INVENTORY OF CLIMATE SMART AGRICULTURE FINGER MILLET TECHNOLOGIES, INNOVATIONS & MANAGEMENT PRACTICES

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1.0 Definition of terms and summary tables of Finger Millet 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)

Summary of Inventory of TIMPs in the Finger Millet Value Chain

The inventory process resulted in a total of 29 TIMPs including 16 technologies, 8 innovations and 5 management practices, distributed among the 4 sub-themes, as indicated in Table 1

Commodity/VC	Sub-Theme	Technologies	Innovations	Management Practices
Finger Millet	Improved Finger Millet varieties	15	0	0
Finger Millet	Agronomic practices	0	0	5
Finger Millet	Postharvest management	1	0	0
Finger Millet	Value addition	0	8	0
Overall Total		**16**	**8**	**5**

1.2 Summary of Status of TIMPs in Finger Millet Value Chain

The inventory process resulted in a total of 23 TIMPs that are ready for up scaling, 6 TIMPs that require validation and all TIMPs require further research for better performance 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
Finger Millet	Improved Finger Millet varieties	12	3	Need to be improved in yield and resistance to abiotic and biotic stresses
Finger Millet	Agronomic practices	5	0	Require refinement to specific agro-ecologies and varieties
Finger Millet	Postharvest management	1	0	Requires improvement in efficiency
Finger Millet	Value addition	5	2	Require improved packaging
Overall Total		23	6	Can be improved

Table3: Inventory of Finger Millet TIMPs by Category and Status

TIMPs Sub-Theme	TIMPs Title	TIMPs Category	Status
2.1 Improved Finger Millet varieties			
	2.1.1 Finger Millet Variety Maridadi	Technology	Ready for up-scaling
	2.1.2 Finger Millet Variety KAK-Wimbi 1	Technology	Ready for up-scaling
	2.1.3 Finger Millet Variety KAK-Wimbi 3	Technology	Ready for up-scaling

	2.1.4 Finger Millet Variety KAK-Wimbi 2	Technology	Ready for up-scaling
	2.1.5 Finger Millet Variety KAK-Wimbi 4	Technology	Ready for up-scaling
	2.1.6 Finger Millet Variety P-224	Technology	Ready for up-scaling
	2.1.7 Finger Millet Variety KACIMMI 65	Technology	Requires validation
	2.1.8 Finger Millet Variety GBK 043254	Technology	Requires validation
	2.1.9 Finger Millet Variety KACIMMI 49	Technology	Requires validation
	2.1.10 Finger Millet Variety Nakuru 1	Technology	Ready for up-scaling
	2.1.11 Finger Millet Variety KAT FM 1	Technology	Ready for up-scaling
	2.1.12 Finger Millet Variety MSU FM 60D	Technology	Ready for up-scaling
	2.1.13 Finger Millet Variety EUFM 401	Technology	Ready for up-scaling
	2.1.14 Finger Millet Variety EUFM 502	Technology	Ready for up-scaling
	2.1.15 Finger Millet Variety EUFM 503	Technology	Ready for up-scaling
2.2 Agronomic practices	2.2.1 Planting Finger Millet in rows	Management Practice	Ready for up-scaling
	2.2.2. Use of fertilizer in finger millet cultivation	Management Practice	Ready for up-scaling
	2.2.3 Weed Management	Management Practice	Ready for up-scaling
	2.2.4 Herbicide Weed Control in Finger Millet	Management Practice	Requires validation
	2.2.5 Early season planting of Finger Millet	Management Practice	Requires validation
2.3Postharvest management	2.3.1 Thresher machine	Technology	Requires validation
2.4 Value addition	2.4.1 Finger Millet Crackie Food Product	Innovation	Ready for up-scaling
	2.4.2 Finger Millet Tamuu Paste Food Product	Innovation	Ready for up-scaling
	2.4.3 Finger Millet Onion bites Food Product	Innovation	Ready for up-scaling
	2.4.4 Finger Millet Cake Food Product	Innovation	Ready for up-scaling
	2.4.5 Finger Millet Chapati Food Product	Innovation	Ready for up-scaling
	2.4.6 Finger Millet Mandazi Food Product	Innovation	Ready for up-scaling
	2.4.7 Finger Millet Blended and Composite Flour Food Product	Innovation	Requires validation
	2.4.7 Finger Millet Biscuit Snack Food Product	Innovation	Requires validation

2.0 Detailed Finger millet Value chain TIMPS

2.1 Improved Finger Millet varieties

2.1.1 TIMP Name	Finger Millet Variety Maridadi
Category (i.e. technology, innovation or management practice)	Technology
A: Description of the technology, innovation or management practice	
Problem to be addressed	Low finger millet yield
What is it? (TIMP description) 	It is an early maturing (90 – 120 days) and high yielding variety (1,100 – 4,900 $kgha^{-1}$ depending on environment) that is resistant; to Blast, *Striga*, and lodging; and tolerant to drought. Its characteristic features include; brown grain colour and purple nodal pigmentation. Optimal environmental conditions: Rainfall (600-900mm annually), altitude (0 – 1500 m.a.s.l.) and soils (well-draining loams).
Justification	The variety, which was formally released in Kenya in 2015 is highly adopted in western Kenya. It is early maturing as demanded by farmers and breeders, high yielding, synchronous in maturity allowing one time harvesting, produces palatable and nutritious food products. Because of early maturity, it is drought escaping and thus assurance of produce. As a cereal, it provides food diversity and security e.g. unlike maize, it is not affected by maize lethal necrosis disease and Fall Army Worm. Significant seed stocks are available for immediate up-scaling.
B: Assessment of dissemination and scaling up/out approaches	
Users of TIMP	Farmers, extension agencies, processing industry, seed producers and traders
Approaches used in dissemination	• ToTs, Extension publications (leaflets, booklets, posters etc.) • FFS • Local FM Radio Stations • Farmer group training • On-farm experimentation • Field days • Agricultural shows and trade fairs • Farmer to farmer communication • Plot demonstrations • Distribution of small seed packets.
Critical/essential factors for successful promotion	Participatory Implementation, stakeholder capacity building, functioning seed system, stakeholder networks, effective extension services

Partners/stakeholders for scaling up and their respective roles.	• Public and private partners –[MOALF&I) for extension, • ICRISAT for technical backstopping and promotion; • FIPs (Farmer Input Promotion) for promotion • Farmer Groups for activity implementation and promotion • Service provider agencies e.g. Micro-finance agencies and banks for credit provision, agro-vets for input supply • Processors and manufacturers to create market for produce, aggregators e.g. CARD (Community Action for Rural Development) for economy of scale sales and marketing], and • Others e.g. NGOs, CBOs, and FBOs to provide specialist services like community mobilization, nutrition training etc.
C: Current situation and future scaling up	
Counties where already promoted if any	Western counties of Kakamega, Bungoma, Busia, and Siaya
Counties where TIMPs will be upscaled	Bomet, Kericho and West Pokot
Challenges in development and dissemination	• Negative attitude to crop in some segments of society (orphan crop); • Limited investment in crop; limited publicity; • Seed companies disinterest in pure-line-self-pollinating crops; • Limited utilization products; • Low investment in crop development research– especially along the value chain
Suggestions for addressing the challenges	• Investment in crop development (research, extension, processing, manufacturing and promotion); • Supportive policies like the recently passed blending policy, • Lifting of ban on traditional brews; • Positive publicity.
Lessons learned in up scaling, if any	Investments in the crop and participation of champions can enhance technology up-take – like the case of this technology in western Kenya; stakeholder linkages and participatory implementation is important.
Social, environmental, policy and market conditions necessary for development and up-scaling	• Finger millet is socially acceptable and any technology to increase its production will be readily adopted. • Enabling policy frameworks, in Big 4 Agenda, that requires the blending of high nutritive value food products, provides an enabling environment.

	• Awareness of the benefits/advantages/management of the technology to enhance acceptability for increased up take. • Existence of suitable bio-physical environments in target counties. • Availability of commodity market.
D: Economic, gender, vulnerable and marginalized groups (VMGs) considerations	
Basic costs	Per acre production cost KES 30,250/=
Estimated returns	Per acre returns KES 68,888/= and thus net benefit KES 38,638/=
Gender issues and concerns in development, dissemination adoption and scaling up	• Labour intensity in weeding, threshing and winnowing – mostly done by women, therefore likely to overburden them; • Grain sales also by women, likely to increase their incomes. • Most farmer groups composed of women – if targeted this may leave out the opinion and interests of men;
Gender related opportunities	• Increased production and sales results in increased incomes for both women and youth. • Youth could also benefit through application of ICT networking for marketing.
VMG issues and concerns in development, dissemination, adoption and scaling up	• Due to prejudices associated with their social status, VMGs are excluded from access to and benefits from improved technologies. Thus, affirmative action is required to promote the crop for the VMGs including value addition aspects. • The crop is important for food and nutrition security; therefore, there is need to adopt affirmative action targeting the VMGs for dissemination, adoption and consumption. • Production is labour intensive; thus, need for mechanization/labour saving interventions to assist the majority women farmers. • Enhance market linkages to trigger increased production to benefit VMGs.
VMG related opportunities	• Increased production will lead to increased consumption of nutritious finger millet, hence improved health of VMGs; • High value of crop will lead to economic empowerment of VMGs. • Changing consumer behavior leading to increased demand hence improved incomes for VMGs
E: Case studies/profiles of success stories	
Success stories	The case of McKnight Foundation funded project in western Kenya and stories of individual farmers e.g. Aliaro Mapesa of Eburaya village, Musanda Ward, Mumias Sub-County in Kakamega County. He

	adopted finger millet Maridadi variety and associated management practices and within a few years of farming 3 acres he had replaced a large chunk of his sugar cane crop with finger millet, producing enough for his household consumption and sales surplus for his financial needs. His family ate finger millet and their health improved; he bought household goods, paid school fees for his children and in two years moved from his grass thatched house to his new permanent house constructed out of finger millet proceeds. He also bought a dairy cow. Today, he lives a better life than he did before adopting finger millet technologies.
Application guidelines for users	Refer to the finger millet production leaflets in KALRO/ICRISAT e.g. Oduori C.O.A. 2018. Finger Millet Variety P-224: Plant Improved Finger Millet Varieties; Apply Good Agricultural Practices; Harvest More for Food and Money. KALRO FCRI, Kisii.
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 FCRI-Kisii; P.O. Box 523-40200, KISII; e-mail address: chrispus.oduori@kalro.org; Tel. +254 (0) 723 770 895/ +254 (0) 736 220 821
Lead organization and scientists	KALRO, Dr. Chrispus O.A. Oduori
Partner organizations	ICRISAT Nairobi; MoALF&I, County governments – Busia, Kakamega, Bungoma, and Siaya.

Gaps

1. Needs improvement to fit in wider agro-ecological zones
2. Needs improvement in yield and resistance to biotic and abiotic stresses.

2.1.2 TIMP Name	Finger Millet Variety KAK-Wimbi 1
Category (i.e. technology, innovation or management practice)	Technology
A: Description of the technology, innovation or management practice	
Problems to be addressed	- Low finger millet yield
What is it? (TIMP description)	It is a late maturing (88 – 138 days) and high yielding variety (1,140 – 6,670 $kgha^{-1}$ depending on environment). It is resistant to blast, Striga and lodging; and tolerant to drought. Characteristic features include; brown grain colour, purple nodal pigmentation, robust plant type, thick stem, and large open panicles.

	Optimal environmental conditions: Rainfall (600-900mm annually), altitude (0 – 2500 m.a.s.l.) and soils (well-draining loams).
Justification	The variety, which was released in Kenya in 2016, is very high yielding (1,140 – 6,670 $kgha^{-1}$ depending on environment) compared to the current commercial varieties yielding 1,200 - 4,900 kg/ha^{-1}, with wide adaptability (AEZ)
Counties where variety was tested and promoted	Western counties of Kakamega, Bungoma, Busia, and Siaya.
Counties where the TIMP will be promoted	Bomet, Kericho and West Pokot
B: Assessment of dissemination and scaling up/out approaches	
Users of TIMP	Farmers, extension agencies, seed producers and traders, processing industry and consumers
Approaches used in development and dissemination	• ToTs, Extension publications (leaflets, booklets, posters etc.) • FFS • Local FM Radio Stations • Farmer group training • On-farm experimentation • Field days • Agricultural shows and trade fairs • Farmer to farmer communication • Plot demonstrations • Distribution of small seed packets.
Critical/essential factors for successful promotion	Participatory implementation, stakeholder capacity building, functioning seed system, stakeholder networks and effective extension services.
Partners/stakeholders for scaling up and their respective roles.	• Public and private partners –[MOALF&I) for extension, • ICRISAT for technical backstopping and promotion; • FIPs (Farmer Input Promotion) for promotion • Farmer Groups for activity implementation and promotion • Service provider agencies e.g. Micro-finance agencies and banks for credit provision, agro-vets for input supply • Processors and manufacturers to create market for produce, aggregators e.g. CARD (Community Action for Rural Development) for economy of scale sales and marketing], and Others e.g. NGOs,

	CBOs, and FBOs to provide specialist services like community mobilization, nutrition training etc.
C: Current situation and future scaling up	
Counties where already promoted if any	Western Kenya counties of Kakamega, Bungoma, Busia, and Siaya.
Counties where TIMPs will be up-scaled	Bomet, Kericho and West Pokot
Challenges in development and dissemination	Negative attitude to the crop in some segments of society (orphan crop); limited investment in crop; limited publicity; seed companies disinterest in pure-line-self pollinating crops; limited utilization products; low research investment.
Suggestions for addressing the challenges	Investment in crop development (research, extension, processing and manufacturing); supportive policies like the recently passed blending policy, lifting of ban on traditional brews; positive publicity.
Lessons learned in up scaling, if any	Investments in the crop and participation of champions enhance technology up-take – like the case of this technology in western Kenya; stakeholder linkages and participatory implementation is important.
Social, environmental, policy and market conditions necessary for development and up-scaling	Gender inclusiveness in crop research and development; Capacity building of stakeholders; understanding the physical and biotic environment in target ecologies; understanding community culture, preferences, and practices
D: Economic, gender, vulnerable and marginalized groups (VMGs) considerations	
Basic costs	Per acre production cost KES 30,250/=
Estimated returns	Per acre returns KES 76,161/= and thus net benefit KES 45,911/=
Gender issues and concerns in development, dissemination, adoption and scaling up	Labour intensity in weeding, threshing and winnowing – mostly done by women; therefore likely to overburden them; Grain sold by women and most of the cash retained by them; thus, increased production and marketing likely to improve the women's livelihood. Most farmer groups composed of women – if targeted this may leave out the opinion and interests of men
Gender related opportunities	- Enhance women training for improved performance - Increased incomes for Women from increased grain sales (this is considered largely as a women's crop). - Youth could also benefit through application of ICT networking for marketing.
VMG issues and concerns in development, dissemination, adoption and scaling up	Due to prejudice associated with their social status, VMGs are excluded from access to and benefits from improved technologies. Thus, affirmative action is required to promote the crop for the VMGs including value addition aspects. The crop is important for food and nutrition security therefore is need to adopt

	affirmative action targeting the VMGs for dissemination, adoption and consumption. Labour intensity and thus need for mechanization/ labour saving interventions; markets for increased production
VMG related opportunities	- Increased production will lead to increased consumption of nutritious finger millet, hence improved health of VMGs; - High value of crop will lead to economic empowerment of VMGs. - Changing consumer behavior leading to increased demand hence improved incomes for VMGs
E: Case studies/profiles of success stories	
Success stories	The case of McKnight Foundation funded project in western Kenya and stories of individual farmers e.g. Julius Kwoba in Nambale, Busia County.
Application guidelines for users	Refer to the finger millet production leaflets in KALRO/ICRISAT e.g. Oduori C.O.A. 2018. Finger Millet Variety P-224: Plant Improved Finger Millet Varieties; Apply Good Agricultural Practices; Harvest More for Food and Money. KALRO FCRI, Kisii.
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 – FCRI Kisii P.O. Box 523-40200, KISII; e-mail address: chrispus.oduori@kalro.org; Tel. +254 (0) 723 770 895/ +254 (0) 736 220 821
Lead organization and scientists	KALRO, Dr. Chrispus O.A. Oduori
Partner organizations	ICRISAT Nairobi; MoALF&I, Counties Governments of Busia, Kakamega, Bungoma, and Siaya.

