation
What is it? (TIMP description)	PCN is a minute worm-like pest that sucks nutrients from roots, causing gradual decline in potato yields. It is transmitted through infested/contaminated planting materials, soil, water, farm tools/machinery, foot wear/feet of farm workers
Justification	• Potato is among the key food security crops alongside rice, maize, wheat and beans identified under the big four agenda. • Increasing population pressure demand more food to eat, with changing habits to potato and potato products, hence offering ready market • Potato has a short cropping cycle, high water use efficiency leading to high production per unit area compared to other food crops; makes it suitable as a climate smart crop • High production within a short period of time, can be cropped several seasons per year • PCN has the potential of devastating the potato crop, both ware and seed, which could render the country food insecure hence not attaining big four agenda, Kenya Vision 2030 and SGDs.
B: Assessment of dissemination and scaling up/out approaches	
Users of TIMP	• Potato farmers • Seed producing companies and SMEs • Other research organizations/institutions (universities) • Processors (Deeper Industries ltd; Propac Ltd, Sereni Fries Ltd, Twiga Foods) • Agro-input dealers
Approaches used in dissemination	• Farmer Participatory Evaluation exercises • On-farm demonstration • Field days • Agricultural shows • MoALFI/Extension officers • Partners (CIP, NPCK, FAO, ICIPE, GIZ) • Mobile phone text initiative • Farmer to farmer peer learning • Mass media – e.g. Mkulima programme, Smart farmer, Seeds of Gold • Workshops • Seminars, Meetings, trainings • Promotional materials (posters/brochures/leaflets) • Social platform – twitter, google apps, Facebook

Critical/essential factors for successful promotion	• Capacity building of farmers, extension officers and other stakeholder on integrated management practices of PCN • Establishment of FFBS • Mapping of PCN free zones for up and out scaling of certified seed potato production • funding by government to promote production and distribution of certified seed potato at farm level
Partners/stakeholders for scaling up and their roles	• Ministry of Agriculture, Livestock, Fisheries & Irrigation (MoALF & I) Extension and Capacity Building • CIP (International Potato Centre) – Collaborative research on potato variety development • ICIPE (International Centre for Insect Physiology and Ecology)– collaborative research on crop protection • FAO (Food and Agricultural Organization)- co-sharing of resources and networking and knowledge management • CIGs (Common Interest Groups)- back stopping the technologies at grass root levels • GIZ- Nutrition and potato utilization by the communities • NGOs (Non-governmental organization)(CARE Kenya): (Farmer Input Promotion)
C: Current situation and future scaling up	
Counties where already promoted if any	• Traditional potato producing counties-Nyandarua, Nyeri, Kiambu, Taita Taveta, Nakuru, Bomet, Narok, Elgeyo Marakwet, Uasin Gishu, Bungoma, West Pokot, Nandi, Kisii; Murang'a, Baringo, Nyamira, Kirinyaga, Laikipia, and Kericho • Emerging potato producing counties in mid-altitude AEZ (Samburu, Trans Nzoia, Makueni, Embu, Tharaka Nithi, Machakos, Kajiado, and Nairobi
Counties where TIMP will be up-scaled	Elgeyo Marakwet, Nyandarua, Nyeri, Taita Taveta, Bomet and Uasin Gishu as prioritized by counties
Challenges in dissemination	• Big challenge between information availability and accessibility • Non-exposure of the end-user to PCN and its management strategies
Recommendations for addressing the challenges	• Information dissemination – PCN integrated management strategies • Scaling up participation of end-user in on-farm activities/adaptive research/extension activities • Find innovations in reducing integrated management practices costs to encourage more potato production.
Lessons learned in up-scaling if any	• Adoption of FFBS effective in technology dissemination and adoption • Strong PPP-Partnership is important in technology dissemination
Social, environmental, policy and market conditions necessary	• Important in the local diet – • Environmentally friendly resilient and climate smart. • There is availability of market: domestic and regional

for development and upscaling	
D: Economic, gender, vulnerable and marginalized groups (VMGs) considerations	
Basic costs	-
Estimated returns	-
Gender issues and concerns in development, dissemination, adoption and upscaling	• Land ownership mainly by men and therefore women are not involved in decision making on the enterprises to do • Most farmer groups are composed of women and this may leave out the opinion and interests of men
Gender related opportunities	• Seed potato has the potential to create employment for women and youth in harvesting, sorting, grading, packing and marketing Since it is highly demanded variety it creates opportunity for women in production, retailing, value addition and marketing • Trading in seed potato is profitable since seed potato has very high demand every season for potato production
VMG issues and concerns in development, dissemination, adoption and upscaling	• Lack of participation by all VMGS hence exclusion in decision making hence no benefits will accrue due to the project intervention • Negative impact of interventions from the inadequate intervention which include conflicts and elite capture in form of employment, grants or access to benefits that accrue from the proximity to the project, which isolates the needy communities • Communication barriers through language or non-availability of an expert in sign language interpretation
VMG related opportunities	• Capacity building for the VMGs in agri-business will ensure better participation in value addition and trade Women and youth friendly production techniques such as mechanization and business incubation models • There exists opportunities for people living with disabilities; SMEs in seed potato production • SMEs which are led by VMG especially people living of disabilities are preference in capacity building or business development services • Since VMGs have conducive policy environment supported by the government, establishment of seed potato business incubation models will target them. • Capacity building for the VMGs in agri-business will ensure better participation in value addition and trade Women and youth friendly production techniques such as mechanization and business incubation models
E: Case studies/profiles of success stories	
Success stories	KALRO Tigoni in collaboration with ICIPE and Bayer Crop Science are carrying out research trials on integrated practices of PCN management. ICIPE are evaluating different African indigenous vegetables in the 'dead-end trap technology'. The vegetables are of Solanacea family so that they encourage growth of the nematodes in their life cycle since they are hosts. Preliminary results show that some varieties of black shade attract the juveniles into the roots, then

	uprooting is done before the juveniles complete their life cycle. This reduces the population of PCN in the soils. .In addition, vegetables are harvested hence utilized in households promoting nutritional benefits of vegetable consumption.
Application guidelines for users	*Minimize pest entry through strict adherence to regulatory and quarantine measures. *Plant certified and clean PCN-free seed. *Practice crop rotation for over 5 years with non-Solanaceous crops e.g. cereal, legumes, cabbage & leafy vegetables. *Destroy all off-season Solanaceous volunteer plants. *Minimize PCN spread by thoroughly cleaning farm tools, machinery and foot wear. *Plough early to expose and desiccate nematodes through solar heat. *Plant trap crops (e.g. black nightshade and eggplants) and uproot them at 5-6 weeks for safe disposal, hence reducing PCN populations. *Incorporate Brassica residue into soil to reduce PCN levels (bio-fumigation). *Apply neem-based pesticides or biological agents (such as Bionematon) to control PCN.
F: Status of TIMP readiness (1-ready for up-scaling; 2-requires validation; 3-requires further research**)**	Ready for up-scaling
G: Contacts	
Contacts	Centre Director, KALRO-Tigoni P.O. Box 338-00217, Limuru, Kenya Telephone: 0202023213 Mobile: 0727031783 E-mail: kalro.tigoni@kalro.org
Lead organization and scientists	KALRO-Tigoni,
Partner organizations	• International Centre for Insect Physiology and Ecology (ICIPE) • Common Interest Groups (CIGs) • Bayer Crop science

Technology name	**Integrated management of bacterial wilt (BW)**
Category (i.e. technology, innovation or management practice)	Technology
A: Description of the technology, innovation or management practice	
Problem to be addressed	Low potato production due to bacterial wilt
What is it? (TIMP description)	Bacterial wilt is a devastating disease of potato caused by a bacteria but has no cure It is transmitted through infested/contaminated planting materials, soil, water, farm tools/machinery, foot wear/feet of farm workers

