





DRAFT

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

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Kenya Agricultural and Livestock Research Organization

Under

KENYA CLIMATE SMART AGRICULTURE PROJECT (KCSAP)

April 2019

Version 1

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

	2.1.4 Finger Millet Variety KAK-	Tashnalagy	Ready for up-scaling
	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 KACIMI 65	MI Technology	Requires validation
	2.1.8 Finger Millet Variety GBK 043254	Technology	Requires validation
	2.1.9 Finger Millet Variety KACIMI 49	MI Technology	Requires validation
	2.1.10 Finger Millet Variety Nakuru	l Technology	Ready for up-scaling
	2.1.11 Finger Millet Variety KAT FM	I 1 Technology	Ready for up-scaling
	2.1.12 Finger Millet Variety MSU FN 60D	M 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	2.2.1 Planting Finger Millet in rows	Management Practice	Ready for up-scaling
practices	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 Finge Millet	er Management Practice	Requires validation
	2.2.5 Early season planting of Finger Millet	Management Practice	Requires validation
2.3Postharvest	2.3.1 Thresher machine	Technology	Requires validation
management			1
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	t Innovation	Ready for up-scaling
	2.4.5 Finger Millet Chapati Food	Innovation	Ready for up-scaling
	Product 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	d 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,	Technology
innovation or management	
practice)	
A: Description of the technology, i	nnovation or management practice
Problem to be addressed	Low finger millet yield
What is it? (TIMP description)	It is an early maturing $(90 - 120 \text{ days})$ and high yielding variety $(1,100 - 4,900 \text{ kgha}^{-1} \text{ depending on}$ environment) that is resistant; to Blast, <i>Striga</i> , 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 an	
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 sc	aling 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.

	Γ
	 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 a	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

KALRO/ Millet Va Varieties; More for	the finger millet production leaflets in
Varieties; More for	CRISAT e.g. Oduori C.O.A. 2018. Finger
More for	iety P-224: Plant Improved Finger Millet
	Apply Good Agricultural Practices; Harvest
F: Status of TIMP Readiness (1, 1 – Ready	ood and Money. KALRO FCRI, Kisii.
1. Status of Linte Reduiness (1) 1 Reduy	for up scaling.
Ready for up-scaling; 2. Requires	
validation; 3. Requires further	
research)	

G: Contacts	
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Lead organization and scientists	KALRO, Dr. Chrispus O.A. Oduori
Partner organizations	ICRISAT Nairobi; MoALF&I, County governments –
	Busia, Kakamega, Bungoma, and Siaya.

- 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,	Technology
innovation or management	
practice)	
A: Description of the technology, i	nnovation or management practice
Problems to be addressed	- Low finger millet yield
What is it? (TIMP description)	It is a late maturing $(88 - 138 \text{ days})$ and high yielding variety $(1,140 - 6,670 \text{ kgha}^{-1} \text{ depending on}$ 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 $(1,140 - 6,670 \text{ kgha}^{-1} \text{ depending on}$ environment) compared to the current commercial varieties yielding 1,200 - 4,900 kg/ha ⁻¹ , with wide adaptability (AEZ)
Counties where variety was tested	Western counties of Kakamega, Bungoma, Busia, and
and promoted Counties where the TIMP will be	Siaya. Bomet, Kericho and West Pokot
promoted	
B: Assessment of dissemination an	d scaling up/out approaches
Users of TIMP	Farmers, extension agencies, seed producers and
	traders, processing industry and consumers
Approaches used in development	• ToTs, Extension publications (leaflets, booklets,
and dissemination	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	• Public and private partners -[MOALF&I) for
and their respective roles.	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 so	
Counties where already promoted if	Western Kenya counties of Kakamega, Bungoma,
any	Busia, and Siaya.
Counties where TIMPs will be up-	Bomet, Kericho and West Pokot
scaled	
Challenges in development and	Negative attitude to the crop in some segments of
dissemination	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	Investment in crop development (research, extension,
challenges	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	Investments in the crop and participation of champions
any	enhance technology up-take – like the case of this
	technology in western Kenya; stakeholder linkages
	and participatory implementation is important.
Social, environmental, policy and	Gender inclusiveness in crop research and
market conditions necessary for	development; Capacity building of stakeholders;
development and up-scaling	understanding the physical and biotic environment in
development and up searing	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	Labour intensity in weeding, threshing and winnowing
development, dissemination,	
1	- mostly done by women; therefore likely to
adoption and scaling up	overburden them; Grain sold by women and most of
1	
1	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
1	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.
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adoption and scaling up	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
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adoption and scaling up	 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 Enhance women training for improved performance Increased incomes for Women from increased grain
adoption and scaling up	 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 Enhance women training for improved performance Increased incomes for Women from increased grain sales (this is considered largely as a women's crop).
adoption and scaling up	 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 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.
adoption and scaling up Gender related opportunities VMG issues and concerns in	 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 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
adoption and scaling up Gender related opportunities VMG issues and concerns in development, dissemination,	 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 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. Due to prejudice associated with their social status, VMGs are excluded from access to and benefits from
adoption and scaling up Gender related opportunities VMG issues and concerns in	 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 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. Due to prejudice associated with their social status, VMGs are excluded from access to and benefits from improved technologies. Thus, affirmative action is
adoption and scaling up Gender related opportunities VMG issues and concerns in development, dissemination,	 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 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. 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
adoption and scaling up Gender related opportunities VMG issues and concerns in development, dissemination,	 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 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. Due to prejudice associated with their social status, VMGs are excluded from access to and benefits from improved technologies. Thus, affirmative action is