Gaps

1. Needs improvement in organoleptic taste
2. Needs improvement in yield and resistance to biotic and abiotic stresses
3. Needs reduction in maturity period for low moisture environments

2.1.3 TIMP Name	Finger Millet Variety KAK-Wimbi 3
Category (i.e. technology, innovation or management practice)	Technology
A: Description of the technology, innovation or management practice	
Problems to be addressed	- Low finger millet yield
What is it? (TIMP description)	It is a late maturing (87 – 130 days) and high yielding variety (1290 – 6,350 $kgha^{-1}$ depending on environment); resistant to blast, Striga and lodging; and, tolerant to drought. Characteristic features include; brown grain

	colour, purple nodal pigmentation, robust plant type, thick stem, and large open panicles. Optimal environmental condition: Rainfall (600-900mm annually), altitude (0 – 2500 m.a.s.l.) and soils (well-draining loams).
Justification	The variety, which was released in Kenya in 2016, is very high yielding (1290 – 6,350 $kgha^{-1}$ depending on environment) compared to the current commercial varieties yields of 1200 - 4,900kg/ha^{-1}, with wide adaptability (AEZ)
Counties where variety was tested and promoted	Western counties of Kakamega, Bungoma, Busia, and Siaya.
Counties where the TIMP will be promoted	Bomet, Kericho and West Pokot
B: Assessment of dissemination and scaling up/out approaches	
Users of TIMP	Farmers, extension agencies, seed producers, traders, processing industry and consumers
Approaches used in development and dissemination	Hybridization breeding and pure line selection, Not yet disseminated but On-farm experimentation and demonstration, field days, shows, farmer to farmer communication, leaflets, larger plot demonstrations will be applied.
Critical/essential factors for successful promotion	Participatory implementation, stakeholder capacity building, functioning seed system, stakeholder networks and effective extension services.
Partners/stakeholders for scaling up and their respective roles.	• Public and private partners –[MOALF&I) for extension, • ICRISAT for technical backstopping and promotion; • FIPs (Farmer Input Promotion) for promotion • Farmer Groups for activity implementation and promotion • Service provider agencies e.g. Micro-finance agencies and banks for credit provision, agro-vets for input supply • Processors and manufacturers to create market for produce, aggregators e.g. CARD (Community Action for Rural Development) for economy of scale sales and marketing], and Others e.g. NGOs, CBOs, and FBOs to provide specialist services like community mobilization, nutrition training etc.
C: Current situation and future scaling up	

Counties where already promoted if any	Western counties of Kakamega, Bungoma, Busia, and Siaya.
Counties where TIMPs will be up-scaled	Bomet, Kericho and West Pokot
Challenges in development and dissemination	Negative attitude to the crop in some segments of society (orphan crop); limited investment in crop; limited publicity; seed companies disinterest in pure-line-self-pollinating crops; limited utilization products; low research investment.
Suggestions for addressing the challenges	Investment in crop development (research, extension, processing and manufacturing); supportive policies like the recently passed blending policy, lifting of ban on traditional brews; positive publicity.
Lessons learned in up scaling, if any	Investment in the crop and participation of champions enhances technology up-take – like the case of this technology in western Kenya; stakeholder linkages and participatory implementation is important.
Social, environmental, policy and market conditions necessary	Gender inclusiveness in crop research and development; Capacity building of stakeholders; understanding of the physical and biotic environment in target ecologies; understanding community culture, preferences, and practices
D: Economic, gender, vulnerable and marginalized groups (VMGs) considerations	
Basic costs	Per acre production cost KES 30,250/=
Estimated returns	Per acre returns KES 72,280/= and thus net benefit KES 42,030/=
Gender issues and concerns in development and dissemination adoption and scaling up	Labour intensity in weeding, threshing and winnowing – mostly done by women; therefore likely to overburden them; Grain sold by women and most of the cash retained by them; thus, increased production and marketing likely to improve the women's livelihood. Most farmer groups composed of women – if targeted this may leave out the opinion and interests of men;
Gender related opportunities	-Increased incomes for Women from increased grain sales (this is considered largely as a women's crop). - Youth could also benefit through application of ICT networking for marketing.
VMG issues and concerns in development and dissemination adoption and scaling up	The crop is important for food and nutrition security; therefore need to adopt affirmative action targeting the VMGs for dissemination, adoption and consumption. Labour intensity and thus need for mechanization/ labour saving interventions; markets for increased production
VMG related opportunities	- Increased production will lead to increased consumption of nutritious finger millet, hence improved health of VMGs; high value of crop will lead to economic empowerment of VMGs. - Changing consumer behavior leading to increased demand hence improved incomes for VMGs
E: Case studies/profiles of success stories	

Success stories	The case of McKnight Foundation funded project in western Kenya and stories of individual farmers e.g. Julius Kwoba in Nambale, Busia County.
Application guidelines for users	Refer to the finger millet production leaflets in KALRO/ICRISAT e.g. Oduori C.O.A. 2018. Finger Millet Variety P-224: Plant Improved Finger Millet Varieties; Apply Good Agricultural Practices; Harvest More for Food and Money. KALRO FCRI, Kisii.
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 – FCRI Kisii P.O. Box 523-40200, KISII; e-mail address: chrispus.oduori@kalro.org; Tel. +254 (0) 723 770 895/ +254 (0) 736 220 821
Lead organization and scientists	KALRO, Dr. Chrispus O.A. Oduori
Partner organizations	ICRISAT Nairobi; MoALF&I, Counties Governments of Busia, Kakamega, Bungoma, and Siaya.

Gaps

1. Needs improvement in organoleptic taste
2. Needs improvement in yield and resistance to biotic and abiotic stresses
3. Needs reduction in maturity period for low moisture environments

2.1.4 TIMP Name	Finger Millet Variety KAK-Wimbi 2
Category (i.e. technology, innovation or management practice)	Technology
A: Description of the technology, innovation or management practice	
Problemsto be addressed	- Low finger millet yield
What is it? (TIMP description) 	It is a late maturing (88 – 131 days) and high yielding variety (1320 – 6,060kgha^{-1} depending on environment); that is resistant to; blast, Striga and lodging; and, tolerant to drought. Its characteristic features include; dark brown grain colour, deep purple plant pigmentation, erect plant type, medium size straight panicles. Optimal environmental conditions: Rainfall (600-900mm annually), altitude (0 – 2500 m.a.s.l.) and soils (well-draining loams).
Justification	The variety, which was released in Kenya in 2016, is very high yielding (1320 – 6,060 kgha^{-1} depending on environment) compared to the current commercial varieties (1200 - 4,900kg/ha^{-1}), respectively, with wide adaptability (AEZ)
Counties where variety was tested and promoted	Not yet extensively tested.

Counties where the TIMP will be promoted	Western Kenya counties of Kakamega, Bungoma, Busia, Nyamira, Kisii, Migori, Bomet, Kericho and West Pokot
B: Assessment of dissemination and scaling up/out approaches	
Users of TIMP	Farmers, extension agencies, seed producers traders, processing industry and consumers
Approaches used in development and dissemination	Hybridization breeding and pure line selection, Not yet disseminated but On-farm experimentation and demonstration, field days, shows, farmer to farmer communication, leaflets, larger plot demonstrations will be applied.
Most effective approach	On-farm experimentation and larger plot effect demonstrations.
Critical/essential factors for successful promotion	Participatory implementation, stakeholder capacity building, functioning seed system, stakeholder networks and effective extension services.
Partners/stakeholders for scaling up and their respective roles.	• Public and private partners –[MOALF&I) for extension, • ICRISAT for technical backstopping and promotion; • FIPs (Farmer Input Promotion) for promotion • Farmer Groups for activity implementation and promotion • Service provider agencies e.g. Micro-finance agencies and banks for credit provision, agro-vets for input supply • Processors and manufacturers to create market for produce, aggregators e.g. CARD (Community Action for Rural Development) for economy of scale sales and marketing], and Others e.g. NGOs, CBOs, and FBOs to provide specialist services like community mobilization, nutrition training etc.
C: Current situation and future scaling up	
Current extent of reach	Not yet extensively disseminated, except in few locations in western Kenya.
Challenges in development and dissemination	Negative attitude to the crop in some segments of society (orphan crop); limited investment in crop; limited publicity; seed companies disinterest in pure-line-self-pollinating crops; limited utilization products; low research investment.
Suggestions for addressing the challenges	Investment in crop development (research, extension, processing and manufacturing); supportive policies like the recently passed

	blending policy, lifting of ban on traditional brews; positive publicity.
Lessons learned in up scaling, if any	Investments in the crop and participation of champions enhance technology up-take – like the case of this technology in western Kenya; stakeholder linkages and participatory implementation is important.
Social, environmental, policy and market conditions necessary	Gender inclusiveness in crop research and development; Capacity building of stakeholders; understanding the physical and biotic environment in target ecologies; understanding community culture, preferences, and practices
D: Economic, gender, vulnerable and marginalized groups (VMGs) considerations	
Basic costs	Per acre production cost KES 30,250/=
Estimated returns	Per acre returns KES 71,300/= and thus net benefit KES 41,050/=
Gender issues and concerns in development and dissemination, adoption and scaling up	Labour intensity in weeding, threshing and winnowing – mostly done by women; therefore likely to overburden them; Grain sold by women and most of the cash retained by them; thus, increased production and marketing likely to improve the women's livelihood. Most farmer groups composed of women – if targeted this may leave out the opinion and interests of men;
Gender related opportunities	- Enhance women training for improved performance - Increased incomes for Women from increased grain sales (this is considered largely as a women's crop). - Youth could also benefit through application of ICT networking for marketing.
VMG issues and concerns in development and dissemination adoption and scaling up	- The crop is important for food and nutrition security; therefore need to adopt affirmative action targeting the VMGs for dissemination, adoption and consumption. - Labour intensity and thus need for mechanization/ labour saving interventions; markets for increased production
VMG related opportunities	- Increased production will lead to increased consumption of nutritious finger millet, hence improved health of VMGs; high value of crop will lead to economic empowerment of VMGs. - Changing consumer behavior leading to increased demand hence improved incomes for VMGs
E: Case studies/profiles of success stories	
Success stories	Not yet extensively disseminated..

Application guidelines for users	Refer to the finger millet production leaflets in KALRO/ICRISAT e.g. Oduori C.O.A. 2018. Finger Millet Variety P-224: Plant Improved Finger Millet Varieties; Apply Good Agricultural Practices; Harvest More for Food and Money. KALRO FCRI, Kisii.
F: Status of TIMP Readiness (1. Ready for up-scaling; 2. Requires validation; 3. Requires further research)	Ready for up-scaling with validation in areas it has not been disseminated.
G: Contacts	
Contacts	Centre Director KALRO – FCRI Kisii, P.O. Box 523-40200, KISII; e-mail address: chrispus.oduori@kalro.org; Tel. +254 (0) 723 770 895/ +254 (0) 736 220 821
Lead organization and scientists	KALRO, Dr. Chrispus O.A. Oduori
Partner organizations	ICRISAT Nairobi; MoALF&I, Counties Governments of Busia, Kakamega, Bungoma, Siaya, Bomet, Kericho, and West Pokot.

Gaps

1. Needs improvement in yield and resistance to biotic and abiotic stresses
2. Needs reduction in maturity period for low moisture environments
3. Needs enhancement in vigour

2.1.5 TIMP Name	Finger Millet Variety KAK-Wimbi 4
Category (i.e. technology, innovation or management practice)	Technology
A: Description of the technology, innovation or management practice	
Problems to be addressed	- Low finger millet yield
What is it? (TIMP description) 	It is a late maturing (87 – 130 days) and high yielding variety (1400 – 5500 kgha^{-1} depending on environment); that is tolerant to blast and drought, and resistant to Striga and lodging. Its characteristic features include; brown grain colour, dark green robust erect plant type, and large open incurved panicles. Optimal environmental conditions: Rainfall (600-900mm annually), altitude (0 – 2500 m.a.s.l.) and soils (well-draining loams).
Justification	The variety, which was released in Kenya in 2016, is very high yielding (1400 – 5,500 kgha^{-1}) compared to the current commercial varieties (1200 - 4,900kg/ha^{-1}), depending on environment) versus respectively, with wide adaptability (AEZ)
Counties where already promoted if any	Tested in western counties of Kakamega, Bungoma, Busia, and Siaya with limited dissemination.

Counties where TIMP will be upscaled	Western Kenya counties of Kakamega, Bungoma, Busia, Nyamira, Kisii, Migori, Bomet, Kericho and West Pokot
B: Assessment of dissemination and scaling up/out approaches	
Users of TIMP	Farmers, extension agencies, seed producers traders, processing industry and consumers
Approaches used in development and dissemination	Hybridization breeding and pure line selection, Not yet disseminated but On-farm experimentation and demonstration, field days, shows, farmer to farmer communication, leaflets, larger plot demonstrations will be applied.
Most effective approach	On-farm experimentation and larger plot effect demonstrations.
Critical/essential factors for successful promotion	Participatory implementation, stakeholder capacity building, functioning seed system, stakeholder networks and effective extension services.
Partners/stakeholders for scaling up and their respective roles.	• Public and private partners –[MOALF&I) for extension, • ICRISAT for technical backstopping and promotion; • FIPs (Farmer Input Promotion) for promotion • Farmer Groups for activity implementation and promotion • Service provider agencies e.g. Micro-finance agencies and banks for credit provision, agro-vets for input supply • Processors and manufacturers to create market for produce, aggregators e.g. CARD (Community Action for Rural Development) for economy of scale sales and marketing], and Others e.g. NGOs, CBOs, and FBOs to provide specialist services like community mobilization, nutrition training etc.
C: Current situation and future scaling up	
Challenges in development and dissemination	Negative attitude to the crop in some segments of society (orphan crop); limited investment in crop; limited publicity; seed companies disinterest in pure-line-self-pollinating crops; limited utilization products; low research investment.
Suggestions for addressing the challenges	Investment in crop development (research, extension, processing and manufacturing); supportive policies like the recently passed blending policy, lifting of ban on traditional brews; positive publicity.
Lessons learned in up scaling, if any	Investment in the crop and participation of champions enhances technology up-take – like the case of this technology in western Kenya;

	stakeholder linkages and participatory implementation is important.
Social, environmental, policy and market conditions necessary	Gender inclusiveness in crop research and development; Capacity building of stakeholders; understanding the physical and biotic environment in target ecologies; understanding community culture, preferences, and practices
D: Economic, gender, vulnerable and marginalized groups (VMGs) considerations	
Basic costs	Per acre production cost KES 30,250/=
Estimated returns	Per acre returns KES 72,000/= and thus net benefit KES 41,750/=
Gender issues and concerns in development, dissemination, adoption, and scaling up	Labour intensity in weeding, threshing and winnowing – mostly done by women; therefore likely to overburden them; Grain is sold by women and most of the cash retained by them; thus, increased production and marketing likely to improve the women's livelihood. Most farmer groups composed of women – if targeted this may leave out the opinion and interests of men
Gender related opportunities	- Increased incomes for Women from increased grain sales (this is considered largely as a women's crop). - Youth could also benefit through application of ICT networking for marketing.
VMG issues and concerns in development, dissemination, adoption and scaling up	Due to prejudice associated with their social status, VMGs are excluded from access to and benefits from improved technologies. Thus, affirmative action is required to promote the crop for the VMGs including value addition aspects. The crop is important for food and nutrition security; therefore need to adopt affirmative action targeting the VMGs for dissemination, adoption and consumption. Labour intensity and thus need for mechanization/ labour saving interventions; markets for increased production
VMG related opportunities	- Increased production will lead to increased consumption of nutritious finger millet, hence improved health of VMGs; high value of crop will lead to economic empowerment of VMGs. - Changing consumer behavior, leading to increased demand hence improved incomes for VMGs
E: Case studies/profiles of success stories	
Success stories	The case of McKnight Foundation funded project in western Kenya and stories of individual farmers e.g. Julius Kwoba in Nambale, Busia County.
Application guidelines for users	Refer to the finger millet production leaflets in KALRO/ICRISAT e.g. Oduori C.O.A. 2018. Finger Millet Variety P-224: Plant Improved

	Finger Millet Varieties; Apply Good Agricultural Practices; Harvest More for Food and Money. KALRO FCRI, Kisii.
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 – FCRI Kisii, P.O. Box 523-40200, KISII; e-mail address: chrispus.oduori@kalro.org; Tel. +254 (0) 723 770 895/ +254 (0) 736 220 821
Lead organization and scientists	KALRO, Dr. Chrispus O.A. Oduori
Partner organizations	ICRISAT Nairobi; MoALF&I, Counties Governments of Busia, Kakamega, Bungoma, and Siaya.