Justification	• Potato is among the key food security crops alongside rice, maize, wheat and beans identified under the big four agenda. • Increasing population pressure demand more food to eat, with changing habits to potato and potato products, hence offering ready market • Potato has a short cropping cycle, high water use efficiency leading to high production per unit area compared to other food crops; makes it suitable as a climate smart crop • High production within a short period of time, can be cropped several seasons per year • Bacterial wilt has the potential of causing 100% crop loss, both ware and seed, which could render the country food insecure hence not attaining big four agenda, Kenya Vision 2030 and SGDs.
B: Assessment of dissemination and scaling up/out approaches	
Users of TIMP	• Potato farmers • Seed producing companies and SMEs • Other research organizations/institutions (universities) • Processors (Deeper Industries ltd; Propac Ltd, Sereni Fries Ltd, Twiga foods) • Agro-input dealers
Approaches used in dissemination	• Farmer Participatory Evaluation exercises • On-farm demonstration • Field days • Agricultural shows • MoALFI/Extension officers • Partners (CIP, NPCK, FAO, ICIPE, GIZ) • Mobile phone text initiative • Farmer to farmer peer learning • Mass media – "Mkulima programme" • Workshops • Seminars, Meetings, trainings • Promotional materials (posters/brochures/leaflets) • Social platform – twitter, google apps, Facebook
Critical/essential factors for successful promotion	• Capacity building of farmers, extension officers and other stakeholder on integrated management practices of BW • Establishment of FFBS • Mapping of BW free zones for up and out scaling of certified seed potato production • funding by government to promote production and distribution of certified seed potato at farm level
Partners/stakeholders for scaling up and their roles	• Ministry of Agriculture, Livestock, Fisheries & Irrigation (MoALF & I)-Extension and Capacity building • CIP (International Potato Centre) – Collaborative research on potato variety development • ICIPE (International Centre for Insect Physiology and Ecology)– collaborative research on crop protection

	• FAO (Food and Agricultural Organization)- co-sharing of resources and networking and knowledge management • CIGs (Common Interest Groups)- back stopping the technologies at grass root levels • GIZ- Nutrition and potato utilization by the communities • NGOs (Non-governmental organization)-CARE Kenya: (Farmer Input Promotion)
C: Current situation and future scaling up	
Counties where already promoted if any	• Traditional potato producing counties- Nyandarua, Nyeri, Kiambu, Taita Taveta, Nakuru, Bomet, Narok, Elgeyo Marakwet, Uasin Gishu, Bungoma, West Pokot, Nandi, Kisii; Murang'a, Baringo, Nyamira, Kirinyaga, Laikipia, and Kericho • Emerging potato producing counties in mid-altitude AEZ (Samburu, Trans Nzoia, Makueni, Embu, Tharaka Nithi, Machakos, Kajiado, and Nairobi
Counties where TIMP will be up-scaled	Elgeyo Marakwet, Nyandarua, Nyeri, Taita Taveta, Bomet and Uasin Gishu as prioritized by counties
Challenges in dissemination	• Big challenge between information availability and accessibility • Non-exposure of the end-user to bacterial wilt and its management strategies
Recommendations for addressing the challenges	• Information dissemination – BW integrated management strategies • Scaling up participation of end-user in on-farm activities/adaptive research/extension activities • Find innovations in reducing integrated management practices costs to encourage more potato production.
Lessons learned in up-scaling if any	• Adoption of FFBS effective in technology dissemination and adoption • Strong PPP-Partnership is important in technology dissemination
Social, environmental, policy and market conditions necessary for development and upscaling	• Important in the local diet – • Environmentally friendly resilient and climate smart. • There is availability of market: domestic and regional
D: Economic, gender, vulnerable and marginalized groups (VMGs) considerations	
Basic costs	-
Estimated returns	-
Gender issues and concerns in development, dissemination, adoption and upscaling	• Land ownership mainly by men and therefore women are not involved in decision making on the enterprises to do • Most farmer groups are composed of women and this may leave out the opinion and interests of men • Seed potato production is done by youth and women but marketing is done by the men so the money goes to the men
Gender related opportunities	• Seed potato has the potential to create employment for women and youth in harvesting, sorting, grading, packing and marketing Since

	it is highly demanded variety it creates opportunity for women in production, retailing, value addition and marketing • Trading in seed potato is profitable since seed potato has very high demand every season for potato production
VMG issues and concerns in development, dissemination, adoption and upscaling	• Lack of participation by all VMGS hence exclusion in decision making hence no benefits will accrue due to the project intervention • Negative impact of interventions from the inadequate intervention which include conflicts and elite capture in form of employment, grants or access to benefits that accrue from the proximity to the project, which isolates the needy communities • Communication barriers through language or non-availability of an expert in sign language interpretation
VMG related opportunities	• Capacity building for the VMGs in agri-business will ensure better participation in value addition and trade Women and youth friendly production techniques such as mechanization and business incubation models • There exists opportunities for people living with disabilities; SMEs in seed potato production • SMEs which are led by VMG especially people living of disabilities are preference in capacity building or business development services • Since VMGs have conducive policy environment supported by the government, establishment of seed potato business incubation models will target them. • Capacity building for the VMGs in agri-business will ensure better participation in value addition and trade Women and youth friendly production techniques such as mechanization and business incubation models
E: Case studies/profiles of success stories	
Success stories from previous similar projects	-
Application guidelines for users	*Survey the area before setting up your potato crop; check sloppiness of land; status of neighboring potato crops. Do not establish your potato crop on the lower side of the hill above another potato crop * Construct soil conservation measures such as terraces to divert runoff from upstream *Minimize pest entry through strict adherence to regulatory and quarantine measures. *Plant certified and clean BW-free seed. *Practice crop rotation for over 5 years with non-Solanaceous crops e.g. cereal, legumes, cabbage & leafy vegetables. *Destroy volunteer plants in your land during crop rotation *Minimize BW spread by thoroughly cleaning farm tools, machinery and foot wear in available disinfectant such as sodium hypochlorite

	*Strictly observe field sanitation where all previous season crops are buried or burned. *Minimize human or animal traffic in your potato crop *Incorporate grass family crops in your rotation plan
F: Status of TIMP readiness (1-ready for up-scaling; 2-requires validation; 3-requires further research**)**	Ready for up-scaling
G: Contacts	
Contacts	Centre Director, KALRO-Tigoni P.O. Box 338-00217, Limuru, Kenya Telephone: 0202023213 Mobile: 0727031783 E-mail: kalro.tigoni@kalro.org
Lead organization and scientists	KALRO-Tigoni,
Partner organizations	• International Centre for Insect Physiology and Ecology (ICIPE) • Common Interest Groups (CIGs) • Bayer Crop science

Technology name	**Late blight management**
Category (i.e. technology, innovation or management practice)	Technology
A: Description of the technology, innovation or management practice	
Problem to be addressed	Low potato production due to potato cyst nematode infestation
What is it? (TIMP description)	• Late blight is a disease of the potato caused by a fungus, *Phytophthora infestans*. It is a devastating disease that can cause 100% crop loss. It is favored by low temperatures and high humidity.
Justification	• Potato is among the key food security crops alongside rice, maize, wheat and beans identified under the big four agenda. • Increasing population pressure demand more food to eat, with changing habits to potato and potato products, hence offering ready market • Potato has a short cropping cycle, high water use efficiency leading to high production per unit area compared to other food crops; makes it suitable as a climate smart crop • Late blight has the potential of devastating the potato crop, both ware and seed, which could render the country food insecure hence not attaining big four agenda, Kenya Vision 2030 and SGDs.
B: Assessment of dissemination and scaling up/out approaches	
Users of TIMP	• Potato farmers • Seed producing companies and SMEs • Other research organizations/institutions (universities)