	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
TT TT	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	
Success stories	The case of McKnight Foundation funded project in
Success stories	western Kenya and stories of individual farmers e.g.
A galiestica enidelines for years	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
Ready for up-scaling; 2. Requires	
validation; 3. Requires further	
research)	
G: Contacts	
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Lead organization and scientists	KALRO, Dr. Chrispus O.A. Oduori
Partner organizations	ICRISAT Nairobi; MoALF&I, Counties Governments
	of Busia, Kakamega, Bungoma, and Siaya.
a	

- 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,	Technology
innovation	or	management	
practice)			
A: Description of the technology, innovation or management practice			
Problems to	be addre	essed	- Low finger millet yield
What is it? (TIMP de	escription)	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 $(1290 - 6,350 \text{ kgha}^{-1} \text{ depending on} \text{ environment})$ compared to the current commercial varieties yields of $1200 - 4,900 \text{ kg/ha}^{-1}$, with wide adaptability (AEZ)
Counties where variety was tested	Western counties of Kakamega, Bungoma, Busia, and
and promoted	Siaya.
Counties where the TIMP will be	Bomet, Kericho and West Pokot
promoted	
B: Assessment of dissemination an	d scaling up/out approaches
Users of TIMP	Farmers, extension agencies, seed producers, traders,
	processing industry and consumers
Approaches used in development	Hybridization breeding and pure line selection, Not yet
and dissemination	disseminated but On-farm experimentation and
	demonstration, field days, shows, farmer to farmer
	communication, leaflets, larger plot demonstrations will
Critical/essential factors for	be applied.
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:
	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 sc	
C: Current situation and future scaling up	

Counties where already promoted if	Western counties of Kakamega, Bungoma, Busia, and
any	Siaya.
Counties where TIMPs will be up-	Bomet, Kericho and West Pokot
scaled	boniet, iterieno une vest i okot
Challenges in development and	Negative attitude to the crop in some segments of society
dissemination	(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	Investment in crop development (research, extension,
challenges	processing and manufacturing); supportive policies like
enanenges	the recently passed blending policy, lifting of ban on
	traditional brews; positive publicity.
Lessons learned in up scaling, if	Investment in the crop and participation of champions
any	enhances technology up-take – like the case of this
	technology in western Kenya; stakeholder linkages and
	participatory implementation is important.
Social, environmental, policy and	Gender inclusiveness in crop research and development;
market conditions necessary	Capacity building of stakeholders; understanding of the
market conditions necessary	physical and biotic environment in target ecologies;
	understanding community culture, preferences, and
	practices
D: Economic, gender, vulnerable a	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	Labour intensity in weeding, threshing and winnowing –
development and dissemination	mostly done by women; therefore likely to overburden
adoption and scaling up	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	The crop is important for food and nutrition security;
development and dissemination	therefore need to adopt affirmative action targeting the
adoption and scaling up	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	
Ready for up-scaling; 2. Requires		
validation; 3. Requires further		
research)		
G: Contacts		
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	+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.	

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

2.1.4 TIMP Name	Finger Millet Variety KAK-Wimbi 2
Category (i.e. technology, innovation or	Technology
management practice)	
A: Description of the technology, innovatio	n or management practice
Problemsto be addressed	- Low finger millet yield
What is it? (TIMP description)	It is a late maturing $(88 - 131 \text{ days})$ and high
	yielding variety $(1320 - 6,060$ kgha ⁻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	
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. C: Current situation and future 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. Microfinance 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.
Current extent of reach	Not yet extensively disseminated except in few
	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

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VMG related opportunities - Increased production will lead to increase consumption of nutritious finger mille hence improved health of VMGs; high value of crop will lead to economic empowerme		
consumption of nutritious finger mille hence improved health of VMGs; high value of crop will lead to economic empowerme		
hence improved health of VMGs; high value of crop will lead to economic empowerme	VMG related opportunities	
of crop will lead to economic empowerme		
OI VIVIUS.		of crop will lead to economic empowerment of VMGs.
- Changing consumer behavior leading		- Changing consumer behavior leading to
		increased demand hence improved incomes
for VMGs		-
E: Case studies/profiles of success stories	E: Case studies/profiles of success stories	
Success stories Not yet extensively disseminated		Not yet extensively disseminated

Application guidalines for users	Pafer to the finger millet production leaflets in
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	Ready for up-scaling with validation in areas it
up-scaling; 2. Requires validation; 3.	has not been disseminated.
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, Counties
	Governments of Busia, Kakamega, Bungoma,
	Siaya, Bomet, Kericho, and West Pokot.

- 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	Technology
management practice)	
A: Description of the technology, innova	tion or management practice
Problems to be addressed	- Low finger millet yield
What is it? (TIMP description)	It is a late maturing $(87 - 130 \text{ days})$ and high yielding variety $(1400 - 5500 \text{ kgha}^{-1} \text{ depending on})$ 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 scale	ing 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, agrovets 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 ma	arginalized 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	Ready for up-scaling
for up-scaling; 2. Requires 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, Counties
	Governments of Busia, Kakamega, Bungoma, and
	Siaya.