Gaps

1. Needs improvement in blast disease resistance
2. Needs improvement in yield and resistance to biotic and abiotic stresses
3. Needs reduction in maturity period for low moisture environments

2.1.6TIMP Name	Finger Millet Variety P-224
Category (i.e. technology, innovation or management practice)	Technology
A: Description of the technology, innovation or management practice	
Problem addressed	- Low finger millet yield.
What is it? (TIMP description) 	A high yielding finger millet variety (1200 - 4,900kg/ha^{-1}, depending on environment) that is moderately early in maturity (95 – 125 days). Characteristic features include brown grain colour with no anthocyanins (colours) on leaves, nodes, and panicles. Also, it has large open panicles with prominent grains; it is prone to post maturity lodging, moderately susceptible to blast disease and susceptible to Striga. Optimal environmental conditions: Rainfall (600-900mm annually), altitude (0 – 2500 m.a.s.l.) and soils (well-draining loams)..Has wide environmental adaptability.
Justification	-The first formally released variety in Kenya in 1991; one of few whose seed is certified by KEPHIS and commercially produced by Kenya Seed Company and KALRO Seed Unit; very high yielding under favourable conditions; significant seed stocks available.
Counties where TIMP will be promoted	Bomet, Kericho and West Pokot.
B: Assessment of dissemination and scaling up/out approaches	

Users of TIMP	Farmers, extension agencies, seed producers traders, and consumers
Approaches used in dissemination	On-farm experimentation and dissemination, field days, shows, farmer to farmer communication, leaflets, larger plot demonstrations.
Most effective approach	On-farm experimentation and larger plot effect demonstrations.
Critical/essential factors for successful promotion	Participatory Implementation, stakeholder capacity building, Functioning seed system, Stakeholder networks and efficient extension service.
Partners/stakeholders for scaling up and their respective roles.	• Public and private partners –[MOALF&I) for extension, • ICRISAT for technical backstopping and promotion; • FIPs (Farmer Input Promotion) for promotion • Farmer Groups for activity implementation and promotion • Service provider agencies e.g. Micro-finance agencies and banks for credit provision, agro-vets for input supply • Processors and manufacturers to create market for produce, aggregators e.g. CARD (Community Action for Rural Development) for economy of scale sales and marketing], and Others e.g. NGOs, CBOs, and FBOs to provide specialist services like community mobilization, nutrition training etc.
C: Current situation and future scaling up	
Current extent of reach	Western Kenya counties of Kakamega, Bungoma, Busia and Siaya. Many other pockets in the country where seed has penetrated also grow the variety.
Challenges in development and dissemination	Negative attitude to crop in some segments of society (orphan crop); limited investment in crop; limited publicity; seed companies disinterest in pure-line-self-pollinating crops; limited utilization products; low research investment.
Recommendations for addressing the challenges	Investment in crop development (research, extension, processing and manufacturing); supportive policies like the recently passed blending policy, lifting of ban on traditional brews; positive publicity.
Lessons learned in up-scaling if any?	Investments in the crop and participation of champions can enhance technology up-take – like the case of this technology in western Kenya; stakeholder linkages and participatory implementation is important.
Social, environmental, policy and market conditions necessary	Gender inclusiveness in crop research and development; Capacity building of stakeholders; understanding the physical and biotic environment

	in target ecologies; understanding community culture, consumer preferences and social practices.
D: Economic, gender, vulnerable and marginalized groups (VMGs) considerations	
Basic costs	Per acre production cost KES 30,250/=
Estimated returns	Per acre returns KES 63,000/= and thus net benefit KES 32,750/=
Gender issues and concerns in development, dissemination, adoption and scaling up	Labour intensity in weeding, threshing and winnowing (variety has poor threshability and dusty thus aggravating labour intensity) – mostly done by women; Grain sales also done by women; therefore likely to overburden them but also benefit them and likely to improve the women's livelihood. . Most farmer groups composed of women – if targeted this may leave out the opinion and interests of men
Gender issues and concerns in development and dissemination adoption and scaling up	Labour intensity in weeding, threshing and winnowing – mostly done by women; therefore likely to overburden them; Grain sold by women and most of the cash retained by them; thus, increased production and marketing likely to improve the women's livelihood. Most farmer groups composed of women – if targeted this may leave out the opinion and interests of men;
Gender related opportunities	- Enhance women training for improved performance - Increased incomes for Women from increased grain sales (this is considered largely as a women's crop). - Youth also stand to benefit through application of ICT networking for marketing.
VMG issues and concerns in development, dissemination, adoption and scaling up	Due to prejudice associated with their social status, VMGs are excluded from access to and benefits from improved technologies. Thus, affirmative action is required to promote the crop for the VMGs including value addition aspects. Labour intensity and thus need for mechanization/ labour saving interventions; markets for increased production
VMG related opportunities	Increased production will lead to increased consumption of nutritious finger millet, hence improved health of VMGs; high value of crop will lead to economic empowerment of VMGs
E: Case studies/profiles of success stories	
Success stories	The case of McKnight Foundation funded project in western Kenya and stories of individual farmers e.g. Julius Kwoba in Nambale, Busia County.
Application guidelines for users	Finger millet variety P-224 production leaflet
F: **Status of TIMP Readiness (1. Ready for up-scaling; 2. Requires**	Ready for up-scaling as improvement for resistance (blast disease, Striga, and lodging) and improved threshability.

validation; 3. Requires further research)	
G: Contacts	
Contacts	Centre Director KALRO – FCRI Kisii, P.O. Box 523-40200, KISII; e-mail address: chrispus.oduori@kalro.org; Tel. +254 (0) 723 770 895/ +254 (0) 736 220 821
Lead organization and scientists	KALRO, Dr. Chrispus O.A. Oduori
Partner organizations	ICRISAT Nairobi; MoALF&I in Counties – Busia, Kakamega, Bungoma, and Siaya.

Gaps

1. Needs improvement in blast, Striga, drought, and lodging resistance
2. Needs improvement in yield and resistance to biotic and abiotic stresses
3. Needs reduction in maturity period for low moisture environments

2.1.7 TIMP Name	Finger Millet Variety KACIMMI 65
Category (i.e. technology, innovation or management practice)	Technology
A: Description of the technology, innovation or management practice	
Problems to be addressed	- Late maturity in mid to low moisture supply areas; Finger millet low yield.
	It is an early maturing (87 – 118 days) and high yielding variety (1,335 – 4,010 kgha^{-1} depending on environment) that is resistant; to Blast, *Striga*, and lodging; and tolerant to drought. Its characteristic features include; brown grain colour and with no pigmentation. Optimal environmental conditions: Rainfall (600-900mm annually), altitude (0 – 2,000 m.a.s.l.) and soils (well-draining loams). **Features:-** Brown grain colour; no pigmentation; medium height; high tillering; medium size open panicles
Justification	-Variety in National Performance Trials and has potential for release to serve short rain season areas in Kenya; very high yielding variety with wide adaptability.
B: Assessment of dissemination and scaling up/out approaches	
Users of TIMP	Farmers, extension agencies, seed producers traders, and consumers
Approaches used in dissemination	Not yet disseminated but method used in dissemination of successful technologies to be adopted i.e. On-farm experimentation and dissemination, field days, shows, farmer to farmer communication, leaflets, larger plot demonstrations.
Most effective approach	On-farm experimentation and larger plot effect demonstrations to be adopted.

Critical/essential factors for successful promotion	Participatory Implementation, stakeholder capacity building, Functioning seed system, Stakeholder networks
Partners/stakeholders for scaling up and their respective roles	• Public and private partners –[MOALF&I) for extension, • ICRISAT for technical backstopping and promotion; • FIPs (Farmer Input Promotion) for promotion • Farmer Groups for activity implementation and promotion • Service provider agencies e.g. Micro-finance agencies and banks for credit provision, agro-vets for input supply • Processors and manufacturers to create market for produce, aggregators e.g. CARD (Community Action for Rural Development) for economy of scale sales and marketing], and Others e.g. NGOs, CBOs, and FBOs to provide specialist services like community mobilization, nutrition training etc.
C: Current situation and future scaling up	
Counties where already promoted if any	Not yet promoted as it is still undergoing verification in National Performance Trials.
Counties where TIMPs will be upscaled	Bomet, Kericho and West Pokot
Challenges in development and dissemination	Not yet disseminated but expected challenges :- Negative attitude to crop in some segments of society (orphan crop); limited investment in crop; limited publicity; seed companies disinterest in pure-line-self-pollinating crops; limited utilization products; low research; expanse of potential beneficiary and distance from source investment
Recommendations for addressing the challenges	Investment in crop development (research, extension, processing and manufacturing); supportive policies like the recently passed blending policy, lifting of ban on traditional brews; positive publicity.
Lessons learned	Not yet disseminated but anticipated - Investments in the crop and participation of champions can enhance technology up-take – like the case of this technology in western Kenya; stakeholder linkages and participatory implementation is important.
Social, environmental, policy and market conditions necessary	Gender inclusiveness in crop research and development; capacity building of stakeholders; understanding the physical and biotic environment in target ecologies; understanding community culture, preferences, and practices
D: Economic, gender, vulnerable and marginalized groups (VMGs) considerations	

Basic costs	Production cost data yet to be estimated
Estimated returns	Estimated Production returns data yet to be estimated
Gender issues and concerns in development, dissemination, adoption and scaling up.	Labour intensity in weeding, threshing and winnowing – mostly done by women; therefore likely to overburden them; Grain sold by women and most of the cash retained by them; thus, increased production and marketing likely to improve the women's livelihood. Most farmer groups composed of women – if targeted this may leave out the opinion and interests of men.
Gender related opportunities	- Enhance women training for improved performance - Increased incomes for Women from increased grain sales (this is considered largely as a women's crop). - Youth also stand to benefit through application of ICT networking for marketing.
VMG issues and concerns in development, dissemination, adoption and scaling up	Labour intensity and thus need for mechanization/ labour saving interventions; markets for increased production
VMG related opportunities	Increased production will lead to increased consumption of nutritious finger millet, hence improved health of VMGs; high value of crop will lead to economic empowerment of VMGs
E: Case studies/profiles of success stories	
Success stories	The variety is still in research Centres – at Kakamega and Kisii
Application guidelines for users	Finger millet variety production leaflet
F: Contacts	
F: **Status of TIMP Readiness (1. Ready for up-scaling; 2. Requires validation; 3. Requires further research)**	Ready for up-scaling
G: Contacts	Centre Director KALRO – FCRI Kisii P.O. Box 523-40200, KISII; e-mail address: chrispus.oduori@kalro.org; Tel. +254 (0) 723 770 895/ +254 (0) 736 220 821
Lead organization and scientists	KALRO, Dr. Chrispus O.A. Oduori
Partner organizations	ICRISAT Nairobi; MoALF in Counties – Busia, Kakamega, Bungoma, and Siaya.

Gaps

1. Needs testing through NPT and DUS for release and seed multiplication
2. Needs improvement in yield and resistance to biotic and abiotic stresses
3. Needs extensive on-farm testing and validation

2.1.8 TIMP Name	Finger Millet Variety GBK 043254

Category (i.e. technology, innovation or management practice)	Technology
A: Description of the technology, innovation or management practice	
Problem addressed	- Low yields due to late crop maturity in mid to low rainfall areas; - Few market options attributed to low utilization (consumption, processing, trade, manufacturing etc)
What is it? (TIMP description)	A high yielding, early maturing, finger millet variety that is –; Striga resistant, Blast and Drought tolerant;. Characteristic features include; Whitish Brown grain colour; light purple pigmentation; medium height; medium size open panicles with finger spikelet discontinuity. Optimal environmental conditions: Rainfall (600-900mm annually), altitude (0 – 2,000 m.a.s.l.) and soils (well-draining loams). **Features:-** Whitish brown grain colour; no pigmentation; medium height; medium size open panicles with gapy spikes.
Justification	-Variety is already in National Performance Trials and has potential for release to serve short rain season areas in Kenya; This very high yielding variety with wide adaptability will address poor yields in the mid to low rainfall areas.
B: Assessment of dissemination and scaling up/out approaches	
Users of TIMP	Farmers, extension agencies, seed producers traders, and consumers
Approaches used in dissemination	Not yet disseminated but methods used in successfully disseminating earlier technologies to be adopted i.e. On-farm experimentation and dissemination, field days, shows, farmer to farmer communication, leaflets, larger plot demonstrations.
Most effective approach	On-farm experimentation and larger plot effect demonstrations.
Critical/essential factors for successful promotion	Participatory Implementation, stakeholder capacity building, Functioning seed system, Stakeholder networks
Partners/stakeholders for scaling up and their respective roles.	• Public and private partners –[MOALF&I) for extension, • ICRISAT for technical backstopping and promotion; • FIPs (Farmer Input Promotion) for promotion • Farmer Groups for activity implementation and promotion • Service provider agencies e.g. Micro-finance agencies and banks for credit provision, agro-vets for input supply. • Processors and manufacturers to create market for produce, aggregators e.g. CARD (Community Action

	for Rural Development) for economy of scale sales and marketing], and Others e.g. NGOs, CBOs, and FBOs to provide specialist services like community mobilization, nutrition training etc.
C: Current situation and future scaling up	
Counties where already promoted if any	Variety still in research Centres – Kakamega and Kisii.
Counties where TIMPS will be upscaled	Bomet, Kericho and West Pokot
Challenges in development and dissemination	Not yet disseminated but expected challenges - Negative attitude to crop in some segments of society (orphan crop); limited investment in crop; limited publicity; seed companies disinterest in pure-line-self-pollinating crops; limited utilization products; low research investment; expanse of potential beneficiary and distance from source.
Recommendations for addressing the challenges	Investment in crop development (research, extension, processing and manufacturing); supportive policies like the recently passed blending policy, lifting of ban on traditional brews; positive publicity.
Lessons learned	Not yet disseminated but anticipated - Investments in the crop and participation of champions can enhance technology up-take – like the case of this technology in western Kenya; stakeholder linkages and participatory implementation is important.
Social, environmental, policy and market conditions necessary	Gender inclusiveness in crop research and development; capacity building of stakeholders; understanding the physical and biotic environment in target ecologies; understanding community culture, preferences, and practices
D: Economic, gender, vulnerable and marginalized groups (VMGs) considerations	
Basic costs	Production cost data yet to be estimated
Estimated returns	Estimated Production returns data yet to be estimated
Gender issues and concerns in development, dissemination, adoption and scaling up	Labour intensity in weeding, threshing and winnowing – mostly done by women; Grain sales also by women– mostly done by women; therefore likely to overburden them but also benefit them as most of the cash retained by them; thus, increased production and marketing likely to improve the women's livelihood. Most farmer groups composed of women – if targeted this may leave out the opinion and interests of men
Gender related opportunities	- Enhance women training for improved performance - Increased incomes for Women from increased grain sales (this is considered largely as a women's crop). - Youth also stand to benefit through application of ICT networking for marketing.
VMG issues and concerns in development, dissemination adoption and scaling up	Labour intensity and thus need for mechanization/ labour saving interventions; markets for increased production

VMG related opportunities	Increased production will lead to increased consumption of nutritious finger millet, hence improved health of VMGs; high value of crop will lead to economic empowerment of VMGs
E: Case studies/profiles of success stories	
Success stories	The variety is still in research Centres – at Kakamega and Kisii
Application guidelines for users	Finger millet variety production leaflet
F: **Status of TIMP Readiness (**1. Ready for up-scaling; 2. Requires validation; 3. Requires further research**)**	Requires validation
G: Contacts	
Contacts	KALRO-Kisii
Lead organization and scientists	KALRO, Dr. Chrispus O.A. Oduori
Partner organizations	ICRISAT Nairobi; MoALF in Counties – Busia, Kakamega, Bungoma, and Siaya.

Gaps

1. Needs testing through NPT and DUS for release and seed multiplication
2. Needs improvement in yield and resistance to biotic and abiotic stresses
3. Needs extensive on-farm testing and validation

2.1.9 TIMP Name	Finger Millet Variety KACIMMI 49
Category (i.e. technology, innovation or management practice)	Technology
A: Description of the technology, innovation or management practice	
Problem addressed	Low finger millet yields
What is it? (TIMP description)	A high yielding, medium maturing finger millet variety –that is also Striga, blast and drought tolerant. Characteristic features include: Brown grain colour; no pigmentation; medium height; medium size twisted finger panicles. Optimal environmental conditions: Rainfall (600-900mm annually), altitude (0 – 2,000 m.a.s.l.) and soils (well-draining loams).
Justification	-Variety is very high yielding with wide adaptability. It is already in National Performance Trials and has potential for release to serve medium rain season areas in Kenya;
Counties where TIMP will be upscaled	Kericho, Bomet, and West Pokot
B: Assessment of dissemination and scaling up/out approaches	
Users of TIMP	Farmers, extension agencies, seed producers traders, and consumers
Approaches used in dissemination	Not yet disseminated but methods used in successfully disseminating earlier technologies to be adopted i.e. On-farm experimentation and dissemination, field days,

	shows, farmer to farmer communication, leaflets, larger plot demonstrations.
Critical/essential factors for successful promotion	Participatory Implementation, stakeholder capacity building, Functioning seed system, Stakeholder networks
Partners/stakeholders for scaling up and their respective roles.	• Public and private partners –[MOALF&I) for extension, • ICRISAT for technical backstopping and promotion; • FIPs (Farmer Input Promotion) for promotion • Farmer Groups for activity implementation and promotion • Service provider agencies e.g. Micro-finance agencies and banks for credit provision, agro-vets for input supply • Processors and manufacturers to create market for produce, aggregators e.g. CARD (Community Action for Rural Development) for economy of scale sales and marketing], and Others e.g. NGOs, CBOs, and FBOs to provide specialist services like community mobilization, nutrition training etc.
C: Current situation and future scaling up	
Counties where already promoted if any	Not yet promoted but can grow well in all regions varying in yield depending on climatic conditions.Variety still in research Centres – Kakamega and Kisii.
Counties where TIMPs will be upscaled	Bomet, Kericho and West Pokot
Challenges in development and dissemination	Not yet disseminated but expected challenges - Negative attitude to crop in some segments of society (orphan crop); limited investment in crop; limited publicity; seed companies disinterest in pureline self pollinating crops; limited utilization products; low research investment expanse of potential beneficiary and distance from source.
Recommendations for addressing the challenges	Investment in crop development (research, extension, processing and manufacturing); supportive policies like the recently passed blending policy, lifting of ban on traditional brews; positive publicity.
Lessons learned	Not yet disseminated but anticipated - Investments in the crop and participation of champions can enhance technology up-take – like the case of this technology in western Kenya; stakeholder linkages and participatory implementation is important.
Social, environmental, policy and market conditions necessary	Gender inclusiveness in crop research and development; capacity building of stakeholders; understanding the physical and biotic environment in target ecologies; understanding community culture, preferences, and practices

D: Economic, gender, vulnerable and marginalized groups (VMGs) considerations	Requires validation
Basic costs	Production cost data yet to be estimated
Estimated returns	Estimated Production returns data yet to be calculated
Gender issues and concerns in development, dissemination adoption and scaling up	Labour intensity in weeding, threshing and winnowing – mostly done by women; Grain sale also by women– mostly done by women; therefore likely to overburden them but also benefit them as most of the cash retained by them; thus, increased production and marketing likely to improve the women's livelihood. Most farmer groups composed of women – if targeted this may leave out the opinion and interests of men
Gender related opportunities	- Enhance women training for improved performance - Increased incomes for Women from increased grain sales (this is considered largely as a women's crop). - Youth also stand to benefit through application of ICT networking for marketing.
VMG issues and concerns in development, dissemination adoption and scaling up	Due to prejudice associated with their social status, VMGs are excluded from access to and benefits from improved technologies. Thus, affirmative action is required to promote the crop for the VMGs including value addition aspects. Labour intensity and thus need for mechanization/ labour saving interventions; markets for increased production
VMG related opportunities	Increased production will lead to improved food and nutrition security among VMGs; high value of crop will lead to economic empowerment of VMGs
E: Case studies/profiles of success stories	
Success stories	The variety is still in research Centres – at Kakamega and Kisii
Application guidelines for users	Finger millet variety production leaflet
F: **Status of TIMP Readiness (1. Ready for up-scaling; 2. Requires validation; 3. Requires further research)**	Requires validation
G: Contacts	
Contacts	Centre Director, KALRO-Kisii; P.O. Box 523-40200, KISII; e-mail address: chrispus.oduori@kalro.org; Tel. +254 (0) 723 770 895/ +254 (0) 736 220 821
Lead organization and scientists	KALRO, Dr. Chrispus O.A. Oduori
Partner organizations	ICRISAT Nairobi; MoALF in Counties – Busia, Kakamega, Bungoma, and Siaya.