	• Processors (Deeper Industries ltd; Propac Ltd, Sereni Fries Ltd, Twiga foods) • Agro-input dealers
Approaches used in dissemination	• Farmer Participatory Evaluation exercises • On-farm demonstration • Field days • Agricultural shows • MoA/Extension officers • Partners (CIP, NPCK, FAO, ICIPE, GIZ) • Mobile phone text initiative • Farmer to farmer peer learning • Mass media- e.g Mkulima programme, Smart Farmer and Seeds of Gold • Workshops, Seminars, Meetings, trainings • Promotional materials (posters/brochures/leaflets) • Social Media platforms – twitter, google apps, Facebook
Most effective approach	• On-farm trials/demonstrations • Farmer field and business schools (FFBS)
Critical/essential factors for successful promotion	• Capacity building of farmers, extension officers and other stakeholder on integrated management practices of late blight • Establishment of FFBS • funding by government to promote production and distribution of certified seed potato at farm level
Partners/stakeholders for scaling up	• Ministry of Agriculture, Livestock, Fisheries & Irrigation (MoALF & I) • CIP (International Potato Centre) – Collaborative research on potato variety development • ICIPE (International Centre for Insect Physiology and Ecology)– collaborative research on crop protection • FAO (Food and Agricultural Organization)- co-sharing of resources and networking and knowledge management • CIGs (Common Interest Groups)- back stopping the technologies at grass root levels • GIZ- Nutrition and potato utilization by the communities • NGOs (Non-governmental organization)(CARE Kenya): (Farmer Input Promotion)
C: Current situation and future scaling up	
Counties where up-scaled if any	• Traditional potato producing counties- Nyandarua, Nyeri, Kiambu, Taita Taveta, Nakuru, Bomet, Narok, Elgeyo Marakwet, Uasin Gishu, Bungoma, West Pokot, Nandi, Kisii; Murang'a, Baringo, Nyamira, Kirinyaga, Laikipia, and Kericho • Emerging potato producing counties in mid-altitude AEZ - Samburu, Trans Nzoia, Makueni, Embu, Tharaka Nithi, Machakos, Kajiado, and Nairobi

Counties where TIMP will be up-scaled	Elgeyo Marakwet, Nyandarua, Nyeri, Taita Taveta, Bomet and Uasin Gishu as prioritized by counties
Challenges in dissemination	• Big challenge between information availability and accessibility • Inadequate exposure of the end-user to late blight and its management strategies
Suggestions for addressing the challenges	• Information dissemination – Late blight integrated management strategies • Scaling up participation of end-user in on-farm activities/adaptive research/extension activities • Find innovations in reducing integrated management practices costs to encourage more potato production.
Lessons learned in upscaling if any	• Adoption of FFBS effective in technology dissemination and adoption • Strong PPP-Partnership is important in technology dissemination
Social, environmental, policy and market conditions necessary for development and upscaling	• Important in the local diet – • Environmentally friendly resilient and climate smart. • There is availability of market: domestic and regional
D: Economic, gender, vulnerable and marginalized groups (VMGs) considerations	
Basic costs	-
Estimated returns	-
Gender issues and concerns in development, dissemination, adoption and up-scaling	• Land ownership mainly by men and therefore women are not involved in decision making on the enterprises to do • Most farmer groups are composed of women and this may leave out the opinion and interests of men • Women involved in production are forced to spray their crops yet it is unhealthy for them. In some cases all gender spray without protective clothing
Gender related opportunities	• Seed potato has the potential to create employment for women and youth in harvesting, sorting, grading, packing and marketing Since it is highly demanded variety it creates opportunity for women in production, retailing, value addition and marketing • Trading in seed potato is profitable since seed potato has very high demand every season for potato production
VMG issues and concerns in development, dissemination, adoption and up-scaling	• Lack of participation by all VMGS hence exclusion in decision making hence no benefits will accrue due to the project intervention • Negative impact of interventions from the inadequate intervention which include conflicts and elite capture in form of employment, grants or access to benefits that accrue from the proximity to the project, which isolates the needy communities • Communication barriers through language or non-availability of an expert in sign language interpretation
VMG related opportunities	• Capacity building for the VMGs in agri-business will ensure better participation in value addition and trade Women and youth

	friendly production techniques such as mechanization and business incubation models • There exists opportunities for people living with disabilities; SMEs in seed potato production • SMEs which are led by VMG especially people living of disabilities are preference in capacity building or business development services • Since VMGs have conducive policy environment supported by the government, establishment of seed potato business incubation models will target them. • Capacity building for the VMGs in agri-business will ensure better participation in value addition and trade Women and youth friendly production techniques such as mechanization and business incubation models
E: Case studies/profiles of success stories	
Success stories from previous similar projects	-
Application guidelines for users	*Minimize pest entry through strict adherence to regulatory and quarantine measures. *Plant certified and clean late blight free seed. *Practice crop rotation for 4 seasons with non-Solanaceous crops e.g. cereal, legumes, cabbage & leafy vegetables. *Destroy all off-season Solanaceous volunteer plants. *Minimize late blight spread by thoroughly cleaning farm tools, machinery and foot wear. *Plough early and do timely planting *Follow strictly the recommended spray regimes from chemical companies
F: Status of TIMP readiness (1-ready for up-scaling; 2-requires validation; 3-requires further research**)**	Ready for up-scaling
F: Contacts	
Contacts	Centre Director, KALRO-Tigoni P.O. Box 338-00217, Limuru, Kenya Telephone: 0202023213 Mobile: 0727031783 E-mail: kalro.tigoni@kalro.org
Lead organization and scientists	KALRO-Tigoni,
Partner organizations	• International Centre for Insect Physiology and Ecology (ICIPE) • Common Interest Groups (CIGs) • Bayer Crop science

Technology name	**Management of viruses in Potato**
Category (i.e. technology, innovation	Technology

or management practice)	
A: Description of the technology, innovation or management practice	
Problem to be addressed	Low potato yields due to virus infection
What is it? (TIMP description)	• Potato viruses cause reduced yields in potato production. The common viruses are Potato leaf roll virus (PLRV), Potato virus Y (PVY) and potato virus X (PVX)
Justification	• Potato is among the key food security crops alongside rice, maize, wheat and beans identified under the big four agenda. • Increasing population pressure demand more food to eat, with changing habits to potato and potato products, hence offering ready market • Potato has a short cropping cycle, high water use efficiency leading to high production per unit area compared to other food crops; makes it suitable as a climate smart crop • High production within a short period of time, can be cropped several seasons per year • Potato viruses has the potential of devastating the potato crop, both ware and seed, which could render the country food insecure hence not attaining big four agenda, Kenya Vision 2030 and SGDs.
B: Assessment of dissemination and scaling up/out approaches	
Users of TIMP	• Potato farmers • Seed producing companies and SMEs • Other research organizations/institutions (universities) • Processors (Deeper Industries ltd; Propac Ltd, Sereni Fries Ltd, Twiga Foods) • Agro-input dealers
Approaches used in dissemination	• Farmer Participatory Evaluation exercises • On-farm demonstration • Field days • Agricultural shows • MoALFI/Extension officers • Partners (CIP, NPCK, FAO, ICIPE, GIZ) • Mobile phone text initiative • Farmer to farmer peer learning • Mass media – "Mkulima programme" • Workshops • Seminars, Meetings, trainings • Promotional materials (posters/brochures/leaflets) • Social platform – twitter, google apps, Facebook
Critical/essential factors for successful promotion	• Capacity building of farmers, extension officers and other stakeholder on integrated management practices of potato viruses • Establishment of FFBS • funding by government to promote production and distribution of certified seed potato at farm level