- 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	Technology
or management practice)	
A: Description of the technology, inn	ovation 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 $(0 - 2500 \text{ m.a.s.l.})$ 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
Approaches used in dissemination	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	Participatory Implementation, stakeholder capacity
promotion	building, Functioning seed system, Stakeholder
promotion	networks and efficient extension service.
Partners/stakeholders for scaling up	• Public and private partners –[MOALF&I) for
and their respective roles.	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 scali	ng 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	Negative attitude to crop in some segments of
dissemination	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	Investment in crop development (research,
challenges	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
Conicl environmental 1'	implementation is important.
Social, environmental, policy and	Gender inclusiveness in crop research and
market conditions necessary	development; Capacity building of stakeholders;
	understanding the physical and biotic environment

	in target ecologies; understanding community
	culture, consumer preferences and social practices.
Di Faanamia gandar vulnarabla and	I 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	Labour intensity in weeding, threshing and
development, dissemination, adoption	winnowing (variety has poor threshability and
and scaling up	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
	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	Labour intensity in weeding, threshing and
development and dissemination	winnowing – mostly done by women; therefore
adoption and scaling up	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	Due to prejudice associated with their social status,
development, dissemination, adoption	VMGs are excluded from access to and benefits
and scaling up	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
E. Cogo atudica/mafiles -f	lead to economic empowerment of VMGs
E: Case studies/profiles of success stores	
5000055 5101105	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 as improvement for resistance
Ready for up-scaling; 2. Requires	(blast disease, Striga, and lodging) and improved
	threshability.
	un condonity.

validation; 3. Requires further research)	
G: Contacts	
Contacts	Centre Director KALRO – FCRI Kisii, P.O. Box 523-40200, KISII; e-mail address: <u>chrispus.oduori@kalro.org</u> ; 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.

- 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	Technology
management practice)	
A: Description of the technology, innova	ation 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, <i>Striga</i> , 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, agrovets 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	
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 m	narginalized 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	Labour intensity in weeding, threshing and
development, dissemination, adoption	winnowing – mostly done by women; therefore
and scaling up.	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	Labour intensity and thus need for
development, dissemination, adoption	mechanization/ labour saving interventions;
and scaling up	markets for increased production Increased production will lead to increased
VMG related opportunities	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 storie	*
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	Ready for up-scaling
for up-scaling; 2. Requires validation;	
3. Requires further research)	
G: Contacts	Centre Director KALRO – FCRI Kisii P.O. Box
	523-40200, KISII; e-mail address:
	<u>chrispus.oduori@kalro.org;</u> 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.

- 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

Category (i.e. technology,	Technology
innovation or management	
practice)	
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 $(0 - 2,000 \text{ m.a.s.l.})$ and soils
	(well-draining loams).
	Features:-
	Whitish brown grain colour; no pigmentation; medium
Justification	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 a	and scaling up/out approaches
Users of TIMP	Farmers, extension agencies, seed producers traders, and
	consumers
Approaches used in	Not yet disseminated but methods used in successfully
dissemination	disseminating earlier technologies to be adopted i.e. On-
	disseminating earlier technologies to be adopted i.e. On- farm experimentation and dissemination, field days,
	disseminating earlier technologies to be adopted i.e. On- farm experimentation and dissemination, field days, shows, farmer to farmer communication, leaflets, larger
dissemination	disseminating earlier technologies to be adopted i.e. On- farm experimentation and dissemination, field days, shows, farmer to farmer communication, leaflets, larger plot demonstrations.
	disseminating earlier technologies to be adopted i.e. On- farm experimentation and dissemination, field days, shows, farmer to farmer communication, leaflets, larger
dissemination	disseminating earlier technologies to be adopted i.e. On- farm experimentation and dissemination, field days, shows, farmer to farmer communication, leaflets, larger plot demonstrations. On-farm experimentation and larger plot effect
dissemination Most effective approach	 disseminating earlier technologies to be adopted i.e. Onfarm experimentation and dissemination, field days, shows, farmer to farmer communication, leaflets, larger plot demonstrations. On-farm experimentation and larger plot effect demonstrations. Participatory Implementation, stakeholder capacity building, Functioning seed system, Stakeholder
dissemination Most effective approach Critical/essential factors for successful promotion	disseminating earlier technologies to be adopted i.e. On- farm experimentation and dissemination, field days, shows, farmer to farmer communication, leaflets, larger plot demonstrations. On-farm experimentation and larger plot effect demonstrations. Participatory Implementation, stakeholder capacity building, Functioning seed system, Stakeholder networks
dissemination Most effective approach Critical/essential factors for successful promotion Partners/stakeholders for scaling	 disseminating earlier technologies to be adopted i.e. Onfarm experimentation and dissemination, field days, shows, farmer to farmer communication, leaflets, larger plot demonstrations. On-farm experimentation and larger plot effect demonstrations. Participatory Implementation, stakeholder capacity building, Functioning seed system, Stakeholder networks Public and private partners –[MOALF&I) for
dissemination Most effective approach Critical/essential factors for successful promotion	 disseminating earlier technologies to be adopted i.e. Onfarm experimentation and dissemination, field days, shows, farmer to farmer communication, leaflets, larger plot demonstrations. On-farm experimentation and larger plot effect demonstrations. Participatory Implementation, stakeholder capacity building, Functioning seed system, Stakeholder networks Public and private partners –[MOALF&I) for extension,
dissemination Most effective approach Critical/essential factors for successful promotion Partners/stakeholders for scaling	 disseminating earlier technologies to be adopted i.e. Onfarm experimentation and dissemination, field days, shows, farmer to farmer communication, leaflets, larger plot demonstrations. On-farm experimentation and larger plot effect demonstrations. Participatory Implementation, stakeholder capacity building, Functioning seed system, Stakeholder networks Public and private partners –[MOALF&I) for extension, ICRISAT for technical backstopping and promotion;
dissemination Most effective approach Critical/essential factors for successful promotion Partners/stakeholders for scaling	 disseminating earlier technologies to be adopted i.e. Onfarm experimentation and dissemination, field days, shows, farmer to farmer communication, leaflets, larger plot demonstrations. On-farm experimentation and larger plot effect demonstrations. Participatory Implementation, stakeholder capacity building, Functioning seed system, Stakeholder networks Public and private partners –[MOALF&I) for extension, ICRISAT for technical backstopping and promotion; FIPs (Farmer Input Promotion) for promotion
dissemination Most effective approach Critical/essential factors for successful promotion Partners/stakeholders for scaling	 disseminating earlier technologies to be adopted i.e. Onfarm experimentation and dissemination, field days, shows, farmer to farmer communication, leaflets, larger plot demonstrations. On-farm experimentation and larger plot effect demonstrations. Participatory Implementation, stakeholder capacity building, Functioning seed system, Stakeholder networks 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
dissemination Most effective approach Critical/essential factors for successful promotion Partners/stakeholders for scaling	 disseminating earlier technologies to be adopted i.e. Onfarm experimentation and dissemination, field days, shows, farmer to farmer communication, leaflets, larger plot demonstrations. On-farm experimentation and larger plot effect demonstrations. Participatory Implementation, stakeholder capacity building, Functioning seed system, Stakeholder networks 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
dissemination Most effective approach Critical/essential factors for successful promotion Partners/stakeholders for scaling	 disseminating earlier technologies to be adopted i.e. Onfarm experimentation and dissemination, field days, shows, farmer to farmer communication, leaflets, larger plot demonstrations. On-farm experimentation and larger plot effect demonstrations. Participatory Implementation, stakeholder capacity building, Functioning seed system, Stakeholder networks 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
dissemination Most effective approach Critical/essential factors for successful promotion Partners/stakeholders for scaling	 disseminating earlier technologies to be adopted i.e. Onfarm experimentation and dissemination, field days, shows, farmer to farmer communication, leaflets, larger plot demonstrations. On-farm experimentation and larger plot effect demonstrations. Participatory Implementation, stakeholder capacity building, Functioning seed system, Stakeholder networks 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
dissemination Most effective approach Critical/essential factors for successful promotion Partners/stakeholders for scaling	 disseminating earlier technologies to be adopted i.e. Onfarm experimentation and dissemination, field days, shows, farmer to farmer communication, leaflets, larger plot demonstrations. On-farm experimentation and larger plot effect demonstrations. Participatory Implementation, stakeholder capacity building, Functioning seed system, Stakeholder networks 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