Gaps

1. Needs testing through NPT and DUS for release and seed multiplication
2. Needs improvement in yield and resistance to biotic and abiotic stresses
3. Needs extensive on-farm testing and validation

2.1.10 TIMP Name	Finger Millet Variety Nakuru 1
Category (i.e. technology, innovation or management practice)	Technology
A: Description of the technology, innovation or management practice	
Problem addressed	Low finger millet yield and production
What is it? (TIMP description)	A high yielding (1,200 - 3,500kg/ha^{-1}, depending on environment), late maturing (120 – 210 days) finger millet variety. It is tolerant to cold and drought. Its characteristic features include dark brown grain colour, purple pigmentation and medium size open panicles. Optimal environmental conditions: Rainfall (600-900mm annually), altitude (1750 – 2500 m.a.s.l.) and soils (well-draining loams). Adapted to cold dry highlands.
Justification	-The variety was released in 1996 for production in the cool dry highlands of Kenya thus diversifying areas of finger millet production.
B: Assessment of dissemination and scaling up/out approaches	
Users of TIMP	Farmers, extension agencies, seed producers traders, and consumers
Approaches to be used in dissemination	On-farm experimentation and dissemination, field days, shows, farmer to farmer communication, leaflets, larger plot demonstrations.
Critical/essential factors for successful promotion	Participatory Implementation, stakeholder capacity building, Functioning seed system, Stakeholder networks and effective extension system.
Partners/stakeholders for scaling up and their respective roles.	• Public and private partners –[MOALF&I) for extension, • ICRISAT for technical backstopping and promotion; • FIPs (Farmer Input Promotion) for promotion • Farmer Groups for activity implementation and promotion • Service provider agencies e.g. Micro-finance agencies and banks for credit provision, agro-vets for input supply • Processors and manufacturers to create market for produce, aggregators e.g. CARD (Community Action for Rural Development) for economy of scale sales and marketing], and Others e.g. NGOs, CBOs, and FBOs to provide specialist services like community mobilization, nutrition training etc.
C: Current situation and future scaling up	
Counties where already promoted if any	Nakuru and Baringo Counties
Counties where TIMPs will be upscaled	Bomet, Kericho and West Pokot
Challenges in development and dissemination	Not yet extensively disseminated. Expected challenges include; Negative attitude to crop in some segments of society (orphan crop); limited investment in crop; limited publicity; seed companies disinterest in pure-line self-pollinating crops; limited utilization of products and low research investment.

Recommendations for addressing the challenges	Investment in crop development (research, extension, processing and manufacturing); supportive policies like the recently passed blending policy, lifting of ban on traditional brews and positive publicity.
Lessons learned	Not yet disseminated but anticipated - Investments in the crop and participation of champions can enhance technology up-take – like the case of this technology in western Kenya; stakeholder linkages and participatory implementation is important.
Social, environmental, policy and market conditions necessary	Gender inclusiveness in crop research and development; capacity building of stakeholders; understanding the physical and biotic environment in target ecologies; understanding community culture, preferences, and practices
D: Economic, gender, vulnerable and marginalized groups (VMGs) considerations	
Basic costs	Production cost = 30,250/=
Estimated returns	Estimated Production returns = 60,606/=, thus estimated net returns = 30,356/=
Gender issues and concerns in development and dissemination adoption and scaling up	Labour intensity in weeding, threshing and winnowing – mostly done by women; therefore likely to overburden them; Grain sold by women and most of the cash retained by them; thus, increased production and marketing likely to improve the women's livelihood. Most farmer groups composed of women – if targeted this may leave out the opinion and interests of men.
Gender related opportunities	- Enhance women training for improved performance - Increased incomes for Women from increased grain sales (this is considered largely as a women's crop). - Youth also stand to benefit through application of ICT networking for marketing.
VMG issues and concerns in development, dissemination, adoption and scaling up	Due to prejudice associated with their social status, VMGs are excluded from access to and benefits from improved technologies. Thus, affirmative action is required to promote the crop for the VMGs including value addition aspects. Labour intensity and thus need for mechanization/ labour saving interventions; markets for increased production
VMG related opportunities	Increased production will lead to increased consumption of nutritious finger millet, hence improved health of VMGs; high value of crop will lead to economic empowerment of VMGs
E: Case studies/profiles of success stories	
Success stories	The variety is still in research Centres – at KALRO BRC Lanet
Application guidelines for users	Finger millet variety production leaflet
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-Lanet P.O. Box 3840, NAKURU; e-mail address: kalrolanet@gmail.com; Tel. +254 (0) 0722 639419
Lead organization and scientists	KALRO, Peter Gachuki
Partner organizations	ICRISAT Nairobi; MoALF&I in Counties – Nakuru

Gaps

1. Needs diversification in adaptability for production in wider agro-ecological zones
2. Needs improvement in yield and resistance to biotic and abiotic stresses

2.1.11 TIMP Name	Finger Millet Variety KAT FM 1
Category (i.e. technology, innovation or management practice)	Technology
A: Description of the technology, innovation or management practice	
Problem addressed	Late maturity in low moisture areas and low finger millet yield.
What is it? (TIMP description) 	It is an early maturing (80 – 115 days); Drought tolerant; moderate yield (1,000 – 2,500kg ha^{-1}) finger millet variety –also suitable for production at altitudes ranging from 250 – 1,150 m.a.s.l. **Features:-** Brown grain colour; no pigmentation; medium height; high tillering; robust growth; open panicles; prominent grain. Optimal environmental conditions: Rainfall (400-700mm annually), altitude (0 – 1200 m.a.s.l.) and soils (well-draining loams).
Justification	-Early maturing variety released in 2000 to serve low rain, low altitude areas in Kenya, especially eastern Kenya.
B: Assessment of dissemination and scaling up/out approaches	
Users of TIMP	Farmers, extension agencies, seed producers traders, and consumers
Approaches used in dissemination	On-farm experimentation and dissemination, field days, shows, farmer to farmer communication, leaflets, larger plot demonstrations.
Most effective approach	On-farm experimentation and larger plot effect demonstrations.
Critical/essential factors for successful promotion	Participatory Implementation, stakeholder capacity building, Functioning seed system, Stakeholder networks
Partners/stakeholders for scaling up, their respective roles and stage of involvement.	• Public and private partners –[MOALF&I) for extension, • ICRISAT for technical backstopping and promotion;

	• FIPs (Farmer Input Promotion) for promotion • Farmer Groups for activity implementation and promotion • Service provider agencies e.g. Micro-finance agencies and banks for credit provision, agro-vets for input supply • Processors and manufacturers to create market for produce, aggregators e.g. CARD (Community Action for Rural Development) for economy of scale sales and marketing], and Others e.g. NGOs, CBOs, and FBOs to provide specialist services like community mobilization, nutrition training etc.
C: Current situation and future scaling up	
Counties where already promoted if any	Eastern Kenya but has been disseminated to wetter areas with disastrous results – blast infestation and damage – Seed at KALRO Katumani and Kenya Seed Company.
Counties where TIMPs will be upscaled	Drier areas of Kericho and West Pokot
Challenges in dissemination	Negative attitude to crop in some segments of society (orphan crop); limited investment in crop; limited publicity; seed companies disinterest in pure line self-pollinating crops; limited utilization products; low research; expanse of potential beneficiary and distance from source.
Recommendations for addressing the challenges	Investment in crop development (research, extension, processing and manufacturing); supportive policies like the recently passed blending policy, lifting of ban on traditional brews; positive publicity.
Lessons learned	- Investments in the crop and participation of champions can enhance technology up-take – like the case of this technology in western Kenya; stakeholder linkages and participatory implementation is important.
Social, environmental, policy and market conditions necessary	Gender inclusiveness in crop research and development; capacity building of stakeholders; understanding the physical and biotic environment in target ecologies; understanding community culture, preferences, and practices
D: Economic, gender, vulnerable and marginalized groups (VMGs) considerations	
Basic costs	Cost of Production per acre: 30,250/=
Estimated returns	Estimated Production returns per acre: 48,485 and thus net returns = 18,235/=

Gender issues and concerns in development, dissemination, adoption and scaling up	Labour intensity in weeding, threshing and winnowing – mostly done by women; Grain sale also by women– mostly done by women; therefore likely to overburden them; ; thus, increased production and marketing likely to improve the women's livelihood as most of the sales cash is retained by them. Most farmer groups composed of women – if targeted this may leave out the opinion and interests of men; women do not travel far to communicate message; hence, could limit up-scaling.
Gender related opportunities	- Enhance women training for improved performance - Increased incomes for Women from increased grain sales (this is considered largely as a women's crop). - Youth also stand to benefit through application of ICT networking for marketing.
VMG issues and concerns in development, dissemination adoption and scaling up	Due to prejudice associated with their social status, VMGs are excluded from access to and benefits from improved technologies. Thus, affirmative action is required to promote the crop for the VMGs including value addition aspects. Labour intensity and thus need for mechanization/ labour saving interventions; markets for increased production
VMG related opportunities	Increased production will lead to increased consumption of nutritious finger millet, hence improved health of VMGs; high value of crop will lead to economic empowerment of VMGs
E: Case studies/profiles of success stories	
Success stories	The variety success not conspicuous
Application guidelines for users	Finger millet variety production leaflet
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-Kisii P.O. Box 523-40200, KISII; e-mail address: chrispus.oduori@kalro.org; Tel. +254 (0) 723 770 895/ +254 (0) 736 220 821
Lead organization and scientists	KALRO, Dr. Chrispus O.A. Oduori, and Ms Rachel Kisilu
Partner organizations	ICRISAT Nairobi; MoALF&I in Counties – Machakos, Makueni, Kitui, Tharaka Nithi, Embu, and Meru.

Gaps

1. Needs improvement in blast disease resistance
2. Needs improvement in yield and resistance to biotic and abiotic stresses

3. Needs improvement in lodging resistance

2.1.12 TIMP Name	Finger Millet Variety MSU FM 60D
Category (i.e. technology, innovation or management practice)	Technology
A: Description of the technology, innovation or management practice	
Problem addressed	- Low finger millet yield and low rainfall conditions.
What is it? (TIMP description)	An early maturing (80-90 days) finger millet variety with moderate yield (average 3,120kg/ha^{-1}). Characteristic features include brown grain colour with no anthocyanins (purple colouration) on leaves, nodes, and panicles., It also has large open panicles with prominent grains; it is prone to post maturity lodging, moderately susceptible to blast disease. Optimal environmental conditions: Rainfall (600-900mm annually), altitude (0 – 1500 m.a.s.l.) and soils (well-draining loams).
Justification	-Released in 2016 for moisture stress areas for drought tolerance and escape. Because of early maturity, it is drought escaping and thus assurance of produce. As a cereal, it provides food diversity and security e.g. unlike maize, it is not affected by maize lethal necrosis and Fall Army Worm
B: Assessment of dissemination and scaling up/out approaches	
Users of TIMP	Farmers, extension agencies, seed producers traders, and consumers
Approaches used in dissemination	On-farm experimentation and dissemination, field days, shows, farmer to farmer communication, leaflets, larger plot demonstrations.
Critical/essential factors for successful promotion	Participatory Implementation, stakeholder capacity building, Functioning seed system, Stakeholder networks and efficient extension service.
Partners/stakeholders for scaling up and their respective roles.	• Public and private partners –[MOALF&I) for extension, • ICRISAT for technical backstopping and promotion; • FIPs (Farmer Input Promotion) for promotion • Farmer Groups for activity implementation and promotion • Service provider agencies e.g. Micro-finance agencies and banks for credit provision, agro-vets for input supply • Processors and manufacturers to create market for produce, aggregators e.g. CARD (Community Action for Rural Development) for economy of scale sales and marketing], and Others e.g. NGOs, CBOs, and FBOs to provide specialist services like community mobilization, nutrition training etc.
C: Current situation and future scaling up	

Counties where already promoted if any	Not yet extensively disseminated.
Counties where TIMPs will be up scaled	Drier areas of Kericho and West Pokot
Challenges in development and dissemination	Negative attitude to crop in some segments of society (orphan crop); limited investment in crop; limited publicity; seed companies disinterest in pure-line-self-pollinating crops; limited utilization products; low research investment.
Recommendations for addressing the challenges	Investment in crop development (research, extension, processing and manufacturing); supportive policies like the recently passed blending policy, lifting of ban on traditional brews; positive publicity.
Lessons learned in up-scaling if any?	Investments in the crop and participation of champions can enhance technology up-take – like the case of this technology in western Kenya; stakeholder linkages and participatory implementation is important.
Social, environmental, policy and market conditions necessary	Gender inclusiveness in crop research and development; Capacity building of stakeholders; understanding the physical and biotic environment in target ecologies; understanding community culture, consumer preferences and social practices.
D: Economic, gender, vulnerable and marginalized groups (VMGs) considerations	
Basic costs	Per acre production cost KES 30,250/=
Estimated returns	Per acre returns KES 55,000/= and thus net benefit KES 22,250/=
Gender issues and concerns in development, dissemination, adoption and scaling up	Labour intensity in weeding, threshing and winnowing – mostly done by women; Grain sale also by women– mostly done by women; therefore likely to overburden them but also benefit them since most of the cash retained by them; thus, increased production and marketing likely to improve the women's livelihood. Most farmer groups composed of women – if targeted this may leave out the opinion and interests of men; women do not travel far to communicate message; hence, could limit up-scaling.
Gender related opportunities	- Enhance women training for improved performance - Increased incomes for Women from increased grain sales (this is considered largely as a women's crop). - Youth also stand to benefit through application of ICT networking for marketing.
VMG issues and concerns in development, dissemination adoption and scaling up	Due to prejudice associated with their social status, VMGs are excluded from access to and benefits from improved technologies. Thus, affirmative action is required to promote the crop for the VMGs including value addition aspects. Labour intensity and thus need for mechanization/ labour saving interventions; markets for increased production
VMG related opportunities	Increased production will lead to increased consumption of nutritious finger millet, hence improved health of VMGs; high value of crop will lead to economic empowerment of VMGs
E: Case studies/profiles of success stories	

Success stories	Not yet disseminated.
Application guidelines for users	Finger millet variety production leaflet
F: **Status of TIMP Readiness (1. Ready for up-scaling; 2. Requires validation; 3. Requires further research)**	Ready for up scaling.
G: Contacts	
Contacts	Maseno University, P.O. Box 333 Maseno, vc@maseno.ac.ke OR mitodida@yahoo.com; Tel. +254 (0) 711 860550.
Lead organization and scientists	Maseno University; Prof. Mathews Dida
Partner organizations	KALRO; ICRISAT Nairobi; MoALF&I in Counties – Busia, Kakamega, Bungoma, and Siaya, Bomet, Kericho, West Pokot.

2.1.13TIMP Name	Finger Millet Variety EUFM-401
Category (i.e. technology, innovation or management practice)	Technology
A: Description of the technology, innovation or management practice	
Problem addressed	- Low finger millet productivity due to unsuitable varieties and low rainfall conditions.
What is it? (TIMP description)	A very early maturing (65-75 days) finger millet variety with moderate yield (1,000 – 1,400kg/ha^{-1}) in Arid and Semi-Arid Lands. Characteristic features include heat tolerance. Optimal environmental conditions: Rainfall (400-600mm annually), altitude (<1500 m.a.s.l.) and soils (well-draining loams).
Justification	-Released in 2016 for moisture stress areas for drought tolerance and escape. Because of early maturity, it is drought escaping and thus assurance of produce making it a good choice crop for food and nutrition security and farmer resilience.
Counties where TIMP will be promoted	Bomet, Kericho and West Pokot and dryland areas where finger millet is produced.
B: Assessment of dissemination and scaling up/out approaches	
Users of TIMP	Farmers, extension agencies, seed producers traders, and consumers
Approaches used in dissemination	On-farm experimentation and dissemination, field days, shows, farmer to farmer communication, leaflets, larger plot demonstrations.
Most effective approach	On-farm experimentation and larger plot effect demonstrations.