Partners/stakeholders for scaling up and their roles	• Ministry of Agriculture, Livestock, Fisheries & Irrigation (MoALF & I)-Extension and Capacity building • CIP (International Potato Centre) – Collaborative research on potato variety development • ICIPE (International Centre for Insect Physiology and Ecology)– collaborative research on crop protection • FAO (Food and Agricultural Organization)- co-sharing of resources and networking and knowledge management • CIGs (Common Interest Groups)- back stopping the technologies at grass root levels • GIZ- Nutrition and potato utilization by the communities • NGOs (Non-governmental organization)(CARE Kenya): (Farmer Input Promotion)
C: Current situation and future scaling up	
Counties where already promoted if any	• Not widely distributed
Counties where TIMP will be up-scaled	Elgeyo Marakwet, Nyandarua, Nyeri, Taita Taveta, Bomet and Uasin Gishu
Challenges in dissemination	• Big challenge between information availability and accessibility • Inadequate exposure of the end-user to potato viruses and its management strategies
Suggestions for addressing the challenges	• Information dissemination – Potato virus integrated management strategies • Scaling up participation of end-user in on-farm activities/adaptive research/extension activities • Find innovations in reducing integrated management practices costs to encourage more potato production.
Lessons learned in up-scaling if any	• Adoption of FFBS effective in technology dissemination and adoption • Strong PPP-Partnership is important in technology dissemination
Social, environmental, policy and market conditions necessary for development and upscaling	• Important in the local diet – • Environmentally friendly resilient and climate smart. • There is availability of market: domestic and regional
D: Economic, gender, vulnerable and marginalized groups (VMGs) considerations	
Basic costs	-
Estimated returns	-
Gender issues and concerns in development, dissemination, adoption and scaling up	• Land ownership mainly by men and therefore women are not involved in decision making on the enterprises to do • Most farmer groups are composed of women and this may leave out the opinion and interests of men • Women involved in production are forced to spray their crops yet it is unhealthy for them. In some cases all gender spray without protective clothing

Gender related opportunities	• Seed potato has the potential to create employment for women and youth in harvesting, sorting, grading, packing and marketing Since it is highly demanded variety it creates opportunity for women in production, retailing, value addition and marketing • Trading in seed potato is profitable since seed potato has very high demand every season for potato production
VMG issues and concerns in development, dissemination, adoption and scaling up	• Lack of participation by all VMGS hence exclusion in decision making hence no benefits will accrue due to the project intervention • Negative impact of interventions from the inadequate intervention which include conflicts and elite capture in form of employment, grants or access to benefits that accrue from the proximity to the project, which isolates the needy communities • Communication barriers through language or non-availability of an expert in sign language interpretation
VMG related opportunities	• Capacity building for the VMGs in agri-business will ensure better participation in value addition and trade • Women and youth friendly production techniques such as mechanization and business incubation models • There exists opportunities for people living with disabilities; SMEs in seed potato production • SMEs which are led by VMG especially people living of disabilities are preference in capacity building or business development services • Since VMGs have conducive policy environment supported by the government, establishment of seed potato business incubation models will target them. • Capacity building for the VMGs in agri-business will ensure better participation in value addition and trade Women and youth friendly production techniques such as mechanization and business incubation models
E: Case studies/profiles of success stories	
Success stories from previous similar projects	-
Application guidelines for users	*Minimize pest entry through strict adherence to regulatory and quarantine measures. *Plant certified and clean PCN-free seed. *Practice crop rotation for 4 seasons with non-Solanaceous crops e.g. cereal, legumes, cabbage & leafy vegetables. *Destroy all off-season Solanaceous volunteer plants. *Minimize virus spread by thoroughly cleaning farm tools, machinery and foot wear. *Scout regularly to monitor presence of aphids which are vectors of viruses; when sited, spraying with appropriate insecticides should be done.
F: Status of TIMP readiness (1-ready for up-scaling; 2-requires	1-Ready for up-scaling

validation; 3-requires further research**)**	
F: Contacts	
Contacts	Centre Director, KALRO-Tigoni P.O. Box 338-00217, Limuru, Kenya Telephone: 0202023213 Mobile: 0727031783 E-mail: kalro.tigoni@kalro.org
Lead organization and scientists	KALRO-Tigoni,
Partner organizations	• International Centre for Insect Physiology and Ecology (ICIPE) • Common Interest Groups (CIGs) • Bayer Crop science

5. Postharvest management of potato

Technology name	**Diffused light store for seed potato**
Category (i.e. technology, innovation or management practice)	Technology
A: Description of the technology, innovation or management practice	
Problem to be addressed	Poor quality sprouts on seed potato due to poor seed sprouting mechanisms
What is it? (TIMP description)	Diffused light store (DLS) is an improved seed store that is cost effective and made from locally available materials used to promote sprouting of seed potato. The quality of the sprouts is of better quality compared to sprouting seed potato in bags or cold storage.
Justification	• Potato is among the key food security crops alongside rice, maize, wheat and beans identified under the big four agenda. • Increasing population pressure demand more food to eat, with changing habits to potato and potato products, hence offering ready market • Poor seed storage leading to low quality sprouts has the potential of reducing the potato yields significantly, both ware and seed, which could render the country food insecure hence not attaining big four agenda, Kenya Vision 2030 and SGDs • High quality seed is one of the key factors affecting potato yields; Uneven sprouting of seed potato planted leads to uneven or poor emergence; low stand count directly leads to low and poor yields. • DLS can be constructed using locally available material; has low operating cost with a high turnover; environmental friendly; has a market demand and can be used by all gender groups
B: Assessment of dissemination and scaling up/out approaches	
Users of TIMP	• Potato farmers • Small scale potato growers and SMEs • Other research organizations/institutions (universities)

	• Processors (Deeper Industries ltd; Propac Ltd, Sereni Fries Ltd, Twiga Foods)
Approaches used in dissemination	• Farmer Participatory Evaluation exercises • On-farm demonstration • Field days • Agricultural shows • MoA/Extension officers • Partners (CIP, NPCK, FAO, ICIPE, GIZ) • Mobile phone text initiative • Farmer to farmer peer learning • Mass media – Mkulima programme, Seeds of Gold, Smart Farmer • Workshops, Seminars, Meetings, trainings • Promotional materials (posters/brochures/leaflets) • Social platform – twitter, google apps, Facebook
Critical/essential factors for successful promotion	• Capacity building of farmers, extension officers and other stakeholder on DLS on proper seed storage • Establishment of FFBS • Field demonstrations on poorly sprouted and DLS sprouted seed potato • funding by government to construct DLS in selected sites to promote storage and sprouting of certified seed potato at farm level
Partners/stakeholders for scaling up and their roles	• Ministry of Agriculture, Livestock, Fisheries & Irrigation (MoALF & I) • CIP (International Potato Centre) – Collaborative research on potato variety development • ICIPE (International Centre for Insect Physiology and Ecology)– collaborative research on crop protection • FAO (Food and Agricultural Organization)- co-sharing of resources and networking and knowledge management • CIGs (Common Interest Groups)- back stopping the technologies at grass root levels • GIZ- Nutrition and potato utilization by the communities • NGOs (Non-governmental organization)(CARE Kenya): (Farmer Input Promotion)
C: Current situation and future scaling up	
Counties where already promoted if any	• Not widely distributed
Counties where TIMP will be up-scaled	Elgeyo Marakwet, Nyandarua, Nyeri, Taita Taveta, Bomet and Uasin Gishu
Challenges in dissemination	• Big challenge between information availability and accessibility • Non-exposure of the end-user to DLS
Suggestions for addressing the challenges	• Information dissemination – DLS • Scaling up participation of end-user in on-farm activities/adaptive research/extension activities • Promotion in potato growing areas.