	for Rural Development) for economy of scale sales
	and marketing], and Others e.g. NGOs, CBOs, and
	FBOs to provide specialist services like community
C. Comment situation and fortune	mobilization, nutrition training etc.
C: Current situation and future	
Counties where already promoted if any	Variety still in research Centres – Kakamega and Kisii.
Counties where TIMPS will be	Bomet, Kericho and West Pokot
upscaled	Doniel, Reneno una west i okot
Challenges in development and	Not yet disseminated but expected challenges - Negative
dissemination	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	Investment in crop development (research, extension,
the challenges	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	Gender inclusiveness in crop research and development;
market conditions necessary	capacity building of stakeholders; understanding the
	physical and biotic environment in target ecologies;
	understanding community culture, preferences, and
D. Foonomia gondon yulnonohla	practices
Basic costs	e and marginalized groups (VMGs) considerations Production cost data yet to be estimated
Estimated returns	
Gender issues and concerns in	Estimated Production returns data yet to be estimated Labour intensity in weeding, threshing and winnowing
development, dissemination,	- mostly done by women; Grain sales also by women-
adoption and scaling up	mostly done by women; therefore likely to overburden
adoption and scaning up	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
11	- 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
	- Youn also stand to benefit through application of ICT networking for marketing.
VMG issues and concerns in	• • • •
VMG issues and concerns in development, dissemination adoption and scaling up	ICT networking for marketing.

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 succes	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.	Requires validation	
Ready for up-scaling; 2. Requires		
validation; 3. Requires further		
research)		
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.	

- Needs testing through NPT and DUS for release and seed multiplication
 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,	Technology
innovation or management	
practice)	
	, 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 a	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	
Counties where already promoted	Not yet promoted but can grow well in all regions
if any	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,	Requires validation
vulnerable and marginalized	requires variation
groups (VMGs) considerations	
Basic costs	Production cost data yet to be estimated
Estimated returns	Estimated Production returns data yet to be calculated
Gender issues and concerns in	Labour intensity in weeding, threshing and winnowing
development, dissemination	- mostly done by women; Grain sale also by women-
adoption and scaling up	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	Due to prejudice associated with their social status, VMGs are excluded from access to and benefits from
development, dissemination adoption and scaling up	improved technologies. Thus, affirmative action is
adoption and scaling up	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 succes	
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.	Requires validation
Ready for up-scaling; 2.	
Requires validation; 3.	
Requires further research)	
G: Contacts	Contro Director KALDO Kielis D.O. Der 502 40200
Contacts	Centre Director, KALRO-Kisii; P.O. Box 523-40200,
	KISII; e-mail address: <u>chrispus.oduori@kalro.org</u> ; Tel. +254 (0) 723 770 895/ +254 (0) 736 220 821
Lead organization and scientists	+254 (0) 725 770 895/ +254 (0) 756 220 821 KALRO, Dr. Chrispus O.A. Oduori
Lead organization and scientists Partner organizations	ICRISAT Nairobi; MoALF in Counties – Busia,
	Kakamega, Bungoma, and Siaya.
Cang	Kakamoga, Dungoma, and Staya.