Critical/essential factors for successful promotion	Participatory Implementation, stakeholder capacity building, Functioning seed system, Stakeholder networks and efficient extension service.
Partners/stakeholders for scaling up and their respective roles.	• Public and private partners –[MOALF&I) for extension, • ICRISAT for technical backstopping and promotion; • FIPs (Farmer Input Promotion) for promotion • Farmer Groups for activity implementation and promotion • Service provider agencies e.g. Micro-finance agencies and banks for credit provision, agro-vets for input supply • Processors and manufacturers to create market for produce, aggregators e.g. CARD (Community Action for Rural Development) for economy of scale sales and marketing], and Others e.g. NGOs, CBOs, and FBOs to provide specialist services like community mobilization, nutrition training etc.
C: Current situation and future scaling up	
Current extent of reach	Not yet extensively disseminated.
Challenges in development and dissemination	Negative attitude to crop in some segments of society (orphan crop); limited investment in crop; limited publicity; seed companies disinterest in pure-line-self-pollinating crops; limited utilization products; low research investment.
Recommendations for addressing the challenges	Investment in crop development (research, extension, processing and manufacturing); supportive policies like the recently passed blending policy, lifting of ban on traditional brews; positive publicity.
Lessons learned in up-scaling if any?	Investments in the crop and participation of champions can enhance technology up-take – like the case of this technology in western Kenya; stakeholder linkages and participatory implementation is important.
Social, environmental, policy and market conditions necessary	Gender inclusiveness in crop research and development; Capacity building of stakeholders; understanding the physical and biotic environment in target ecologies; understanding community culture, consumer preferences and social practices.
D: Economic, gender, vulnerable and marginalized groups (VMGs) considerations	
Basic costs	Per acre production cost KES 30,250/=
Estimated returns	Per acre returns KES 40,000/= and thus net benefit KES 9,750/=
Gender issues and concerns in development, dissemination adoption and scaling up	Labour intensity in weeding, threshing and winnowing (variety has poor threshability and dusty thus aggravating labour intensity) – mostly done by women; Grain sale also by women; therefore likely to overburden them; increased production and marketing likely to improve the women's livelihood as most of the cash retained by them;,. Most farmer groups composed of women – if targeted this may leave out the opinion and interests of men; women do not travel far to communicate message; hence, could limit up-scaling
Gender related opportunities	- Enhance women training for improved performance

	- Increased incomes for Women from increased grain sales (this is considered largely as a women's crop). - Youth also stand to benefit through application of ICT networking for marketing.
VMG issues and concerns in development, dissemination adoption and scaling up	Due to prejudice associated with their social status, VMGs are excluded from access to and benefits from improved technologies. Thus, affirmative action is required to promote the crop for the VMGs including value addition aspects. Labour intensity and thus need for mechanization/ labour saving interventions; markets for increased production
VMG related opportunities	Increased production will lead to increased consumption of nutritious finger millet, hence improved health of VMGs; high value of crop will lead to economic empowerment of VMGs
E: Case studies/profiles of success stories	
Success stories	Not yet disseminated.
Application guidelines for users	Finger millet variety production leaflet
F: **Status of TIMP Readiness (1. Ready for up-scaling; 2. Requires validation; 3. Requires further research)**	Ready for up scaling.
G: Contacts	
Contacts	Egerton University: Division of Research and Extension; P.O. Box 536 Egerton, email: dvc@egerton.ac.ke, Tel. +254 (0) 725 309162.
Lead organization and scientists	Egerton University; Prof. Paul Kimurto
Partner organizations	KALRO; ICRISAT Nairobi; MoALF&I in dryland areas of –Bomet, Kericho, West Pokot, Baringo, Turkana, Machakos, Kitui, Tharaka Nithi Counties etc.

2.1.14 TIMP Name	Finger Millet Variety EUFM-502
Category (i.e. technology, innovation or management practice)	Technology
A: Description of the technology, innovation or management practice	
Problem addressed	- Low finger millet yields due to low rainfall.
What is it? (TIMP description)	A medium maturing (100-120 days) finger millet variety with moderate yield (1,400 – 2,000kg/ha^{-1}). Characteristic features include high tillering capacity that can provide fodder. Optimal environmental conditions: Rainfall (500-700mm annually), altitude (1,200 – 2,200 m.a.s.l.) and soils (well-draining loams).

Justification	-Released in 2018 for medium moisture mid-altitude conditions. Because of early maturity, low moisture requirement and high tillering capacity it is a good choice crop for food and nutrition security and farmer resilience.
B: Assessment of dissemination and scaling up/out approaches	
Users of TIMP	Farmers, extension agencies, seed producers traders, and consumers
Approaches used in dissemination	On-farm experimentation and dissemination, field days, shows, farmer to farmer communication, leaflets, larger plot demonstrations.
Most effective approach	On-farm experimentation and larger plot effect demonstrations.
Critical/essential factors for successful promotion	Participatory Implementation, stakeholder capacity building, Functioning seed system, Stakeholder networks and efficient extension service.
Partners/stakeholders for scaling up and their respective roles.	• Public and private partners –[MOALF&I) for extension, • ICRISAT for technical backstopping and promotion; • FIPs (Farmer Input Promotion) for promotion • Farmer Groups for activity implementation and promotion • Service provider agencies e.g. Micro-finance agencies and banks for credit provision, agro-vets for input supply • Processors and manufacturers to create market for produce, aggregators e.g. CARD (Community Action for Rural Development) for economy of scale sales and marketing], and Others e.g. NGOs, CBOs, and FBOs to provide specialist services like community mobilization, nutrition training etc.
C: Current situation and future scaling up	
Counties where already promoted if any	Not yet extensively disseminated.
Counties where TIMPs will be up scaled	Bomet, Kericho and West Pokot mid –altitude moderate rainfall areas where finger millet is produced.
Challenges in development and dissemination	Negative attitude to crop in some segments of society (orphan crop); limited investment in crop; limited publicity; seed companies disinterest in pure-line-self-pollinating crops; limited utilization products; low research investment.
Recommendations for addressing the challenges	Investment in crop development (research, extension, processing and manufacturing); supportive policies like the recently passed blending policy, lifting of ban on traditional brews; positive publicity.
Lessons learned in up-scaling if any?	Investments in the crop and participation of champions can enhance technology up-take – like the case of this technology in western Kenya; stakeholder linkages and participatory implementation is important.
Social, environmental, policy and market conditions necessary	Gender inclusiveness in crop research and development; Capacity building of stakeholders; understanding the physical and biotic environment in target ecologies; understanding community culture, consumer preferences and social practices.

D: Economic, gender, vulnerable and marginalized groups (VMGs) considerations	
Basic costs	Per acre production cost KES 30,250/=
Estimated returns	Per acre returns KES 40,000/= and thus net benefit KES 10,962/=
Gender issues and concerns in development, dissemination adoption and scaling up	Labour intensity in weeding, threshing and winnowing (variety has poor threshability and dusty thus aggravating labour intensity) – mostly done by women; Grain sale also by women; therefore likely to overburden them; increased production and marketing likely to improve the women's livelihood since most of the cash retained by them;,. Most farmer groups composed of women – if targeted this may leave out the opinion and interests of men; women do not travel far to communicate message; hence, could limit up-scaling.
Gender related opportunities	- Enhance women training for improved performance - Increased incomes for Women from increased grain sales (this is considered largely as a women's crop). - Youth also stand to benefit through application of ICT networking for marketing.
VMG issues and concerns in development, dissemination adoption and scaling up	Due to prejudice associated with their social status, VMGs are excluded from access to and benefits from improved technologies. Thus, affirmative action is required to promote the crop for the VMGs including value addition aspects. Labour intensity and thus need for mechanization/ labour saving interventions; markets for increased production
VMG related opportunities	Increased production will lead to increased consumption of nutritious finger millet, hence improved health of VMGs; high value of crop will lead to economic empowerment of VMGs
E: Case studies/profiles of success stories	
Success stories	Not yet disseminated
Application guidelines for users	Finger millet variety production leaflet
F: **Status of TIMP Readiness (1. Ready for up-scaling; 2. Requires validation; 3. Requires further research)**	Ready for up scaling.
G: Contacts	
Contacts	Egerton University, Department, Postal Address, email, & telephone contacts
Lead organization and scientists	Egerton University; Prof. Paul Kimurto
Partner organizations	KALRO; ICRISAT Nairobi; MoALF&I in of the Bomet, Kericho, West Pokot, Baringo, Turkana, Machakos, Kitui, Tharaka Nithi Counties etc.

2.1.15 TIMP Name	Finger Millet Variety EUFM-503

Category (i.e. technology, innovation or management practice)	Technology
A: Description of the technology, innovation or management practice	
Problem addressed	- Low finger millet yields due to low rainfall.
What is it? (TIMP description)	A medium maturing (90-98 days) finger millet variety and moderate yield (1,500 – 2,500kg/ha^{-1}). Characteristic features include long multi-fingered panicles, high tillering capacity, resistant to blast. Optimal environmental condition: Rainfall (500-700mm annually), altitude (1,200 – 2,200 m.a.s.l.) and soils (well-draining loams).
Justification	-Released in 2018 for medium moisture mid-altitude conditions. Due to its early maturity, low moisture requirement and high tillering capacity it is a good choice crop for food and nutrition security and farmer resilience.
B: Assessment of dissemination and scaling up/out approaches	
Users of TIMP	Farmers, extension agencies, seed producers traders, and consumers
Approaches used in dissemination	On-farm experimentation and dissemination, field days, shows, farmer to farmer communication, leaflets, larger plot demonstrations.
Most effective approach	On-farm experimentation and larger plot effect demonstrations.
Critical/essential factors for successful promotion	Participatory Implementation, stakeholder capacity building, Functioning seed system, Stakeholder networks and efficient extension service.
Partners/stakeholders for scaling up and their respective roles.	• Public and private partners –[MOALF&I) for extension, • ICRISAT for technical backstopping and promotion; • FIPs (Farmer Input Promotion) for promotion • Farmer Groups for activity implementation and promotion • Service provider agencies e.g. Micro-finance agencies and banks for credit provision, agro-vets for input supply • Processors and manufacturers to create market for produce, aggregators e.g. CARD (Community Action for Rural Development) for economy of scale sales and marketing], and Others e.g. NGOs, CBOs, and FBOs to provide specialist services like community mobilization, nutrition training etc.
C: Current situation and future scaling up	
Counties where already promoted if any	Not yet extensively disseminated.
Counties where TIMPs will be upscaled	Bomet, Kericho and West Pokot mid –altitude moderate rainfall areas where finger millet is produced.
Challenges in development and dissemination	Negative attitude to crop in some segments of society (orphan crop); limited investment in crop; limited publicity;

	seed companies disinterest in pure-line-self-pollinating crops; limited utilization products; low research investment.
Recommendations for addressing the challenges	Investment in crop development (research, extension, processing and manufacturing); supportive policies like the recently passed blending policy, lifting of ban on traditional brews; positive publicity.
Lessons learned in up-scaling if any?	Investments in the crop and participation of champions can enhance technology up-take – like the case of this technology in western Kenya; stakeholder linkages and participatory implementation is important.
Social, environmental, policy and market conditions necessary	Gender inclusiveness in crop research and development; Capacity building of stakeholders; understanding the physical and biotic environment in target ecologies; understanding community culture, consumer preferences and social practices.
D: Economic, gender, vulnerable and marginalized groups (VMGs) considerations	
Basic costs	Per acre production cost KES 30,250/=
Estimated returns	Per acre returns KES 40,000/= and thus net benefit KES 18,235/=
Gender issues and concerns in development, dissemination adoption and scaling up	Labour intensity in weeding, threshing and winnowing (variety has poor threshability and dusty thus aggravating labour intensity) – mostly done by women; Grain sale also by women; therefore likely to overburden them; Grain sold by women and most of the cash retained by them; thus, increased production and marketing likely to improve the women's livelihood. Most farmer groups composed of women – if targeted this may leave out the opinion and interests of men; women do not travel far to communicate message; hence, could limit up-scaling
Gender related opportunities	- Enhance women training for improved performance - Increased incomes for Women from increased grain sales (this is considered largely as a women's crop). - Youth also stand to benefit through application of ICT networking for marketing.
VMG issues and concerns in development, dissemination adoption and scaling up	Due to prejudice associated with their social status, VMGs are excluded from access to and benefits from improved technologies. Thus, affirmative action is required to promote the crop for the VMGs including value addition aspects. Labour intensity and thus need for mechanization/ labour saving interventions; markets for increased production
VMG related opportunities	Increased production will lead to increased consumption of nutritious finger millet, hence improved health of VMGs; high value of crop will lead to economic empowerment of VMGs
E: Case studies/profiles of success stories	
Success stories	Not yet disseminated
Application guidelines for users	Finger millet variety production leaflet

F: **Status of TIMP Readiness (1. Ready for up-scaling; 2. Requires validation; 3. Requires further research)**	Ready for up scaling.
G: Contacts	
Contacts	Egerton University: Division of Research and Extension; P.O. Box 536 Egerton, email: dvc@egerton.ac.ke, Tel. +254 (0) 725 309162.
Lead organization and scientists	Egerton University; Prof. Paul Kimurto
Partner organizations	KALRO; ICRISAT Nairobi; MoALF&I in dryland areas of Bomet, Kericho, West Pokot, Baringo, Turkana, Machakos, Kitui, Tharaka Nithi Counties.

2.2 Agronomic practices

2.2.1 TIMP Name	Planting Finger Millet in rows
Category (i.e. technology, innovation or management practice)	Management Practice
A: Description of the technology, innovation or management practice	
Problem addressed	High labour intensity requirements in finger millet cultivation leading to high production costs, eroding incomes.
What is it? (TIMP description) 	Planting finger millet in rows spaced at 30x15cm inter and intra-row spacing, respectively. Planting is done by making furrows at the specified spacing, then drilling in fertilizer, before drilling in seed and covering the furrows. The intra row spacing is attained by thinning the crop in a row to specified spacing. This is in contrast to the old farmers practice of broadcasting that leads to cumbersome weeding
Justification	-Weeding is one of the labour intensive operations in finger millet cultivation and planting in rows will make weeding easier and also enhance cost effective application of fertilizer.
Counties where TIMP will be up-scaled	Kericho, Bomet, and West Pokot
B: Assessment of dissemination and scaling up/out approaches	
Users of TIMP	Farmers and extension agencies
Approaches used in dissemination	On-farm experimentation and dissemination, field days, shows, farmer to farmer communication, leaflets, larger plot demonstrations.
Most effective approach	On-farm experimentation and larger plot effect demonstrations.

Critical/essential factors for successful promotion	Participatory Implementation, stakeholder capacity building, Functioning seed system, Stakeholder networks
Partners/stakeholders for scaling up and their respective roles	• Public and private partners –[MOALF&I) for extension, • ICRISAT for technical backstopping and promotion; • FIPs (Farmer Input Promotion) for promotion • Farmer Groups for activity implementation and promotion • Service provider agencies e.g. Micro-finance agencies and banks for credit provision, agro-vets for input supply • Processors and manufacturers to create market for produce, aggregators e.g. CARD (Community Action for Rural Development) for economy of scale sales and marketing], and others e.g. NGOs, CBOs, and FBOs to provide specialist services e.g. micro-credit
C: Current situation and future scaling up	
Counties where already promoted if any	Has been promoted in western Kenya with an adoption rate of 68% among finger millet farmers in western Kenya Counties of Kakamega, Busia, Bungoma, and Siaya.
Counties where TIMPs will be upscaled	Bomet, Kericho and West Pokot
Challenges in dissemination	Negative attitude to crop in some segments of society (orphan crop); limited investment in crop; limited publicity; low research.
Recommendations for addressing the challenges	Investment in crop development (research and extension, positive publicity.
Lessons learned	Investments in the crop and participation of champions can enhance technology up-take – like the case of this technology in western Kenya; stakeholder linkages and participatory implementation is important.
Social, environmental, policy and market conditions necessary	Women main players in finger millet cultivation and row planting will ease women labour and capacity building of stakeholders; understanding the physical and biotic environment in target ecologies; understanding community culture, preferences, and practices
D: Economic, gender, vulnerable and marginalized groups (VMGs) considerations	
Basic costs	Not yet calculated
Estimated returns	Not yet estimated
Gender issues and concerns in development, dissemination, adoption and scaling up	Labour intensity in weeding, threshing and winnowing – mostly done by women; Grain sale also by women– mostly done by women; therefore likely to overburden them; since most of the cash

	retained by them , increased production and marketing likely to improve the women's livelihood. Most farmer groups composed of women – if targeted this may leave out the opinion and interests of men; women do not travel far to communicate message; hence, could limit up-scaling.
Gender related opportunities	The whole household stands to gain from improved production and incomes
VMG issues and concerns in development, dissemination adoption and scaling up	Due to prejudice associated with their social status, VMGs are excluded from access to and benefits from improved technologies. Thus, affirmative action is required to promote the crop for the VMGs including value addition aspects.
VMG issues and concerns in	Reduced labour requirements will to ease production, a benefit to VMGs.
VMG related opportunities	Increased production will lead to improved food and nutrition security to the advantage of VMGs within the households. Improved production may also lead to improved incomes for VMGs
E: Case studies/profiles of success stories	
Success stories	In western Kenya almost every other finger millet farm is planted in rows.
Application guidelines for users	Finger millet variety production leaflet
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-Kisii, P.O. Box 523-40200, KISII; e-mail address: chrispus.oduori@kalro.org; Tel. +254 (0) 723 770 895/ +254 (0) 736 220 821
Lead organization and scientists	KALRO, Dr. Chrispus O.A. Oduori
Partner organizations	ICRISAT Nairobi; MoALF&I in Counties

Gaps

1. Labour intensity – need to develop planter machine
2. Need to validate optimum plant population and planting arrangement

2.2.2 TIMP Name	Fertilizer in finger millet cultivation
Category (i.e. technology, innovation or management practice)	Complementary Technology
A: Description of the technology, innovation or management practice	
Problem addressed	Low productivity due to inadequate soil nutrient levels
What is it? (TIMP description)	The application of fertilizer for yield optimization in finger millet cultivation.