	• Seed potato multiplication
Lessons learned in upscaling if any	• Adoption of FFBS effective in technology dissemination and adoption • Strong PPP-Partnership is important in technology dissemination
Social, environmental, policy and market conditions necessary	• Important in the local diet – • Environmentally friendly resilient and climate smart. • There is availability of market: domestic and regional
D: Economic, gender, vulnerable and marginalized groups (VMGs) considerations	
Basic costs	-
Estimated returns	-
Gender issues and concerns in development, dissemination, adoption and scaling up	• Land ownership mainly by men and therefore women are not involved in decision making on the enterprises to do • Most farmer groups are composed of women and this may leave out the opinion and interests of men • Seed potato production is done by youth and women but marketing is done by the men so the money goes to the men
Gender related opportunities	• Seed potato has the potential to create employment for women and youth in harvesting, sorting, grading, packing and marketing Since it is highly demanded variety it creates opportunity for women in production, retailing, value addition and marketing • Trading in seed potato is profitable since seed potato has very high demand every season for potato production
VMG issues and concerns in development, dissemination, adoption and scaling up	• Lack of participation by all VMGS hence exclusion in decision making hence no benefits will accrue due to the project intervention • Negative impact of interventions from the inadequate intervention which include conflicts and elite capture in form of employment, grants or access to benefits that accrue from the proximity to the project, which isolates the needy communities • Communication barriers through language or non-availability of an expert in sign language interpretation
VMG related opportunities	• Capacity building for the VMGs in agri-business will ensure better participation in processing and marketing • Women and youth friendly fabrication of processing techniques and business incubation models • There exists opportunities for people living with disabilities; SMEs in seed potato production • SMEs which are led by VMG especially people living of disabilities are preference in capacity building or business development services • Since VMGs have conducive policy environment supported by the government, establishment of seed potato business incubation models will target them. • Capacity building for the VMGs in agri-business will ensure better participation in value addition and trade
E: Case studies/profiles of success stories	

Success stories from previous similar projects	
Application guidelines for users	*Clean the DLS with disinfectant few days before storage and let it dry very well Transport harvested seed potato/ purchased certified seed potato *sort and remove cut, bruised, rotting tubers, mother tubers, soil, stones and all plant debris *grade the seed tubers into sizes; size I,II or III *Arrange the seed tubers in shelves/crates on 1 to 2 layers. Do not mix the sizes, arrange each size separately This ensures proper air circulation and reduced condensation on tubers *If using crates, pile them on each other to maximize on available space
F: Status of TIMP readiness (1-ready for up-scaling; 2-requires validation; 3-requires further research**)**	1-Ready for up-scaling
G: Contacts	
Contacts	Centre Director, KALRO-Tigoni P.O. Box 338-00217, Limuru, Kenya Telephone: 0202023213 Mobile: 0727031783 E-mail: kalro.tigoni@kalro.org
Lead organization and scientists	KALRO-Tigoni,
Partner organizations	• Ministry of Agriculture, Livestock, Fisheries and Irrigation (MoALF&I) • International Potato Centre (CIP) • National Potato Centre of Kenya (NPCK) • International Centre for Insect Physiology and Ecology (ICIPE) • FAO (Food and Agriculture Organization) • Common Interest Groups (CIGs) • Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) • NGOs (CARE Kenya): (Farmer Input Promotion) • USAID FtF (United States Agency for International Agriculture-Feed the Future) • County governments • USAID Ftf

Technology name	**Ware potato storage**
Category (i.e. technology, innovation or management practice)	Technology
A: Description of the technology, innovation or management practice	

Problem to be addressed	High postharvest losses due to lack of ware potato storage Low household incomes as a result of glut in the market as farmers sell off potatoes quickly during peak production since they cannot store them
What is it? (TIMP description)	Ware potato storage is an improved store that is cost effective and made from locally available materials used to lengthen the shelf life of ware potatoes. The quality of the tubers after storage is good and farmers are able to negotiate for better prices in the market as they time to sell when supply is steady or low
Justification	• Potato is among the key food security crops alongside rice, maize, wheat and beans identified under the big four agenda. • Increasing population pressure demand more food to eat, with changing habits to potato and potato products, hence offering ready market • Ware potato storage leads to prolonged shelf life of some potato varieties hence contributing to steady supply of potatoes to the market even during offseason production. This enables the country to be food secure therefore attaining big four agenda, Kenya Vision 2030 and SDGs • Storage also directly affects household incomes since if potatoes can be stored just for a month or more after production, market prices improve significantly leading to increased household incomes of potato growers by up to 100% • Ware potato storage can be constructed using locally available material; environmental friendly; has very low running cost with a high turnover; has a market demand and can be used by all gender groups
B: Assessment of dissemination and scaling up/out approaches	
Users of TIMP	• Potato farmers • Small scale potato growers and SMEs • Other research organizations/institutions (universities) • Processors (Deeper Industries ltd; Propac Ltd, Sereni Fries Ltd, Twiga foods)
Approaches used in dissemination	• Farmer Participatory Evaluation exercises • On-farm demonstration • Field days • Agricultural shows • MoALFI/Extension officers • Partners (CIP, NPCK, FAO, ICIPE, GIZ) • Mobile phone text initiative • Farmer to farmer peer learning • Mass media – e.g. Mkulima programme, Smart Farmer, Seeds of Gold • Workshops, Seminars, Meetings, trainings • Promotional materials (posters/brochures/leaflets) • Social platform – twitter, google apps, Facebook

Critical/essential factors for successful promotion	• Capacity building of farmers, extension officers and other stakeholder on DLS on proper seed storage • Establishment of FFBS • Field demonstrations on poorly sprouted and DLS sprouted seed potato • funding by government to construct DLS in selected sites to promote storage and sprouting of certified seed potato at farm level
Partners/stakeholders for scaling up and their roles	• Ministry of Agriculture, Livestock, Fisheries & Irrigation (MoALF & I)-Extension and Capacity Building • CIP (International Potato Centre) – Collaborative research on potato variety development • ICIPE (International Centre for Insect Physiology and Ecology)– collaborative research on crop protection • FAO (Food and Agricultural Organization)- co-sharing of resources and networking and knowledge management • CIGs (Common Interest Groups)- back stopping the technologies at grass root levels • GIZ- Nutrition and potato utilization by the communities • NGOs (Non-governmental organization)(CARE Kenya): (Farmer Input Promotion) • USAID FtF (United States Agency for International Development-Feed the Future)
C: Current situation and future scaling up	
Counties where already promoted if any	• Traditional potato producing counties -Nyandarua, Nyeri, Kiambu, Taita Taveta, Nakuru, Bomet, Narok, Elgeyo Marakwet, Uasin Gishu, Bungoma, West Pokot, Nandi, Kisii; Murang'a, Baringo, Nyamira, Kirinyaga, Laikipia, and Kericho) • Emerging potato producing counties in mid-altitude AEZ - Samburu, Trans Nzoia, Makueni, Embu, Tharaka Nithi, Machakos, Kajiado, and Nairobi
Counties where TIMP will be up-scaled	Elgeyo Marakwet, Nyandarua, Nyeri, Taita Taveta, Bomet and Uasin Gishu
Challenges in dissemination	• Big challenge between information availability and accessibility • Non-exposure of the end-user to DLS
Recommendations for addressing the challenges	• Information dissemination – DLS • Scaling up participation of end-user in on-farm activities/adaptive research/extension activities • Promotion in potato growing areas. • Seed potato multiplication
Lessons learned in upscaling if any	• Adoption of FFBS effective in technology dissemination and adoption • Strong PPP-Partnership is important in technology dissemination
Social, environmental, policy and market conditions necessary for development and upscaling	• Important in the local diet – • Environmentally friendly resilient and climate smart. • There is availability of market: domestic and regional
D: Economic, gender, vulnerable and marginalized groups (VMGs) considerations	