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,	Technology
innovation or management	
practice)	
A: Description of the techno	logy, innovation or management practice
Problem addressed	Low finger millet yield and production
What is it? (TIMP	A high yielding (1,200 - 3,500kg/ha ⁻¹ , depending on
description)	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-
T	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
D. A	millet production.
B: Assessment of disseminat	ion and scaling up/out approaches
	Farmers, extension agencies, seed producers traders, and consumers
Approaches to be used in	On-farm experimentation and dissemination, field days,
dissemination	shows, farmer to farmer communication, leaflets, larger plot
dissemination	demonstrations.
Critical/essential factors for	Participatory Implementation, stakeholder capacity building,
successful promotion	Functioning seed system, Stakeholder networks and effective
promotion	extension system.
Partners/stakeholders for	
scaling up and their	
respective roles.	• 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 fu	
Counties where already	
promoted if any	
Counties where TIMPs will	Bomet, Kericho and West Pokot
be upscaled	
Challenges in development	
and dissemination	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.

Decommon dations for	Investment in even development (received, extension
Recommendations for	
addressing the challenges	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,	Gender inclusiveness in crop research and development;
policy and market conditions	capacity building of stakeholders; understanding the physical
necessary	and biotic environment in target ecologies; understanding
<u> </u>	community culture, preferences, and practices
D: Economic gondor vulno	rable 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	Labour intensity in weeding, threshing and winnowing -
in development and	mostly done by women; therefore likely to overburden them;
dissemination adoption and	Grain sold by women and most of the cash retained by them;
scaling up	thus, increased production and marketing likely to improve
seemed of	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	Due to prejudice associated with their social status, VMGs
development, dissemination,	are excluded from access to and benefits from improved
adoption and scaling up	technologies. Thus, affirmative action is required to promote
adoption and searing up	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 st	iccess stories
Success stories	The variety is still in research Centres – at KALRO BRC
	Lanet
Application guidelines for	Finger millet variety production leaflet
users	
F: Status of TIMP	Ready for up scaling
Readiness (1. Ready for	
up-scaling; 2. Requires	
validation; 3. Requires	
further research)	
,	
G: Contacts	

Contacts	The Centre Director, KALRO-Lanet P.O. Box 3840, NAKURU; e-mail address: <u>kalrolanet@gmail.com</u> ; Tel. +254 (0) 0722 639419
Lead organization and scientists	KALRO, Peter Gachuki
scientists	
Partner organizations	ICRISAT Nairobi; MoALF&I in Counties – Nakuru

- 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	Technology
management practice)	
A: Description of the technology, innovat	ion 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 $(80 - 115 \text{ days})$; Drought tolerant; moderate yield $(1,000 - 2,500\text{kg ha}^{-1})$ 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	
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. Microfinance 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 u	р
Counties where already promoted if any Counties where TIMPs will be upscaled	Eastern Kenya but has been disseminated to wetter areas with disastrous results – blast infestation and damage – Seed at KALRO Katumani and Kenya Seed Company. 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
	rginalized 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,	Due to prejudice associated with their social
dissemination adoption and scaling up	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	Ready for up scaling
for up-scaling; 2. Requires validation; 3.	, <u>r</u>
Requires further research)	
G: Contacts	
Contacts	Centre Director, KALRO-Kisii P.O. Box 523-
Contacto	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
	INTERV. DI. CHIBDUS V.A. UUUUH. allu MS
	Rachel Kisilu
Partner organizations	Rachel Kisilu ICRISAT Nairobi; MoALF&I in Counties –
	Rachel Kisilu

- Needs improvement in blast disease resistance
 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,	Technology
innovation or management	reemology
practice)	
1 /	logy, 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 $(0 - 1500 \text{ m.a.s.l.})$ 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 disseminat	tion 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	Not yet extensively disseminated.
promoted if any Counties where TIMPs will	Driver arrange of Karrisha and West Palsat
be up scaled	Drier areas of Kericho and West Pokot
Challenges in development	Negative attitude to crop in some segments of society
and dissemination	(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	Investment in crop development (research, extension,
	processing and manufacturing); supportive policies like the
addressing the challenges	recently passed blending policy, lifting of ban on traditional
	brews; positive publicity.
Lessons learned in up-	
Lessons learned in up- scaling if any?	enhance technology up-take – like the case of this technology
scamp if any?	
	in western Kenya; stakeholder linkages and participatory
Social anvironmental	implementation is important.
Social, environmental,	Gender inclusiveness in crop research and development;
policy and market conditions	Capacity building of stakeholders; understanding the
necessary	physical and biotic environment in target ecologies;
	understanding community culture, consumer preferences and social practices.
D: Foonomia gondor vulno	1
Basic costs	rable and marginalized groups (VMGs) considerationsPer 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	Labour intensity in weeding, threshing and winnowing -
in development,	mostly done by women; Grain sale also by women-mostly
discomination adaption and	
dissemination, adoption and	done by women; therefore likely to overburden them but also
scaling up	benefit them since most of the cash retained by them; thus,
-	benefit them since most of the cash retained by them; thus, increased production and marketing likely to improve the
-	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
-	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
-	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
scaling up	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.
-	 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. Enhance women training for improved performance
scaling up	 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. Enhance women training for improved performance Increased incomes for Women from increased grain sales
scaling up	 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. Enhance women training for improved performance Increased incomes for Women from increased grain sales (this is considered largely as a women's crop).
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scaling up Gender related opportunities	 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. 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.
scaling up Gender related opportunities VMG issues and concerns in	 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. 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.
scaling up Gender related opportunities VMG issues and concerns in development, dissemination	 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. 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. Due to prejudice associated with their social status, VMGs are excluded from access to and benefits from improved
scaling up Gender related opportunities VMG issues and concerns in	 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. 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. 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
scaling up Gender related opportunities VMG issues and concerns in development, dissemination	 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. 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. 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.
scaling up Gender related opportunities VMG issues and concerns in development, dissemination	 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. 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. 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
scaling up Gender related opportunities VMG issues and concerns in development, dissemination adoption and scaling up	 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. 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. 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
scaling up Gender related opportunities VMG issues and concerns in development, dissemination	 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. 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. 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
scaling up Gender related opportunities VMG issues and concerns in development, dissemination adoption and scaling up	 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. 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. 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
scaling up Gender related opportunities VMG issues and concerns in development, dissemination adoption and scaling up	 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. 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. 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 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
scaling up Gender related opportunities VMG issues and concerns in development, dissemination adoption and scaling up	 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. 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. 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 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