	
Justification	-Finger millet yields are low due to inadequate soil nutrient levels arising from continuous cultivation. Improved finger millet varieties need fertilizer in order to realize their full yield potential. Fertilizer application contributes to significant yield increase and can even lead to 100% yield increase.
Counties where TIMP will be upscaled	Bomet, Kericho, and West Pokot
B: Assessment of dissemination and scaling up/out approaches	
Users of TIMP	Farmers and extension agencies
Approaches used in dissemination	On-farm experimentation and dissemination, field days, shows, farmer to farmer communication, leaflets, larger plot demonstrations.
Most effective approach	On-farm experimentation and larger plot effect demonstrations.
Critical/essential factors for successful promotion	Participatory Implementation, stakeholder capacity building, Functioning seed system, Stakeholder networks
Partners/stakeholders for scaling up and their respective roles	• Public and private partners –[MOALF&I) for extension, • ICRISAT for technical backstopping and promotion; • FIPs (Farmer Input Promotion) for promotion • Farmer Groups for activity implementation and promotion • Service provider agencies e.g. Micro-finance agencies and banks for credit provision, agro-vets for input supply • Processors and manufacturers to create market for produce, aggregators e.g. CARD (Community Action for Rural Development) for economy of scale sales and marketing], and others e.g. NGOs, CBOs, and FBOs to provide specialist services e.g. micro-credit
C: Current situation and future scaling up	
Counties where already promoted if any	This has been promoted in western Kenya in Kakamega, Busia, Bungoma, and Siaya Counties with an adoption rate of 50% of finger millet farmers now using fertilizer on finger millet.
Counties where TIMPs will be upscaled	
Challenges in dissemination	Negative attitude to crop in some segments of society (orphan crop); high cost of fertilizer, wrong belief that finger

	millet can do without fertilizer; limited investment in crop; limited publicity; low research.
Recommendations for addressing the challenges	Training of farmers on the value of fertilizer in finger millet; Investment in crop development (research and extension), positive publicity.
Lessons learned	Investments in the crop and participation of champions can enhance technology up-take – like the case of this technology in western Kenya; stakeholder linkages and participatory implementation is important. Demonstration of the effect of fertilizer can spur adoption of finger millet.
Social, environmental, policy and market conditions necessary	Understanding the attitude of community towards fertilizer use; carrying out soil analysis and surveys to understand fertilizer requirements. Sensitization of stakeholders and policy makers on the value of fertilizer on the crop.
D: Economic, gender, vulnerable and marginalized groups (VMGs) considerations	
Basic costs	About KES 5,000/= per acre i.e. 1x50kg each of planting and top dressing fertilizer
Estimated returns	Not yet estimated
Gender issues and concerns in development, dissemination, adoption and scaling up	Labour intensity in weeding, threshing and winnowing – mostly done by women; Grain sale also by women– mostly done by women; therefore likely to overburden them; Grain sold by women and most of the cash retained by them; thus, increased production and marketing likely to improve the women's livelihood. Most farmer groups composed of women – if targeted this may leave out the opinion and interests of men; women do not travel far to communicate message; hence, could limit up-scaling.
Gender related opportunities	Women stand to benefit from increased production and grain sales as this is considered a women crop.
VMG issues and concerns in development, dissemination adoption and scaling up	Due to prejudice associated with their social status, VMGs are excluded from access to and benefits from improved technologies. Thus, affirmative action is required to promote the crop for the VMGs including value addition aspects.
VMG issues and concerns in	Labour intensity reduction will lead to easier production by VMGs.
VMG related opportunities	Increased production will lead to improved food and nutrition security to the advantage of VMGs within the households. Improved production will also lead to improved incomes for VMGs
E: Case studies/profiles of success stories	
Success stories	In western Kenya, before intervention only 5.5% of the households in 2007, used fertilizer on finger millet, In 2015, an impact study in the area showed that on average, 49.9%, and 76.6% of households in the area and project farmers, were using fertilizer on finger millet, respectively.
Application guidelines for users	Finger millet variety production leaflet Basal fertilizer, preferably compound 20:20:0 is applied uniformly by drilling in furrows at a rate of 20Kgha-1 each of N and P2O5 before applying seed by drilling and

	covering the furrows with loose soil. This is about applying 2 x 50 bags of fertilizer per hectare. Then after thinning of the crop, another 2x50kg bags of CAN fertilizer is applied as a top dress.
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-Kisii; P.O. Box 523-40200, KISII; e-mail address: chrispus.oduori@kalro.org; Tel. +254 (0) 723 770 895/ +254 (0) 736 220 821
Lead organization and scientists	KALRO, Dr. Chrispus O.A. Oduori
Partner organizations	ICRISAT Nairobi; MoALF&I in Counties

Gaps

1. Refinement in fertilizer levels and fertilizer options
2. Need to determine appropriate strategy of fertilizer application, especially for dry planting

2.2.3 TIMP Name	Thinning and Weed Management
Category (i.e. technology, innovation or management practice)	Management practice
A: Description of the technology, innovation or management practice	
Problem addressed	Low yields/productivity due to high crop plant population and weed infestation.
What is it? (TIMP description) 	The management practice of removing excess crop plants and weeds from finger millet crop to reduce intra and inter-species competition for soil moisture and nutrients and the resultant yield loss.
Justification	-Weeds in finger millet can cause significant economic yield loss. Reduced yield leads to low production, and crop unavailability leading to low utilization (consumption, processing, trade, manufacturing etc). Small seeded finger millet needs protection from smothering effect of weeds. Finger millet like all crops, requires optimum plant population for the optimization of yields
B: Assessment of dissemination and scaling up/out approaches	

Users of TIMP	Farmers and extension agencies
Approaches used in dissemination	On-farm experimentation and dissemination, field days, shows, farmer to farmer communication, leaflets, larger plot demonstrations.
Most effective approach	On-farm experimentation and larger plot effect demonstrations.
Critical/essential factors for successful promotion	Participatory Implementation, stakeholder capacity building, Functioning seed system, Stakeholder networks
Partners/stakeholders for scaling up and their respective roles	• Public and private partners –[MOALF&I) for extension, • ICRISAT for technical backstopping and promotion; • FIPs (Farmer Input Promotion) for promotion • Farmer Groups for activity implementation and promotion • Service provider agencies e.g. Micro-finance agencies and banks for credit provision, agro-vets for input supply. • Processors and manufacturers to create market for produce, aggregators e.g. CARD (Community Action for Rural Development) for economy of scale sales and marketing], and Others e.g. NGOs, CBOs, and FBOs to provide specialist services like community mobilization, nutrition training etc.
C: Current situation and future scaling up	
Counties where already promoted if any	Western Kenya Counties of Kakamega, Busia, Bungoma, and Siaya'
Counties where TIMPs will be upscaled	Bomet, Kericho and West Pokot
Challenges in dissemination	Negative attitude to crop in some segments of society (orphan crop); labour intensity especially in broadcast crop; limited investment in crop; limited publicity; low research.
Recommendations for addressing the challenges	Training of farmers on the importance of weeding finger millet; Investment in crop development (research and extension), positive publicity.
Lessons learned	Investments in the crop and participation of champions can enhance technology up-take – stakeholder linkages and participatory implementation is important. Demonstration of the effect of weed management in finger millet.
Social, environmental, policy and market conditions necessary	Understanding the attitude of community towards weeding; household man-power endowment. Community youth, men, and women ratios.
D: Economic, gender, vulnerable and marginalized groups (VMGs) considerations	
Basic costs	Not yet estimated
Estimated returns	Not yet estimated

Gender issues and concerns in development, dissemination concerns in adoption and scaling up	Men are the custodians of family resources and have to be convinced to invest in weeding operations. Increased workload of weeding is likely to directly impact on women, however they stand to gain from the resulting increased production. Most farmer groups comprise women and will enhance women technology uptake but leave out the opinion and interests of men;
Gender related opportunities	Women stand to benefit in increased production due to healthy finger millet crop and grain sales as this is considered a women crop.
VMG issues and concerns in development and dissemination adoption and scaling up	Due to prejudice associated with their social status, VMGs are excluded from access to and benefits from improved technologies. Thus, affirmative action is required to promote the crop for the VMGs including value addition aspects.
VMG related opportunities	Increased production will lead to increased consumption of nutritious finger millet, hence improved health of VMGs; high value of crop will lead to economic empowerment of VMGs
E: Case studies/profiles of success stories	
Success stories	Increased yields in western Kenya counties of Kakamega, Busia, Siaya, and Bungoma
Application guidelines for users	Weeding at least twice: two weeks after crop emergence and two weeks later. Additional weeding as needed depending on agro-ecological zone. Finger millet variety production leaflet
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-Kisii, P.O. Box 523-40200, KISII; e-mail address: chrispus.oduori@kalro.org; Tel. +254 (0) 723 770 895/ +254 (0) 736 220 821
Lead organization and scientists	KALRO, Dr. Chrispus O.A. Oduori
Partner organizations	ICRISAT Nairobi; MoALF in Counties

Gaps

1. Labour intensity – need to develop weeding machine
2. Need to validate plant population and row spacing
3. Need to identify appropriate herbicides and combinations
4. Develop effective strategy for herbicide use

2.2.5 TIMP Name	Timely Planting of Finger Millet
Category (i.e. technology, innovation or management practice)	Management Practice

A: Description of the technology, innovation or management practice	
Problem addressed	Low yields and or crop failure due to early dry planting or late planting. Recommendation – planting at onset of rains in the season assures utilization of precipitation available in the season
What is it? (TIMP description)	The practice of planting finger millet at the appropriate time in relation to the onset of the rains e.g. in western Kenya by the 15th March during the long rains.
Justification	Dry planting before on-set of rains necessitates planting without fertilizer to avoid scorching which reduces yield. On the other hand late planting especially in semi-arid areas often results in crop failure due to lack of moisture at the crucial stages of crop growth. Timely planting at onset of rains enables use of fertilizer and full utilization of the season's rainfall and avoidance of pests and diseases build-up.
Region promoted	Western Kenya Counties of Kakamega, Buisa, Bungoma, and Siaya
Counties where TIMP will be upscaled	
B: Assessment of dissemination and scaling up/out approaches	
Users of TIMP	Farmers and extension agencies
Approaches used in dissemination	On-farm experimentation and dissemination, field days, shows, farmer to farmer communication, leaflets, larger plot demonstrations.
Most effective approach	On-farm experimentation and larger plot effect demonstrations.
Critical/essential factors for successful promotion	Participatory Implementation, stakeholder capacity building, Functioning seed system, Stakeholder networks
Partners/stakeholders for scaling up and their respective roles	• Public and private partners –[MOALF&I) for extension, • ICRISAT for technical backstopping and promotion; • FIPs (Farmer Input Promotion) for promotion • Farmer Groups for activity implementation and promotion • Service provider agencies e.g. Micro-finance agencies and banks for credit provision, agro-vets for input supply. • Processors and manufacturers to create market for produce, aggregators e.g. CARD (Community Action for Rural Development) for economy of scale sales and marketing], and Others e.g. NGOs, CBOs, and FBOs to provide specialist services like community mobilization, nutrition training etc.
C: Current situation and future scaling up	
Current extent of reach	Finger millet farmers in western Kenya Counties of Kakamega, Busia, Bungoma, and Siaya appreciate the need to plant early.
Challenges in dissemination	Unpredictability of onset of seasonal rains; Negative attitude to crop in some segments of society (orphan crop); limited investment in crop; limited publicity; low research.

Recommendations for addressing the challenges	Liaise with the Meteorological Department to get accurate predictions. Training of farmers on the value of access to and use of meteorological data; Investment in crop development (research and extension), positive publicity.
Lessons learned	Access to and use of meteorological forecasts can enhance planting on time and thus enhance yield.
Social, environmental, policy and market conditions necessary	Sensitization of communities on seasons and use of meteorological data.
D: Economic, gender, vulnerable and marginalized groups (VMGs) considerations	
Basic costs	None
Estimated returns	Not yet estimated
Gender issues and concerns in development and dissemination	Need to sensitize both men and women on value of meteorological data in agriculture.
Gender issues and concerns in development, dissemination concerns in adoption and scaling up	Men are the custodian of family resources and have to be convinced on tha advantages of adopting GAP. Women, however who carry out the production and salles activities stand to gain from the resulting increased production. Most farmer groups comprise women and will enhance women technology uptake but leave out the opinion and interests of men;
Gender related opportunities	Women stand to benefit in increased production due to timely operations and grain sales as this is considered a women crop.
VMG issues and concerns in development and dissemination	Due to prejudice associated with their social status, VMGs are excluded from access to and benefits from improved technologies. Thus, affirmative action is required to promote the crop for the VMGs including value addition aspects.
VMG issues and concerns in adoption and scaling up	Timely operations will lead to enhanced production by VMGs.
VMG related opportunities	Increased production will lead to increased consumption of nutritious finger millet, hence improved health of VMGs; high value of crop will lead to economic empowerment of VMGs
E: Case studies/profiles of success stories	
Success stories	In western Kenya where almost every other finger millet farmer plants early, some even doing dry planting before onset of rains.
Application guidelines for users	Finger millet variety production leaflet
F: **Status of TIMP Readiness (**1. Ready for up-scaling; 2. Requires validation; 3. Requires further research**)**	Ready for up-scaling
G: Contacts	
Contacts	KALRO-Kisii

Lead organization and scientists	KALRO, Dr. Chrispus O.A. Oduori
Partner organizations	ICRISAT Nairobi; MoALF in Counties

Gaps in Finger Millet Timely Planting

1. Needs review and adaptation to climate change effects
2. Needs validation in various environments of finger millet cultivation

2.3 Postharvest management

2.3.1 TIMP Name	Mechanical Thresher
Category (i.e. technology, innovation or management practice)	Technology
A: Description of the technology, innovation or management practice	
Problem addressed	Labour intensity/drudgery in finger millet post-harvest handling,
What is it? (TIMP description) 	A petrol/diesel engine driven Finger millet portable mechanical thresher.
Justification	-Labour is a major finger millet production constraint, especially the post-harvest handling processes of threshing and winnowing, an activity done mostly by women. The thresher will reduce drudgery and production labour costs
B: Assessment of dissemination and scaling up/out approaches	
Users of TIMP	Farmers, extension agencies, seed producers traders, and consumers
Approaches used in dissemination	Not yet disseminated but on-farm demonstration, field days, shows, farmer to farmer communication will be applied.
Most effective approach	Not yet determined.
Critical/essential factors for successful promotion	Participatory Implementation, stakeholder capacity building, Functioning seed system, Stakeholder networks
Partners/stakeholders for scaling up, their respective roles and stage of involvement.	• Public and private partners –[MOALF&I) for extension, • ICRISAT for technical backstopping and promotion; • FIPs (Farmer Input Promotion) for promotion

	• Farmer Groups for activity implementation and promotion • Service provider agencies e.g. Micro-finance agencies and banks for credit provision, agro-vets for input supply. • Processors and manufacturers to create market for produce, aggregators e.g. CARD (Community Action for Rural Development) for economy of scale sales and marketing], and Others e.g. NGOs, CBOs, and FBOs to provide specialist services like community mobilization, nutrition training etc.
C: Current situation and future scaling up	
Counties where already promoted if any	Still at testing stage on-station and on-farm in western Kenya.
Counties where TIMPs will be upscaled	All finger millet growing counties – Busia, Kakamega, Bungoma, Siaya, Kisii, Nyamira, Migori, Kericho, Bomet, West Pokot.
Challenges in dissemination	High cost of acquisition is a potential deterrent for small scale farmers.
Recommendations for addressing the challenges	Distribution of a few test machines in finger millet farmer groups for demonstration of capacity.
Lessons learned	Machine significantly reduces labour and time requirement for threshing and winnowing.
Social, environmental, policy and market conditions necessary	Machine of great potential in alleviation of women labour; capacity building of stakeholders and; understanding community culture, preferences, and practices
D: Economic, gender, vulnerable and marginalized groups (VMGs) considerations	
Basic costs	Cost of machine:80,000/=
Estimated returns	Yet to be estimated.
Gender issues and concerns in development, dissemination, adoption and scaling up	Threshing and winnowing is mostly done by women; the technology is therefore likely to unburden them; Grain sold by women and most of the cash retained by them; thus, increased production and marketing likely to improve the women's livelihood.
Gender related opportunities	- Increased incomes accruing from the saved labour will benefit the women - Youth also stand to benefit through application of ICT networking for marketing. - Youth also stand to benefit through hiring out of threshing and winnowing services