Basic costs	-
Estimated returns	-
Gender issues and concerns in development dissemination, adoption and upscaling	• Land ownership mainly by men and therefore women are not involved in decision making on the enterprises to do • Most farmer groups are composed of women and this may leave out the opinion and interests of men • Seed potato production is done by youth and women but marketing is done by the men so the money goes to the men
Gender related opportunities	• Ware potato has the potential to create employment for women and youth in harvesting, sorting, grading, packing and marketing Since it is highly demanded variety it creates opportunity for women in production, retailing, value addition and marketing • Trading in seed potato is profitable since seed potato has very high demand every season for potato production
VMG issues and concerns in development, dissemination, adoption and upscaling	• Lack of participation by all VMGS hence exclusion in decision making hence no benefits will accrue due to the project intervention • Negative impact of interventions from the inadequate intervention which include conflicts and elite capture in form of employment, grants or access to benefits that accrue from the proximity to the project, which isolates the needy communities • Communication barriers through language or non-availability of an expert in sign language interpretation
VMG related opportunities	• Capacity building for the VMGs in agri-business will ensure better participation in processing and marketing • Women and youth friendly fabrication of processing techniques and business incubation models • There exists opportunities for people living with disabilities; SMEs in seed potato production • SMEs which are led by VMG especially people living of disabilities are preference in capacity building or business development services • Since VMGs have conducive policy environment supported by the government, establishment of Ware potato business incubation models will target them. • Capacity building for the VMGs in agri-business will ensure better participation in value addition and trade
E: Case studies/profiles of success stories	
Success stories from previous similar projects	-
Application guidelines for users	*Clean the ware store with disinfectant a month before bringing in new potatoes for storage and let it dry very well. Ensure ventilators are working well and there's no part allowing light in the store *Transport harvested potatoes from the field to the holding area. Let them remain there for 10 to 14 days to cure properly under natural ventilation.

	*sort and remove cut, bruised, rotting tubers, mother tubers, soil, stones and all plant debris. Where possible wash the tubers carefully not to bruise the tubers. *Let the tubers dry with natural air then package them in wooden boxes/crates and place them in the store. *Boxes can be piled on each other to maximize on space. Ensure the entire store is completely dark so that the tubers do not begin to green *minimize movement inside the storage to reduce amount of light entering inside *If it is cooler outside than inside, open door for an hour to allow natural ventilation of tubers *Check regularly for condensation which can enhance rotting. When condensation is seen, allow the door to remain open for an hour particularly at night to allow the tubers to dry. Check for rotting or sprouting tubers and remove
F: Status of TIMP readiness (1-ready for up-scaling; 2-requires validation; 3-requires further research**)**	1-ready for up-scaling
F: Contacts	
Contacts	Centre Director, KALRO-Tigoni P.O. Box 338-00217, Limuru, Kenya Telephone: 0202023213 Mobile: 0727031783 E-mail: kalro.tigoni@kalro.org
Lead organization and scientists	KALRO-Tigoni,
Partner organizations	• Ministry of Agriculture, Livestock, Fisheries and Irrigation (MoALF&I) • National Potato Centre of Kenya (NPCK) • FAO (Food and Agriculture Organization) • Common Interest Groups (CIGs) • Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) • USAID FtF (United States Agency for International Agriculture-Feed the Future) • County governments • USAID Ftf (United States Agency for International Development-Feed the Future)

Technology name	**Production of Potato starch**
Category (i.e. technology, innovation or management practice)	Technology
A: Description of the technology, innovation or management practice	
Problem addressed	During oversupply of potatoes, there are a lot of damages and bruises that cause potatoes to deteriorate in quality. This causes a lot of product

	losses which is usually passed on to the potato growers as loss in revenue
What is it? (TIMP description)	• Potato starch is a carbohydrate extracted from starch grains of potato tubers. Potato starch is refined, containing minimal fat or proteins giving it a clear white colour. Potato starch is used in making soups, gluten free recipes, cakes and cuisines. Potato starch has a neutral taste, good clarity, high binding strength, long texture with low tendencies to foaming or yellowing. Some potato starch is also produced as a byproduct from the potato processing industry, recovered from the potato cutting circuit during the production of French fries and potato chips
Justification	• Manufacturing is part of the big four agenda and potato starch extraction will benefit this industry. This will lead to creation of employment through industry growth, revenue increase through retailing the potato starch to culinary industries, instead allowing the oversupply of potatoes to go to waste. This product is environmental friendly; climate smart; and there's very high market demand for starch for industrial use
B: Assessment of dissemination and scaling up/out approaches	
Users of TIMP	• Potato farmers • Small scale potato growers and SMEs • Other research organizations/institutions (universities) • Processors (Deeper Industries ltd; Propac Ltd, Sereni Fries Ltd, Twiga foods)
Approaches used in dissemination	• Farmer Participatory Evaluation exercises • On-farm demonstration • Field days • Agricultural shows • MoALFI Extension officers • Partners (CIP, NPCK, FAO, ICIPE, GIZ) • Mobile phone text initiative • Farmer to farmer peer learning • Mass media -Mkulima programme, Smart Farmer and Seeds of Gold • Workshops, Seminars, Meetings, trainings • Promotional materials (posters/brochures/leaflets) • Social Media platforms – twitter, google apps, Facebook
Critical/essential factors for successful promotion	• Capacity building of farmers, extension officers and other stakeholder on potato starch extraction • funding by government to evaluate local varieties for high starch content for recommendation to end-users
Partners/stakeholders for scaling up	• Ministry of Agriculture, Livestock, Fisheries & Irrigation (MoALF & I)-Extension and Capacity Building • CIP (International Potato Centre) – Collaborative research on potato variety development • ICIPE (International Centre for Insect Physiology and Ecology)– collaborative research on crop protection

	• FAO (Food and Agricultural Organization)- co-sharing of resources and networking and knowledge management • CIGs (Common Interest Groups)- back stopping the technologies at grass root levels • GIZ- Nutrition and potato utilization by the communities • NGOs (Non-governmental organization)(CARE Kenya): (Farmer Input Promotion) • USAID FtF (United States Agency for International Development- Feed the Future)
C: Current situation and future scaling up	
Counties where already promoted if any	• Traditional potato producing counties-Nyandarua, Nyeri, Kiambu, Taita Taveta, Nakuru, Bomet, Narok, Elgeyo Marakwet, Uasin Gishu, Bungoma, West Pokot, Nandi, Kisii, Murang'a, Baringo, Nyamira, Kirinyaga, Laikipia, and Kericho • Emerging potato producing counties in mid-altitude AEZ (Samburu, Trans Nzoia, Makueni, Embu, Tharaka Nithi, Machakos, Kajiado, and Nairobi
Counties where TIMP will be up-scaled	Elgeyo Marakwet, Nyandarua, Nyeri, Taita Taveta, Bomet and Uasin Gishu
Challenges in dissemination	• Big challenge between information availability and accessibility • Non-exposure of the end-user to potato starch
Suggestions for addressing the challenges	• Information dissemination –Potato starch extraction • Scaling up participation of end-user in on-farm activities/adaptive research/extension activities • Promotion of starch extraction in potato growing areas.
Lessons learned in upscaling if any	• Adoption of FFBS effective in technology dissemination and adoption • Strong PPP-Partnership is important in technology dissemination
Social, environmental, policy and market conditions necessary for development and upscaling	• Important in the local diet – • Environmentally friendly resilient and climate smart. • There is availability of market: domestic and regional
D: Economic, gender, vulnerable and marginalized groups (VMGs) considerations	
Basic costs	-
Estimated returns	-
Gender issues and concerns in development, dissemination, adoption and upscaling	• Land ownership mainly by men and therefore women are not involved in decision making on the enterprises to do • Most farmer groups are composed of women and this may leave out the opinion and interests of men • Potato production is done by youth and women but marketing is done by the men so the money goes to the men
Gender related opportunities	• Potato has the potential to create employment for women and youth in production of starch and marketing • Awareness creation will create demand for starch, creating opportunity for women in production, retailing, and marketing • Trading in potato starch is profitable since starch has very high demand every season for industrial use