Success stories	Not yet disseminated.
Application guidelines for	Finger millet variety production leaflet
users	
F: Status of TIMP	Ready for up scaling.
Readiness (1. Ready for	
up-scaling; 2. Requires	
validation; 3. Requires	
further research)	
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	Maseno University; Prof. Mathews Dida
scientists	
Partner organizations	KALRO; ICRISAT Nairobi; MoALF&I in Counties – Busia,
	Kakamega, Bungoma, and Siaya, Bomet, Kericho, West
	Pokot.

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Critical/essential factors for successful promotion Partners/stakeholders for scaling up and their respective roles.	 Participatory Implementation, stakeholder capacity building, Functioning seed system, Stakeholder networks and efficient extension service. 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 fut	
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,	Gender inclusiveness in crop research and development;
policy and market conditions	Capacity building of stakeholders; understanding the
necessary	physical and biotic environment in target ecologies; understanding community culture, consumer preferences and social practices.
D: Economic, gender, vulne	rable 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	Labour intensity in weeding, threshing and winnowing
in development,	(variety has poor threshability and dusty thus aggravating
dissemination adoption and	labour intensity) – mostly done by women; Grain sale also by
scaling up	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	Due to prejudice associated with their social status, VMGs
development, dissemination	are excluded from access to and benefits from improved
adoption and scaling up	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
VMC related and artumities	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 su	
Success stories	Not yet disseminated.
Application guidelines for	
users	
F: Status of TIMP	Ready for up scaling.
Readiness (1. Ready for	
up-scaling; 2. Requires	
validation; 3. Requires	
further research)	
G: Contacts	Easter University Division of Descent and Estersion
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	Egerton University; Prof. Paul Kimurto
scientists	Egenon Oniversity, 1101. 1 au Kinuto
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,	Technology
innovation or management	
practice)	
A: Description of the techno	logy, innovation or management practice
Problem addressed	- Low finger millet yields due to low rainfall.
What is it? (TIMP	
description)	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 disseminat	ion 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 fut	ture 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 su	iccess stories
Success stories	Not yet disseminated
	Finger millet variety production leaflet
F: Status of TIMP Readiness (1. Ready for up-scaling; 2. Requires validation; 3. Requires further research) G: Contacts	Ready for up scaling.
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
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Orterer (i.e. technologie	T - 1
Category (i.e. technology,	Technology
innovation or management	
practice)	• • •
	ogy, innovation or management practice
Problem addressed	- Low finger millet yields due to low rainfall.
What is it? (TIMP	A medium maturing (90-98 days) finger millet variety and
description)	moderate yield $(1,500 - 2,500 \text{ kg/ha}^{-1})$. Characteristic
	features include long multi-fingered panicles, high tillering
	capacity, resistant to blast.
	Optimal environmental condition: Rainfall (500-700mm
	annually), altitude $(1,200 - 2,200 \text{ m.a.s.l.})$ and soils (well-
Justification	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.
	on and scaling up/out approaches
Users of TIMP	Farmers, extension agencies, seed producers traders, and
	consumers
Approaches used in	On-farm experimentation and dissemination, field days,
dissemination	shows, farmer to farmer communication, leaflets, larger plot
	demonstrations.
Most effective approach	On-farm experimentation and larger plot effect
	demonstrations.
Critical/essential factors for	Participatory Implementation, stakeholder capacity
successful promotion	building, Functioning seed system, Stakeholder networks and efficient extension service.
Partners/stakeholders for	• Public and private partners –[MOALF&I) for extension,
scaling up and their respective	• ICRISAT for technical backstopping and promotion;
roles.	• 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 futu	
Counties where already	Not yet extensively disseminated.
5	
promoted if any	
promoted if any Counties where TIMPs will	Bomet, Kericho and West Pokot mid -altitude moderate
promoted if any Counties where TIMPs will be upscaled	rainfall areas where finger millet is produced.
promoted if any Counties where TIMPs will	·