VMG issues and concerns in development, dissemination, adoption and scaling up	Reduction in cost of finger millet production thus enabling VMGs to participate in production.
VMG issues and concerns in	Affordability of machine; operability;
VMG related opportunities	Participation in finger millet value chain, especially production.
E: Case studies/profiles of success stories	
Success stories	Not documented
Application guidelines for users	Machine operation manual
F: **Status of TIMP Readiness (**1. Ready for up-scaling; 2. Requires validation; 3. Requires further research**)**	Ready for up-scaling with validation and further research
G: Contacts	
Contacts	Centre Director, KALRO-Kisii P.O. Box 523-40200, KISII; e-mail address: chrispus.oduori@kalro.org; Tel. +254 (0) 723 770 895/ +254 (0) 736 220 821/ ICRISAT Nairobi, P.O. Box 39063, NAIROBI, Kenya. Tel +254 20 7224550; e-mail: icrisat.nairobi@cgiar.org
Lead organization and scientists	KALRO/ ICRISAT, Dr. Chrispus O.A. Oduori & Dr. Henry Ojulong, respectively
Partner organizations	ICRISAT Nairobi; MoALF in Counties – where finger millet is grown

Gaps

1. Needs validation of finger millet post-harvest processors
2. Needs fine tuning for clean threshing and winnowing
3. Identification of private sector investors in different counties

2.4 Value addition

2.4.1 TIMP Name	Finger Millet Crackie Snack Food Product.
Category (i.e. technology, innovation or management practice)	Innovation
A: Description of the technology, innovation or management practice	
Problem addressed	Limited finger millet utilization food products depressing the crop value chain
What is it? (TIMP description) 	A dry snack food product made from finger millet, sweet potato, spices and wheat flour.
Justification	-Enhanced production of finger millet is likely to result in a glut, with consequent decline in prices. Diversification of

	finger millet utilization as food products will enhance uptake and consumption of finger millet, increasing the demand and thus creating market for the grain
B: Assessment of dissemination and scaling up/out approaches	
Users of TIMP	Farmers, extension agencies, traders, and consumers
Approaches used in dissemination	On-farm experimentation, training and dissemination through value addition expose, field days, shows, farmer to farmer communication, leaflets etc.
Critical/essential factors for successful promotion	Participatory Implementation, stakeholder capacity building and networks; promotions involving Public Private partnerships (PPP).
Partners/stakeholders for scaling up	• Public and private partners –[MOALF&I) for extension, • ICRISAT for technical backstopping and promotion; • FIPs (Farmer Input Promotion) for promotion • Farmer Groups for activity implementation and promotion • Service provider agencies e.g. Micro-finance agencies and banks for credit provision, agro-vets for input supply • Processors and manufacturers to create market for produce, aggregators e.g. CARD (Community Action for Rural Development) for economy of scale sales and marketing], and others e.g. NGOs, CBOs, and FBOs to provide specialist services e.g. micro-credit
C: Current situation and future scaling up	
Counties where already promoted if any	Finger millet farming communities, processors, and manufacturers in western Kenya Counties of Kakamega, Busia, Bungoma, and Siaya.
Counties where TIMPs will be upscaled	Kericho Bomet and West Pokot counties
Challenges in dissemination	Prejudice on products of orphan crops; difficulty in acquiring requisite standards certificates from regulatory agencies e.g. KEBS; lack of credit facilities. Undeveloped packaging materials.
Recommendations for addressing the challenges	Promotional campaigns; sensitization of regulatory agencies and policy makers; linkage to credit facility providers to promote commercialization. Develop appropriate packaging materials. Inter country machine sourcing to be encouraged.
Lessons learned	A good value added product penetrates the market very fast.
Social, environmental, policy and market conditions necessary	Target women and youth in society who are the major adopters (manufacturers) and consumers, respectively. The flour blending policy adopted recently will positively impact production of product.
D: Economic, gender, vulnerable and marginalized groups (VMGs) considerations	
Basic costs	Not yet estimated, needs to be determined
Estimated returns	Not yet estimated, needs to be determined
Gender issues and concerns in development, dissemination adoption and scaling up	Women are the key adopters and children the key consumers. Women and youth are the key adopters and the product is consumed by all ages.

Gender related opportunities	Women and youth stand to benefit in production and trade in the product.
VMG issues and concerns in development, dissemination adoption and scaling up	Due to prejudice associated with their social status, VMGs are excluded from access to and benefits from improved technologies. Thus, affirmative action is required to promote the crop for the VMGs including value addition aspects. Cheap nutritious food products made in their backyards will lead to enhanced production and consumption by VMGs hence improved health and incomes.
VMG related opportunities	Opportunity to produce, trade in, and consume locally produced nutritious food products
E: Case studies/profiles of success stories	
Success stories	Cottage production of the products in western Kenya like by EASTCOM Foods, Wamama Tuamue women group, Busibwabi widows and orpharns group and PAWA bakers in Siaya and Busia respectively.
Application guidelines for users	Finger millet crackie production leaflet
F: **Status of TIMP Readiness (**1. Ready for up-scaling; 2. Requires validation; 3. Requires further research**)**	Ready for up-scaling
F: Contacts	
Contacts	KALRO-Alupe, P.O. Box 278 – 50400, BUSIA (K). Tel +254 724 687 774; e-mail address: rhodazik@gmail.com
Lead organization and scientists	KALRO, Dr. Rhoda A. Nungo and Dr. Chrispus Oduori
Partner organizations	ICRISAT Nairobi; MoALF, MoH in Counties, EASTCOM Foods; PAWA Bakers. WamamaTuamue women group, Busibwabo widows and orpharns group

Gaps

1. Identification of private sector investors in different counties
2. Appropriate packaging and promotion

2.4.2 TIMP Name	Finger Millet TAMUU Paste Food Product.
Category (i.e. technology, innovation or management practice)	Innovation
A: Description of the technology, innovation or management practice	
Problem addressed	Limited finger millet uptake in the market resulting in depressed prices utilization food products
What is it? (TIMP description)	A paste food product made from finger millet that can be used as bread spread or consumed directly.

	
Justification	- Enhanced production of finger millet is likely to result in a glut, with consequent decline in prices. Diversification of finger millet utilization as food products will enhance uptake and consumption of finger millet, increasing the demand and thus creating market for the grai
B: Assessment of dissemination and scaling up/out approaches	
Users of TIMP	Farmers, extension agencies, traders, and consumers
Approaches used in dissemination	On-farm experimentation, training and dissemination through value addition expose, field days, shows, farmer to farmer communication, leaflets etc.
Critical/essential factors for successful promotion	Participatory Implementation, stakeholder capacity building and networks; promotions involving Public Private partnerships (PPP).
Partners/stakeholders for scaling up and their roles	• Public and private partners –[MOALF&I) for extension, • ICRISAT for technical backstopping and promotion; • FIPs (Farmer Input Promotion) for promotion • Farmer Groups for activity implementation and promotion • Service provider agencies e.g. Micro-finance agencies and banks for credit provision, agro-vets for input supply • Processors and manufacturers to create market for produce, aggregators e.g. CARD (Community Action for Rural Development) for economy of scale sales and marketing, and others e.g. NGOs, CBOs, and FBOs to provide specialist services e.g. micro-credit.
C: Current situation and future scaling up	
Counties where already promoted if any	Finger millet farming communities, processors, and manufacturers in western Kenya Counties of Kakamega, Busia, Bungoma, and Siaya.
Counties where TIMPs will be up scaled	Bomet, Kericho and West Pokot
Challenges in dissemination	Prejudice on products of orphan crops; difficulty in acquiring requisite standards certificates from regulatory agencies e.g. KEBS; lack of credit facilities. Undeveloped packaging materials.
Recommendations for addressing the challenges	Promotional campaigns; sensitization of regulatory agencies and policy makers; linkage to credit facility providers to promote commercialization.
Lessons learned	A good value added product addressing malnutrition with high potential to compete imported products. Certification of

	the product by Kenya Bureau of Standards recently will positively impact production of product.
Social, environmental, policy and market conditions necessary	Target malnourished individuals, small scale and medium scale entrepreneurs for production and malnourished individuals in the society who are the major adopters and humanitarian agencies, respectively.
D: Economic, gender, vulnerable and marginalized groups (VMGs) considerations	
Basic costs	Not yet estimated
Estimated returns	Not yet estimated
Gender issues and concerns in development and dissemination	Youth SMEs producers and malnourished individuals are the key consumers.
Gender issues and concerns in adoption and scaling up	Women are the key adopters and children the key consumers.
Gender related opportunities	Women stand to benefit in production of raw materials and youth SMEs in paste product and trade.
VMG issues and concerns in development and dissemination	Due to requirement for the use of several machines, development is limited to focused SMEs. Affirmative action is required to promote the crops production and product dissemination for the VMGs.
VMG issues and concerns in adoption and scaling up	Affordable nutritious food products locally made will lead to enhanced raw materials production and product consumption by VMGs hence bettering their health and incomes.
VMG related opportunities	Opportunity to produce raw materials, trade in, and consume locally produced nutritious food products
E: Case studies/profiles of success stories	
Success stories	Cottage production of the product in western Kenya by EASTCOM Foods in Siaya.
Application guidelines for users	Finger millet TAMUU production leaflet
F: **Status of TIMP Readiness (**1. Ready for up-scaling; 2. Requires validation; 3. Requires further research**)**	Ready for up-scaling
F: Contacts	
Contacts	KALRO-Alupe, P.O. Box 278 – 50400, BUSIA (K). Tel +254 724 687 774; e-mail address: rhodazik@gmail.com
Lead organization and scientists	KALRO, Dr. Rhoda A. Nungoand Dr. Chrispus Oduori
Partner organizations	UoN, JKUAT, EASTCOM Foods.

Gaps

1. Identification of private sector investors in different counties
2. Appropriate packaging and promotion
3. Validation with other potential legume ingredients
4. Validation of requisite machines for making the product.

2.4.3 TIMP Name	Finger Millet Onion bites Food Product.

Category (i.e. technology, innovation or management practice)	Innovation
A: Description of the technology, innovation or management practice	
Problem addressed	Limited finger millet utilization food products
What is it? (TIMP description) 	A snack food product made from finger millet, sweet potato, wheat flour and onions.
Justification	-Diversification of finger millet food products will enhance consumption of finger millet, enhance demand and thus spur increased production and utilization of finger millet.
Region promoted	Western Kenya Counties of Kakamega, Buisa, Bungoma, and Siaya
Counties where TIMP will be up scaled	
B: Assessment of dissemination and scaling up/out approaches	
Users of TIMP	Farmers, extension agencies, traders, and consumers
Approaches used in dissemination	On-farm experimentation, training and dissemination through value addition expose, field days, shows, farmer to farmer communication, leaflets etc.
Most effective approach	On-farm experimentation, training, and practical demonstration of preparation process.
Critical/essential factors for successful promotion	Participatory Implementation, stakeholder capacity building and networks; promotions involving Public Private partnerships (PPP).
Partners/stakeholders for scaling up	• Public and private partners –[MOALF&I) for extension, • ICRISAT for technical backstopping and promotion; • FIPs (Farmer Input Promotion) for promotion • Farmer Groups for activity implementation and promotion • Service provider agencies e.g. Micro-finance agencies and banks for credit provision, agro-vets for input supply • Processors and manufacturers to create market for produce, aggregators e.g. CARD (Community Action for Rural Development) for economy of scale sales and marketing], and others e.g. NGOs, CBOs, and FBOs to provide specialist services e.g. micro-credit
C: Current situation and future scaling up	

Current extent of reach	Finger millet farming communities, and small scale entrepreneurs in western Kenya Counties of Kakamega, Busia, Bungoma, and Siaya.
Challenges in dissemination	Prejudice on products of orphan crops; difficulty in acquiring requisite standards certificates from regulatory agencies e.g. KEBS; lack of credit facilities. Undeveloped packaging materials.
Recommendations for addressing the challenges	Promotional campaigns; sensitization of regulatory agencies and policy makers; linkage to credit facility providers to promote commercialization and development of appropriate packaging materials
Lessons learned	A good value added product will penetrate the market very fast.
Social, environmental, policy and market conditions necessary	Target women, youth and children in society who are the major adopters and consumers, respectively. The flour blending policy adopted recently will positively impact production and utilization of product.
D: Economic, gender, vulnerable and marginalized groups (VMGs) considerations	
Basic costs	Not yet estimated
Estimated returns	Not yet estimated
Gender issues and concerns in development and dissemination	Women and youth are the key adopters in product development and dissemination while the general public including children the key consumers.
Gender issues and concerns in adoption and scaling up	Women and youth are the key adopters
Gender related opportunities	Women and youth stand to benefit in production and trade in the product.
VMG issues and concerns in development and dissemination	Due to prejudice associated with their social status, VMGs are excluded from access to and benefits from improved technologies. Thus, affirmative action is required to promote the crop for the VMGs including value addition aspects.
VMG issues and concerns in adoption and scaling up	Cheap nutritious food products made in their backyards will lead to enhanced production and consumption by VMGs hence enhancing their health and incomes.
VMG related opportunities	Opportunity to produce, trade in, and consume locally produced nutritious food products
E: Case studies/profiles of success stories	
Success stories	Cottage production of the products in western Kenya like by PAWA bakers, Busibwabo widows and orphans group and Wamama Tuamue women group in Busia County
Application guidelines for users	Finger millet Onion bites production leaflet
F: **Status of TIMP Readiness (**1. Ready for up-scaling; 2. Requires validation; 3. Requires further research**)**	Ready for up-scaling
F: Contacts	
Contacts	KALRO-Alupe, P.O. Box 278 – 50400, BUSIA (K). Tel +254 724 687 774; e-mail address: rhodazik@gmail.com

Lead organization and scientists	KALRO, Dr. Rhoda A. Nungo and Chrispus Oduori
Partner organizations	ICRISAT Nairobi; MoALF, MoH in Counties, EASTCOM Foods; PAWA Bakers.

Gaps

1. Identification of small scale entrepreneurs in different counties
2. Appropriate packaging and promotion
3. Extensive dissemination

2.4.4 TIMP Name	Finger Millet Cake Food Product.
Category (i.e. technology, innovation or management practice)	Innovation
A: Description of the technology, innovation or management practice	
Problem addressed	Limited finger millet utilization food products
What is it? (TIMP description) 	A cake made from a finger millet – wheat flour composite.
Justification	-Diversification of finger millet food products will enhance consumption of finger millet, enhance demand and thus spur increased production of finger millet.
Region promoted	Western Kenya Counties of Kakamega, Buisa, Bungoma, and Siaya
Counties where TIMP will be upscaled	
B: Assessment of dissemination and scaling up/out approaches	
Users of TIMP	Farmers, extension agencies, traders, and consumers
Approaches used in dissemination	On-farm experimentation, training and dissemination through value addition expose, field days, shows, farmer to farmer communication, leaflets etc.
Most effective approach	On-farm experimentation, training, and practical demonstration of preparation process for home level and commercial.
Critical/essential factors for successful promotion	Participatory Implementation, stakeholder capacity building and networks; promotions involving Public Private partnerships (PPP).
Partners/stakeholders for scaling up	• Public and private partners –[MOALF&I) for extension, • ICRISAT for technical backstopping and promotion; • FIPs (Farmer Input Promotion) for promotion • Farmer Groups for activity implementation and promotion • Service provider agencies e.g. Micro-finance agencies and banks for credit provision, agro-vets for input supply • Processors and manufacturers to create market for produce, aggregators e.g. CARD (Community Action

	for Rural Development) for economy of scale sales and marketing], and others e.g. NGOs, CBOs, and FBOs to provide specialist services e.g. micro-credit
C: Current situation and future scaling up	
Current extent of reach	Finger millet farming communities, processors, and small scale entrepreneurs in western Kenya Counties of Kakamega, Busia, Bungoma, and Siaya.
Challenges in dissemination	Prejudice on products of orphan crops; difficulty in acquiring requisite standards certificates from regulatory agencies e.g. KEBS; lack of credit facilities. Undeveloped packaging materials.
Recommendations for addressing the challenges	Promotional campaigns; sensitization of regulatory agencies and policy makers; linkage to credit facility providers to promote commercialization and production of appropriate packaging materials..
Lessons learned	A good value added product will penetrate the market very fast.
Social, environmental, policy and market conditions necessary	Target women and youth in society who are the major adopters (producers) and consumers, respectively. The flour blending policy adopted recently will positively impact production of product.
D: Economic, gender, vulnerable and marginalized groups (VMGs) considerations	
Basic costs	Not yet estimated
Estimated returns	Not yet estimated
Gender issues and concerns in development and dissemination	Women and youth are the key adopters in development and dissemination and the general public key consumers.
Gender issues and concerns in adoption and scaling up	Women and youth are the key adopters in production.
Gender related opportunities	Women and youth stand to benefit in production and trade in the product.
VMG issues and concerns in development and dissemination	Due to prejudice associated with their social status, VMGs are excluded from access to and benefits from improved technologies. Thus, affirmative action is required to promote the crop for the VMGs including value addition aspects.
VMG issues and concerns in adoption and scaling up	Cheap nutritious food products made in their backyards will lead to enhanced production and consumption by VMGs hence enhancing their health and incomes.
VMG related opportunities	Opportunity to produce, trade in, and consume locally produced nutritious food products
E: Case studies/profiles of success stories	
Success stories	Cottage production of the products in western Kenya like by PAWA bakers in Siaya and Busia respectively.
Application guidelines for users	Finger millet cake production leaflet
F: **Status of TIMP Readiness (**1. Ready for up-scaling; 2.	Ready for up-scaling

Requires validation; 3. Requires further research**)**	
F: Contacts	
Contacts	KALRO-Alupe, P.O. Box 278 – 50400, BUSIA (K). Tel +254 724 687 774; e-mail address: rhodazik@gmail.com
Lead organization and scientists	KALRO, Dr. Rhoda A. Nungo and Dr. Chrispus Oduori
Partner organizations	ICRISAT Nairobi; MoALF in Counties, EASTCOM Foods; PAWA Bakers and Wamama Tuamue women group.