VMG issues and concerns in development, dissemination, adoption and upscaling	• Lack of participation by all VMGS hence exclusion in decision making hence no benefits will accrue due to the project intervention • Negative impact of interventions from the inadequate intervention which include conflicts and elite capture in form of employment, grants or access to benefits that accrue from the proximity to the project, which isolates the needy communities • Communication barriers through language or non-availability of an expert in sign language interpretation
VMG related opportunities	• Capacity building for the VMGs in agri-business will ensure better participation in processing and marketing • Women and youth friendly fabrication of processing techniques and business incubation models • There exists opportunities for people living with disabilities; SMEs in potato starch production • SMEs which are led by VMG especially people living of disabilities are preference in capacity building or business development services • Since VMGs have conducive policy environment supported by the government, establishment of seed potato business incubation models will target them. • Capacity building for the VMGs in agri-business will ensure better participation in value addition and trade
E: Case studies/profiles of success stories	
Success stories from previous similar projects	KALRO Tigoni extracted
Application guidelines for users	* Wash the selected potatoes thoroughly and peel using the knife *Grate the potatoes placing them in a container. Let the grated potatoes stay in the water for 10-15 minutes *Wash your hands thoroughly and rinse with clean water. *Afterwards, add 2 litres of water in the grated material and squeeze out the starch from the grated potatoes using a sieve and clean hands, transferring the material to a separate container and add 2 litres of water, let the material stay for 10-15 minutes again and squeeze to remove more starch. *Using a sieve, squeeze the grated potato material to be able to get as much starch as possible while collecting it in another container. Repeat the process once more to ensure all the starch has been squeezed out. *Collect all the water which has been strained 3 times and collected in separate containers in one container and allow it to settle for 60 minutes. You will be able to see white sludge at the bottom of the container. *Drain off the water carefully taking care not to pour out the sludge. Add clean water in the sludge and let it settle again for 30 minutes *Drain off the water carefully again and what is left is the white sludge that is wet starch

	*Spread the wet starch onto the tray and sundry the starch to powder form. During hot weather it will take 1-2 days to dry while during rainy season or chilly weather it may take longer
F: Status of TIMP readiness (1-ready for up-scaling; 2-requires validation; 3-requires further research	1-ready for up-scaling
F: Contacts	
Contacts	Centre Director, KALRO-Tigoni P.O. Box 338-00217, Limuru, Kenya Telephone: 0202023213 Mobile: 0727031783 E-mail: kalro.tigoni@kalro.org
Lead organization and scientists	KALRO-Tigoni,
Partner organizations	• Ministry of Agriculture, Livestock, Fisheries and Irrigation (MoALF&I) • National Potato Centre of Kenya (NPCK) • FAO (Food and Agriculture Organization) • Common Interest Groups (CIGs) • Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) • USAID FtF (United States Agency for International Agriculture-Feed the Future) • County governments

Technology name	**Zeba**
Category (i.e. technology, innovation or management practice)	Technology
A: Description of the technology, innovation or management practice	
Problem to be addressed	Drought that causes crop failure leading to food loss making vulnerable communities exposed to high risks of climate change and to suffer from food insecurity, particularly the women and the children Rainfall variation and in adequate due to climate change
What is it? (TIMP description)	Zeba is a soil enhancer that absorbs and releases moisture and nutrients only when plants need them, conserving water at a time when food producers are grappling with water shortage occasioned by changing weather patterns.
Justification	The water retention technology is based on a starch based absorbent which comes in form of granules. Each granule has ability to expand by 400 times its original size, trapping water and nutrients which are then released during dry spells while remaining effective for more than an year. Up to 95 per cent of the water held by the granules is released back to the soil. Zeba is also a climate smart technology

B: Assessment of dissemination and scaling up/out approaches	
Users of TIMP	• Ware Potato growers • SMEs • Other research organizations/institutions (universities) • County extension officers
Approaches used in dissemination	• Farmer Participatory Evaluation exercises • On-farm demonstration • Field days • Agricultural shows • MoALFI/Extension officers • Partners (CIP, NPCK, FAO, ICIPE, GIZ) • Mobile phone text initiative • Farmer to farmer peer learning • Mass media – e.g. Mkulima programme, Smart Farmer, Seeds of Gold • Workshops, Seminars, Meetings, trainings • Promotional materials (posters/brochures/leaflets) • Social Media platforms
Most effective approach	• On-farm trials/demonstrations • Farmer field days
Critical/essential factors for successful promotion	• Recruitment and support for SMEs for potato production • Field demonstrations
Partners/stakeholders for scaling up	• Ministry of Agriculture, Livestock, Fisheries & Irrigation (MoALF & I)-Extension and Capacity Building • CIP (International Potato Centre) – Collaborative research on potato variety development • ICIPE (International Centre for Insect Physiology and Ecology)– collaborative research on crop protection • FAO (Food and Agricultural Organization)- co-sharing of resources and networking and knowledge management • CIGs (Common Interest Groups)- back stopping the technologies at grass root levels • GIZ- Nutrition and potato utilization by the communities • NGOs (Non-governmental organization)-CARE Kenya: Farmer Input Promotion
C: Current situation and future scaling up	
Counties where already promoted if any	Nairobi
Counties where TIMP will be up-scaled	Elgeyo Marakwet, Nyandarua, Nyeri, Taita Taveta, Bomet and Uasin Gishu
Challenges in dissemination	• Lack of information about the existence of the technology
Recommendations for addressing the challenges	• Information dissemination - GAPs • Scaling up participation of end-user in on-farm activities/adaptive research/extension activities

Lessons learned in upscaling if any	• Adoption of FFBS effective in technology dissemination and adoption • Partnership is important in technology dissemination
Social, environmental, policy and market conditions necessary for development and upscaling	• Environmentally friendly resilient and climate smart. • There is availability of market:
D: Economic, gender, vulnerable and marginalized groups (VMGs) considerations	
Basic costs	Cost is KES 1,500 per Kg. (KES 7,500 for 5Kg/ acre)
Estimated returns	Expected increased production by 1/3 Returns KES 46200 less cost KES 7500= KES 38700
Gender issues and concerns in development, dissemination, adoption and scaling up	• Land ownership mainly by men and therefore women are not involved in decision making on the enterprises to do • Most farmer groups are composed of women and this may leave out the opinion and interests of men • Potato production is done by youth and women but marketing is done by the men so the money goes to the men
Gender related opportunities	• Potato has the potential to create employment for women and youth in harvesting, sorting, grading, packing and marketing Since it is highly demanded variety it creates opportunity for women in production, retailing, value addition and marketing • Trading in seed potato is profitable since seed potato has very high demand every season for potato production
VMG issues and concerns in development, dissemination and adoption and scaling up	• Lack of participation by all VMGS hence exclusion in decision making hence no benefits will accrue due to the project intervention • Negative impact of interventions from the inadequate intervention which include conflicts and elite capture in form of employment, grants or access to benefits that accrue from the proximity to the project, which isolates the needy communities • Communication barriers through language or non-availability of an expert in sign language interpretation
VMG related opportunities	• Capacity building for the VMGs in agri-business will ensure better participation in processing and marketing • Women and youth friendly fabrication of processing techniques and business incubation models • There exists opportunities for people living with disabilities; SMEs in seed potato production • SMEs which are led by VMG especially people living of disabilities are preference in capacity building or business development services • Since VMGs have conducive policy environment supported by the government, establishment of seed potato business incubation models will target them. • Capacity building for the VMGs in agri-business will ensure better participation in value addition and trade
E: Case studies/profiles of success stories	