VMG issues and concerns in	 Youth also stand to benefit through application of ICT networking for marketing. Due to prejudice associated with their social status, VMGs
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).
	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 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
Estimated returns	Per acre returns KES 40,000/= and thus net benefit KES 18,235/=
D: Economic, gender, vulner Basic costs	able and marginalized groups (VMGs) considerations Per acre production cost KES 30,250/=
	and social practices.
and market conditions necessary	Capacity building of stakeholders; understanding the physical and biotic environment in target ecologies; understanding community culture, consumer preferences
Social, environmental, policy	technology in western Kenya; stakeholder linkages and participatory implementation is important.Gender inclusiveness in crop research and development;
Lessons learned in up-scaling if any?	brews; positive publicity. Investments in the crop and participation of champions can enhance technology up-take – like the case of this
Recommendations for addressing the challenges	crops; limited utilization products; low research investment. Investment in crop development (research, extension, processing and manufacturing); supportive policies like the recently passed blending policy, lifting of ban on traditional

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, innov	vation 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 sca	aling 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 Partners/stakeholders for scaling up and their respective roles	 Participatory Implementation, stakeholder capacity building, Functioning seed system, Stakeholder networks 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, agrovets 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 goalin	a un
C: Current situation and future scalin	
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	Due to prejudice associated with their social
development, dissemination adoption	status, VMGs are excluded from access to and
and scaling up	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 stor	
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
Ready for up-scaling; 2. Requires	
validation; 3. Requires further	
research)	
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
<u>a</u>	

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

2.2.2 TIMP Name	Fertilizer in finger millet cultivation	
Category (i.e. technology,	Complementary Technology	
innovation or management		
practice)		
A: Description of the technology, innovation or management practice		
Problem addressed	Low productivity due to inadequate soil nutrient levels	
What is it? (TIMP	The application of fertilizer for yield optimization in finger	
description)	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	Bomet, Kericho, and West Pokot
upscaled	
	on 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	Participatory Implementation, stakeholder capacity
successful promotion	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 futu	
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	Training of farmers on the value of fertilizer in finger millet;
addressing the challenges	Investment in crop development (research and extension),
x 1 1	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	Understanding the attitude of community towards fertilizer
and market conditions	use; carrying out soil analysis and surveys to understand
necessary	fertilizer requirements. Sensitization of stakeholders and
	policy makers on the value of fertilizer on the crop.
	able 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	Labour intensity in weeding, threshing and winnowing -
development, dissemination,	mostly done by women; Grain sale also by women-mostly
adoption and scaling up	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	Due to prejudice associated with their social status, VMGs
development, dissemination	are excluded from access to and benefits from improved
adoption and scaling up	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
VMC related opportunities	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
E. Case studies/profiles of su	improved incomes for VMGs
E: Case studies/profiles of su 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,
	1 0
Application guidelines for	were using fertilizer on finger millet, respectively. Finger millet variety production leaflet
users	Basal fertilizer, preferably compound 20:20:0 is applied
u5015	uniformly by drilling in furrows at a rate of 20Kgha-1 each
	of N and P2O5 before applying seed by drilling and
	or in and 1205 before apprying seed by drining and

	covering the furrows with loose soil. This is about applying 2×50 bags of fertilizer per hectare. Then after thinning of the crop, another $2x50$ kg 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: <u>chrispus.oduori@kalro.org</u> ; 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

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

Category (i.e. technology, innovation or management practice) Management practice A: Description of the technology, innovation or management practice 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	2.2.3 TIMP Name	Thinning and Weed Management
or 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		
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		Management practice
Problem addressedLow 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 for soil moisture and population for the optimization of yields		
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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	Justification	• •
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population for the optimization of yields		1 0
		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	Participatory Implementation, stakeholder capacity
promotion	building, Functioning seed system, Stakeholder
promotion	networks
Partners/stakeholders for scaling up	• Public and private partners –[MOALF&I) for
and their respective roles	extension,
and then respective roles	• ICRISAT for technical backstopping and
	promotion;
	1
	• 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 scali	
Counties where already promoted if	Western Kenya Counties of Kakamega, Busia,
any	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	Training of farmers on the importance of weeding
challenges	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	Understanding the attitude of community towards
market conditions necessary	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	Men are the custodians of family resources and
development, dissemination concerns	have to be convinced to invest in weeding
in adoption and scaling up	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
Sender Terated opportunities	due to healthy finger millet crop and grain sales as
	this is considered a women crop.
VMG issues and concerns in	Due to prejudice associated with their social status,
development and dissemination	VMGs are excluded from access to and benefits
adoption and scaling up	from improved technologies. Thus, affirmative
adoption and scaning up	action is required to promote the crop for the VMGs
	including value addition aspects.
VMG related opportunities	Increased production will lead to increased
V WO related opportunities	1
	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 sto	
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
Ready for up-scaling; 2. Requires	
validation; 3. Requires further	
research)	
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

- 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,	Management Practice
innovation or management	
practice)	

A: Description of the technol-	ogy, 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	The practice of planting finger millet at the appropriate time
description)	in relation to the onset of the rains e.g. in western Kenya by
	the 15 th 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	
	on and scaling up/out approaches
Users of TIMP	Farmers and extension agencies
Approaches used in	On-farm experimentation and dissemination, field days,
dissemination	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	• Public and private partners –[MOALF&I) for extension,
scaling up and their respective	• ICRISAT for technical backstopping and promotion;
roles	• 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 futu	
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.