Gaps

1. Identification of small scale entrepreneurs in different counties
2. Appropriate packaging and promotion
3. Validation of requisite community baking ovens.

2.4.5 TIMP Name	Finger Millet Chapatti Food Product.
Category (i.e. technology, innovation or management practice)	Innovation
A: Description of the technology, innovation or management practice	
Problem addressed	Limited finger millet utilization food products
What is it? (TIMP description) 	A main meal dish made from a finger millet – wheat flour composite.
Justification	-Diversification of finger millet food products will enhance consumption of finger millet, enhance demand and thus spur increased production of finger millet.
Region promoted	Western Kenya Counties of Kakamega, Buisa, Bungoma, and Siaya
Counties where TIMP will be upscaled	
B: Assessment of dissemination and scaling up/out approaches	
Users of TIMP	Farmers, extension agencies, traders, and consumers
Approaches used in dissemination	On-farm experimentation, training and dissemination through value addition expose, field days, shows, farmer to farmer communication, leaflets etc.
Most effective approach	On-farm experimentation, training, and practical demonstration of preparation process.
Critical/essential factors for successful promotion	Participatory Implementation, stakeholder capacity building and networks; promotions involving Public Private partnerships (PPP).
Partners/stakeholders for scaling up	• Public and private partners –[MOALF&I) for extension, • ICRISAT for technical backstopping and promotion;

	• FIPs (Farmer Input Promotion) for promotion • Farmer Groups for activity implementation and promotion • Service provider agencies e.g. Micro-finance agencies and banks for credit provision, agro-vets for input supply • Processors and manufacturers to create market for produce, aggregators e.g. CARD (Community Action for Rural Development) for economy of scale sales and marketing], and others e.g. NGOs, CBOs, and FBOs to provide specialist services e.g. micro-credit
C: Current situation and future scaling up	
Current extent of reach	Finger millet farming communities, processors, and small scale entrepreneurs in western Kenya Counties of Kakamega, Busia, Bungoma, and Siaya.
Challenges in dissemination	Prejudice on products of orphan crops due to colour.
Recommendations for addressing the challenges	Promotional campaigns; sensitization of households and food outlets to promote commercialization.
Lessons learned	A good value added product will penetrate the market very fast.
Social, environmental, policy and market conditions necessary	Target women, youth and food outlets in society are the major adopters (producers) and general community as consumers, respectively. The flour blending policy adopted recently will positively impact production and utilization of product.
D: Economic, gender, vulnerable and marginalized groups (VMGs) considerations	
Basic costs	Not yet estimated
Estimated returns	Not yet estimated
Gender issues and concerns in development and dissemination	Women and youth are the key adopters and general community the key consumers.
Gender issues and concerns in adoption and scaling up	Women and youth are the key adopters and children the key consumers.
Gender related opportunities	Women and youth stand to benefit in production and trade in the product.
VMG issues and concerns in development and dissemination	Due to prejudice associated with their social status, VMGs are excluded from access to and benefits from improved technologies. Thus, affirmative action is required to promote the crop for the VMGs including value addition aspects.
VMG issues and concerns in adoption and scaling up	Affordable nutritious food products made in their backyards will lead to enhanced production and consumption by VMGs hence enhancing their health and incomes.
VMG related opportunities	Opportunity to produce, trade in, and consume locally produced nutritious food products
E: Case studies/profiles of success stories	
Success stories	Production of the products in western Kenya by PAWA bakers, Wamama Tuamue in Busia county.
Application guidelines for users	Finger millet Chapatti production leaflet
F: **Status of TIMP Readiness (**1. Ready for up-	Ready for up-scaling and requires further research as regards to variety effect on product.

scaling; 2. Requires validation; 3. Requires further research**)**	
F: Contacts	
Contacts	KALRO-Alupe, P.O. Box 278 – 50400, BUSIA (K). Tel +254 724 687 774; e-mail address: rhodazik@gmail.com
Lead organization and scientists	KALRO, Dr. Rhoda A. Nungo and Dr. Chrispus Oduori
Partner organizations	ICRISAT Nairobi; MoALF in Counties, EASTCOM Foods; PAWA Bakers and Wamama Tuamue women group.

Gaps

1. Appropriate packaging and promotion

2.4.6 TIMP Name	Finger Millet Mandazi Food Product.
Category (i.e. technology, innovation or management practice)	Innovation
A: Description of the technology, innovation or management practice	
Problem addressed	Limited finger millet utilization food products
What is it? (TIMP description) 	A snack food product made from a finger millet – wheat flour blend.
Justification	-Diversification of finger millet food products will enhance consumption of finger millet, enhance demand and thus spur increased production and utilization of finger millet.
Region promoted	Western Kenya Counties of Kakamega, Buisa, Bungoma, and Siaya
Counties where TIMP will be upscaled	
B: Assessment of dissemination and scaling up/out approaches	
Users of TIMP	Farmers, extension agencies, traders, and consumers
Approaches used in dissemination	On-farm experimentation, training and dissemination through value addition expose, field days, shows, farmer to farmer communication, leaflets etc.
Most effective approach	On-farm experimentation, training, and practical demonstration of preparation process.
Critical/essential factors for successful promotion	Participatory Implementation, stakeholder capacity building and networks; promotions involving Public Private partnerships (PPP).
Partners/stakeholders for scaling up	• Public and private partners –[MOALF&I) for extension, • ICRISAT for technical backstopping and promotion; • FIPs (Farmer Input Promotion) for promotion • Farmer Groups for activity implementation and promotion

	• Service provider agencies e.g. Micro-finance agencies and banks for credit provision, agro-vets for input supply • Processors and manufacturers to create market for produce, aggregators e.g. CARD (Community Action for Rural Development) for economy of scale sales and marketing], and others e.g. NGOs, CBOs, and FBOs to provide specialist services e.g. micro-credit
C: Current situation and future scaling up	
Current extent of reach	Finger millet farming communities, and SMEs in western Kenya Counties of Kakamega, Busia, Bungoma, and Siaya.
Challenges in dissemination	Prejudice on products of orphan crops due to colour;
Recommendations for addressing the challenges	Promotional campaigns; sensitization of policy makers; to promote consumption and commercialization.
Lessons learned	A good value added product will penetrate the market very fast.
Social, environmental, policy and market conditions necessary	Target women and youth in society who are the major adopters (SMEs) and general public consumers, respectively. The flour blending policy adopted recently will positively impact production and utilization of product.
D: Economic, gender, vulnerable and marginalized groups (VMGs) considerations	
Basic costs	Not yet estimated
Estimated returns	Not yet estimated
Gender issues and concerns in development and dissemination	Women and youth are the key adopters and general public the key consumers.
Gender issues and concerns in adoption and scaling up	Women and youth are the key adopters and general public the key consumers.
Gender related opportunities	Women and youth stand to benefit in production and trade in the product.
VMG issues and concerns in development and dissemination	Due to prejudice associated with their social status, VMGs are excluded from access to and benefits from improved technologies. Thus, affirmative action is required to promote the crop for the VMGs including value addition aspects.
VMG issues and concerns in adoption and scaling up	Affordable nutritious food products made in their backyards will lead to enhanced production and consumption by VMGs hence enhancing their health and incomes.
VMG related opportunities	Opportunity to produce, trade in, and consume locally produced nutritious food products
E: Case studies/profiles of success stories	
Success stories	Cottage production of the products in western Kenya like by PAWA bakers, Wamama Tuamue women group and Busibwabo widows and orphans group in Busia county.
Application guidelines for users	Finger millet Mandazi production leaflet
F: **Status of TIMP Readiness (**1. Ready for up-scaling; 2. Requires validation; 3. Requires further research**)**	Ready for up-scaling

F: Contacts	
Contacts	KALRO-Alupe, P.O. Box 278 – 50400, BUSIA (K). Tel +254 724 687 774; e-mail address: rhodazik@gmail.com
Lead organization and scientists	KALRO, Dr. Rhoda A. Nungo and Dr. Chrispus Oduori
Partner organizations	ICRISAT Nairobi; MoALF in Counties, EASTCOM Foods; PAWA Bakers.

Gaps

1. Appropriate packaging and promotion

2.4.7 TIMP Name	Finger Millet Blended and Composite Flour Product.
Category (i.e. technology, innovation or management practice)	
A: Description of the technology, innovation or management practice	
Problem addressed	Limited finger millet utilization food products
What is it? (TIMP description) 	Flour products made from finger millet – wheat or maize flour composite.
Justification	-Diversification of finger millet food products will enhance consumption of finger millet, enhance demand and thus spur increased production and utilization of finger millet.
Region promoted	Western Kenya Counties of Kakamega, Buisa, Bungoma, and Siaya
Counties where TIMP will be up scaled	
B: Assessment of dissemination and scaling up/out approaches	
Users of TIMP	Farmers, extension agencies, traders, and consumers
Approaches used in dissemination	On-farm experimentation, training and dissemination through value addition expose, field days, shows, farmer to farmer communication, leaflets etc.
Most effective approach	On-farm experimentation, training, and practical demonstration of preparation process.

Critical/essential factors for successful promotion	Participatory Implementation, stakeholder capacity building and networks; promotions involving Public Private partnerships (PPP).
Partners/stakeholders for scaling up	• Public and private partners –[MOALF&I) for extension, • ICRISAT for technical backstopping and promotion; • FIPs (Farmer Input Promotion) for promotion • Farmer Groups for activity implementation and promotion • Service provider agencies e.g. Micro-finance agencies and banks for credit provision, agro-vets for input supply • Processors and manufacturers to create market for produce, aggregators e.g. CARD (Community Action for Rural Development) for economy of scale sales and marketing], and others e.g. NGOs, CBOs, and FBOs to provide specialist services e.g. micro-credit
C: Current situation and future scaling up	
Current extent of reach	Finger millet farming communities, processors, and manufacturers in western Kenya Counties of Kakamega, Busia, Bungoma, and Siaya.
Challenges in dissemination	Prejudice on products of orphan crops; difficulty in acquiring requisite standards certificates from regulatory agencies e.g. KEBS; lack of credit facilities. Undeveloped packaging materials.
Recommendations for addressing the challenges	Promotional campaigns; sensitization of regulatory agencies and policy makers; linkage to credit facility providers to promote utilization and commercialization.
Lessons learned	A good value added product will penetrate the market very fast.
Social, environmental, policy and market conditions necessary	Target women and youth in society who are the major adopters (manufacturers) and consumers, respectively. The flour blending policy adopted recently will positively impact production and utilization of product.
D: Economic, gender, vulnerable and marginalized groups (VMGs) considerations	
Basic costs	Not yet estimated
Estimated returns	Not yet estimated
Gender issues and concerns in development and dissemination	Women and youth are the key adopters and the general public key consumers.
Gender issues and concerns in adoption and scaling up	Women and youth are the key adopters, children, pregnant and lactating mothers and older men and women the key consumers.
Gender related opportunities	Women and youth stand to benefit in production and trade in the product.

VMG issues and concerns in development and dissemination	Due to prejudice associated with their social status, VMGs are excluded from access to and benefits from improved technologies. Thus, affirmative action is required to promote the crop for the VMGs including value addition aspects.
VMG issues and concerns in adoption and scaling up	Affordable nutritious food products made in their backyards will lead to enhanced production and consumption by VMGs hence enhancing their health and incomes.
VMG related opportunities	Opportunity to produce, trade in, and consume locally produced nutritious food products
E: Case studies/profiles of success stories	
Success stories	Cottage production of the products in western Kenya like by EASTCOM Foods and PAWA bakers in Siaya and Busia respectively.
Application guidelines for users	Finger millet Blended and Composite Flour production leaflet
F: **Status of TIMP Readiness (**1. Ready for up-scaling; 2. Requires validation; 3. Requires further research**)**	Requires validation;
F: Contacts	
Contacts	KALRO-Alupe, P.O. Box 278 – 50400, BUSIA (K). Tel +254 724 687 774; e-mail address: rhodazik@gmail.com
Lead organization and scientists	KALRO, Dr. Rhoda A. Nungo and Dr. Chrispus Oduori
Partner organizations	ICRISAT Nairobi; MoALF in Counties, EASTCOM Foods; PAWA Bakers.

Gaps

1. Appropriate packaging and promotion
2. Validation in nutrient composition

2.4.8 TIMP Name	Finger Millet Biscuit, snack food Product.
Category (i.e. technology, innovation or management practice)	
A: Description of the technology, innovation or management practice	
Problem addressed	Limited finger millet utilization food products
What is it? (TIMP description) 	Snack food product made from finger millet – wheat flour composite.

Justification	-Diversification of finger millet food products will enhance consumption of finger millet, enhance demand and thus spur increased production and utilization of finger millet.
Region promoted	Western Kenya Counties of Kakamega, Buisa, Bungoma, and Siaya
Counties where TIMP will be upscaled	Bomet, Kericho, and West Pokot
B: Assessment of dissemination and scaling up/out approaches	
Users of TIMP	Farmers, extension agencies, traders, and consumers
Approaches used in dissemination	On-farm experimentation, training and dissemination through value addition expose, field days, shows, farmer to farmer communication, leaflets etc.
Most effective approach	On-farm experimentation, training, and practical demonstration of preparation process.
Critical/essential factors for successful promotion	Participatory Implementation, stakeholder capacity building and networks; promotions involving Public Private partnerships (PPP).
Partners/stakeholders for scaling up	• Public and private partners –[MOALF&I) for extension, • ICRISAT for technical backstopping and promotion; • FIPs (Farmer Input Promotion) for promotion • Farmer Groups for activity implementation and promotion • Service provider agencies e.g. Micro-finance agencies and banks for credit provision, agro-vets for input supply • Processors and manufacturers to create market for produce, aggregators e.g. CARD (Community Action for Rural Development) for economy of scale sales and marketing], and others e.g. NGOs, CBOs, and FBOs to provide specialist services e.g. micro-credit
C: Current situation and future scaling up	
Current extent of reach	Finger millet farming communities, processors, and manufacturers in western Kenya Counties of Kakamega, Busia, Bungoma, and Siaya.
Challenges in dissemination	Prejudice on products of orphan crops; difficulty in acquiring requisite standards certificates from regulatory agencies e.g. KEBS; lack of credit facilities. Undeveloped packaging materials.
Recommendations for addressing the challenges	Promotional campaigns; sensitization of regulatory agencies and policy makers; linkage to credit facility providers to promote utilization and commercialization.
Lessons learned	A good value added product will penetrate the market very fast.
Social, environmental, policy and market conditions necessary	Target women and youth in society who are the major adopters (manufacturers) and consumers, respectively. The flour blending policy adopted recently will positively impact production and utilization of product.
D: Economic, gender, vulnerable and marginalized groups (VMGs) considerations	
Basic costs	Not yet estimated
Estimated returns	Not yet estimated

Gender issues and concerns in development and dissemination	Women and youth are the key adopters and the general public key consumers.
Gender issues and concerns in adoption and scaling up	Women and youth are the key adopters, children, youth, men and women the key consumers.
Gender related opportunities	Women and youth stand to benefit in production and trade in the product.
VMG issues and concerns in development and dissemination	Due to prejudice associated with their social status, VMGs are excluded from access to and benefits from improved technologies. Thus, affirmative action is required to promote the crop for the VMGs including value addition aspects.
VMG issues and concerns in adoption and scaling up	Affordable nutritious food products made in their backyards will lead to enhanced production and consumption by VMGs hence enhancing their health and incomes.
VMG related opportunities	Opportunity to produce, trade in, and consume locally produced nutritious food products
E: Case studies/profiles of success stories	
Success stories	Cottage production of the products in western Kenya like by EASTCOM Foods and PAWA bakers in Siaya and Busia respectively.
Application guidelines for users	Finger millet Biscuit snack production leaflet
F: **Status of TIMP Readiness (**1. Ready for up-scaling; 2. Requires validation; 3. Requires further research**)**	Requires validation;
F: Contacts	
Contacts	KALRO-Alupe, P.O. Box 278 – 50400, BUSIA (K). Tel +254 724 687 774; e-mail address: rhodazik@gmail.com
Lead organization and scientists	KALRO, Dr. Rhoda A. Nungo and Dr. Chrispus Oduori
Partner organizations	ICRISAT Nairobi; MoALF in Counties, EASTCOM Foods; PAWA Bakers.

Gaps

1. Appropriate packaging and promotion
2. Validation in nutrient composition
3. Validation of Community fabricated ovens and cutters.