Success stories from previous similar projects	-
Application guidelines for users	* Take 5kg of Zeba per acre and mix thoroughly with the recommended fertilizer
F: Status of TIMP readiness (1-ready for up-scaling; 2-requires validation; 3-requires further research	1-Ready for up-scaling
G: Contacts	
Contacts	NPCK
Lead organization and scientists	Centre Director, KALRO-Tigoni P.O. Box 338-00217, Limuru, Kenya Telephone: 0202023213 Mobile: 0727031783 E-mail: kalro.tigoni@kalro.org
Partner organizations	• Ministry of Agriculture, Livestock, Fisheries and Irrigation (MoALF&I) • National Potato Centre of Kenya (NPCK) • FAO (Food and Agriculture Organization) • Common Interest Groups (CIGs) • Deutsche Gesellschaft für Internationale Zusammenarbeit GIZ) • USAID FtF (United States Agency for International Agriculture-Feed the Future) • County governments • USAID Ftf (United States Agency for International Development-Feed the Future)

Technology name	**Viazi Soko**
Category (i.e. technology, innovation or management practice)	Technology
A: Description of the technology, innovation or management practice	
Problem to be addressed	Access to seed and market information by farmers and extension advisory messages
What is it? (TIMP description)	The Viazi Soko is an ICT platform developed by NPCK. Through the platform, farmers are able to query and access seed availability information such as; variety, quantity, price per kg, location and contacts of seed producer and market prices of potato from major towns
Justification	The platform will promote access of certified seed potato information, linkage of farmers to market outlets and send technical advisory messages to potato farmers.
B: Assessment of dissemination and scaling up/out approaches	
Users of TIMP	• Ware Potato growers • Seed producers

	• Potato buyers • Other research organizations/institutions (universities) • County extension officers
Approaches used in dissemination	• Field days/Trade fairs • MoALFI/Extension officers • Training of farmers/extension officers/other stakeholders • Local FM stations • Promotional materials (posters/fliers) • Social platform
Critical/essential factors for successful promotion	• Training of farmers/extension officers/other stakeholders • Field days/Trade fairs • Awareness through local FM stations and Fliers
Partners/stakeholders for scaling up	• Ministry of Agriculture, Livestock, Fisheries & Irrigation (MoALF & I) • CIP (International Potato Centre) – Collaborative research on potato variety development • ICIPE (International Centre for Insect Physiology and Ecology)– collaborative research on crop protection • FAO (Food and Agricultural Organization)- co-sharing of resources and networking and knowledge management • CIGs (Common Interest Groups)- back stopping the technologies at grass root levels • GIZ- Nutrition and potato utilization by the communities • NGOs (Non-governmental organization)(CARE Kenya): (Farmer Input Promotion) • AGRA (Alliance for a Green Revolution in Africa) • Kenya Metrological Department (KMD)
C: Current situation and future scaling up	
Counties where already promoted if any	Major potato producing counties (Meru, Nyandarua, Nyeri, Kiambu, Taita Taveta, Nakuru, Bomet, Narok, Elgeyo Marakwet, Uasin Gishu, Bungoma, Trans Nzoia and West pokot): Other potato producing counties: (Kisii, Nyamira, Kirinyaga, Nandi, Laikipia, and Kericho): other upcoming potato producing counties: (Samburu, Kwale, Makueni, Embu, Tharaka Nithi, Machakos, Kajiado, and Nairobi)
Counties where TIMP will be up-scaled	Elgeyo Marakwet, Nyandarua, Nyeri, Taita Taveta, Bomet and Uasin Gishu
Challenges in dissemination	• In adequate information about the existence of the technology
Suggestions for addressing the challenges	• Information dissemination – GAPs • Scaling up participation of end-user in on-farm activities/adaptive research/extension activities • Need to further reconfigure the platform to enabling it have more functionality such as: an option for consolidating input orders from farmer groups and cooperatives; integrating M-pesa option or any other agreed payment platform for making payments; allow for generation of reports and graphs for analysis; incorporation of Geographical Information System (GIS) into the platform for ease of locating farms, categorization

	of potato farmers and adding the weather prediction and pests and disease control advisory component
Lessons learned in upscaling if any	• Partnership is important in technology dissemination
Social, environmental, policy and market conditions necessary for development and upscaling	• Environmentally friendly resilient and climate smart. • There is availability of market:
D: Economic, gender, vulnerable and marginalized groups (VMGs) considerations	
Basic costs	Cost for further reconfiguration- KES 350,000 Cost for awareness creation through training of farmers/extensions/, and fliers KES 2,000,000
Estimated returns	Returns expected to increase by KES 10 billion from increased productivity and improved returns
Gender issues and concerns in development, dissemination, adoption and upscaling	• Land ownership mainly by men and therefore women are not involved in decision making on the enterprises to do • Most farmer groups are composed of women and this may leave out the opinion and interests of men • Seed potato production is done by youth and women but marketing is done by the men so the money goes to the men
Gender related opportunities	• Potato has the potential to create employment for women and youth in harvesting, sorting, grading, packing and marketing • Creating demand for potato varieties creates opportunities for women in production, retailing, value addition and marketing, hence more demand for information and registration to use the platform • Trading in seed potato is profitable since seed potato has very high demand every season for potato production
VMG issues and concerns in development. Dissemination, adoption and upscaling	• Lack of participation by all VMGS hence exclusion in decision making hence no benefits will accrue due to the project intervention • Negative impact of interventions from the inadequate intervention which include conflicts and elite capture in form of employment, grants or access to benefits that accrue from the proximity to the project, which isolates the needy communities • Communication barriers through language or non-availability of an expert in sign language interpretation on the platform
VMG related opportunities	• Capacity building for the VMGs in agri-business will ensure better participation in processing and marketing • Women and youth friendly fabrication of processing techniques and business incubation models • There exists opportunities for people living with disabilities; SMEs in seed potato production • SMEs which are led by VMG especially people living of disabilities are preference in capacity building or business development services

	• Since VMGs have conducive policy environment supported by the government, establishment of seed potato business incubation models will target them. • Capacity building for the VMGs in agri-business will ensure better participation in value addition and trade
E: Case studies/profiles of success stories	
Success stories from previous similar projects	-
Application guidelines for users	Farmers send SMS query and get feedback of information on seed and market prices
F: Status of TIMP readiness (1-ready for up-scaling; 2-requires validation; 3-requires further research	1-ready for up-scaling
G: Contacts	
Contacts	NPCK
Lead organization and scientists	Centre Director, KALRO-Tigoni P.O. Box 338-00217, Limuru, Kenya Telephone: 0202023213 Mobile: 0727031783 E-mail: kalro.tigoni@kalro.org,
Partner organizations	• Ministry of Agriculture, Livestock, Fisheries and Irrigation (MoALF&I) • National Potato Centre of Kenya (NPCK) • FAO (Food and Agriculture Organization) • Common Interest Groups (CIGs) • Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) • USAID FtF (United States Agency for International Agriculture-Feed the Future) • County governments • USAID Ftf (United States Agency for International Development-Feed the Future) • IFDC (International Fertilizer Development Centre) • KALRO (Kenya Agricultural and Livestock Research Organization)

TIMP = Technologies, Innovations and Management Practices

Gaps **Potato postharvest handling and value addition**

1. Diversification of potato products and recipes
2. Standards for potato products
3. Awareness creation of potato standards