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

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

- Gaps in Finger Millet Timely Planting1. 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	Technology
management practice)	
A: Description of the technology, innovation	n 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, ICPUS AT for technical backstopping and
	 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 Counties where TIMPs will be upscaled	Still at testing stage on-station and on-farm in western Kenya. 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 marg	inalized 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

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VMG issues and concerns in development,	Reduction in cost of finger millet production
dissemination, adoption and scaling up	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	Ready for up-scaling with validation and
up-scaling; 2. Requires validation; 3.	further research
Requires 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
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- 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
innovation or management	
practice)	
A: Description of the techno	ology, innovation or management practice
Problem addressed	Limited finger millet utilization food products depressing the
	crop value chain
What is it? (TIMP	A dry snack food product made from finger millet, sweet
description)	potato, spices and wheat flour.
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E MILLEI	
F .MILLEL C RACHIES	
C	
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 disseming	tion and scaling up/out approaches
Users of TIMP	Farmers, extension agencies, traders, and consumers
Approaches used in	On-farm experimentation, training and dissemination through
dissemination	value addition expose, field days, shows, farmer to farmer
dissemination	communication, leaflets etc.
Critical/essential factors for	Participatory Implementation, stakeholder capacity building
successful promotion	and networks; promotions involving Public Private
successful promotion	partnerships (PPP).
Partners/stakeholders for	• Public and private partners –[MOALF&I) for extension,
scaling up	 ICRISAT for technical backstopping and promotion;
seaming up	 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 supplyProcessors 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 fu Counties where already	
Counties where already promoted if any	Finger millet farming communities, processors, and manufacturers in western Kenya Counties of Kakamega,
promoted if any	Busia, Bungoma, and Siaya.
Counties where TIMPs will	Kericho Bomet and West Pokot counties
be upscaled	Reficito Doniet and West Fokot countes
Challenges in dissemination	Prejudice on products of orphan crops; difficulty in acquiring
8	requisite standards certificates from regulatory agencies e.g.
	KEBS; lack of credit facilities. Undeveloped packaging
	materials.
Recommendations for	Promotional campaigns; sensitization of regulatory agencies
addressing the challenges	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,	Target women and youth in society who are the major
policy and market	adopters (manufacturers) and consumers, respectively. The
conditions necessary	flour blending policy adopted recently will positively impact
	production of product.
	rable 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	Women are the key adopters and children the key consumers.
in development,	Women and youth are the key adopters and the product is
dissemination adoption and	consumed by all ages.
scaling up	

Gender related opportunities	Women and youth stand to benefit in production and trade in
Gender related opportunities	the product.
VMG issues and concerns in	Due to prejudice associated with their social status, VMGs
development, dissemination	are excluded from access to and benefits from improved
adoption and scaling up	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 s	
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	Finger millet crackie production leaflet
users	
F: Status of TIMP	Ready for up-scaling
Readiness (1. Ready for up-	
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	KALRO, Dr. Rhoda A. Nungo and Dr. Chrispus Oduori
scientists	
Partner organizations	ICRISAT Nairobi; MoALF, MoH in Counties, EASTCOM
C	Foods; PAWA Bakers. WamamaTuamue women group,
	Busibwabo widows and orpharns group
Gans	<u> </u>

- 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	
innovation or management		
practice)		
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	A paste food product made from finger millet that can be	
description)	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
	ion 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 fut	
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,	Target malnourished individuals, small scale and medium
policy and market conditions	scale entrepreneurs for production and malnourished
necessary	individuals in the society who are the major adopters and
	humanitarian agencies, respectively.
D: Economic, gender, vulne	rable and marginalized groups (VMGs) considerations
Basic costs	Not yet estimated
Estimated returns	Not yet estimated
Gender issues and concerns	Youth SMEs producers and malnourished individuals are the
in development and	key consumers.
dissemination	
Gender issues and concerns	Women are the key adopters and children the key consumers.
in adoption and scaling up	······································
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	Due to requirement for the use of several machines,
development and	development is limited to focused SMEs. Affirmative action
dissemination	is required to promote the crops production and product
dissemination	dissemination for the VMGs.
VMG issues and concerns in	Affordable nutritious food products locally made will lead to
adoption and scaling up	enhanced raw materials production and product consumption
adoption and scaling up	by VMGs hence bettering their health and incomes.
VMG related opportunities	Opportunity to produce raw materials, trade in, and consume
V WO related opportunities	locally produced nutritious food products
E. Case studies/profiles of a	
E: Case studies/profiles of su	
Success stories	Cottage production of the product in western Kenya by
	EASTCOM Foods in Siaya.
Application guidelines for	Finger millet TAMUU production leaflet
users	
F: Status of TIMP	Ready for up-scaling
Readiness (1. Ready for up-	
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	KALRO, Dr. Rhoda A. Nungoand Dr. Chrispus Oduori
scientists	
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	Innovation		
practice)			
	y, 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	n 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	Promotional campaigns; sensitization of regulatory
addressing the challenges	agencies and policy makers; linkage to credit facility
	providers to promote commercialization and development
	of appropriate packaging materials
Lessons learned	
Lessons learned	A good value added product will penetrate the market very
	fast.
Social, environmental, policy	Target women, youth and children in society who are the
and market conditions	major adopters and consumers, respectively. The flour
necessary	blending policy adopted recently will positively impact
	production and utilization of product.
D: Economic, gender, vulneral	ple and marginalized groups (VMGs) considerations
Basic costs	Not yet estimated
Estimated returns	Not yet estimated
Gender issues and concerns in	Women and youth are the key adopters in product
development and dissemination	development and dissemination while the general public
L	including children the key consumers.
Gender issues and concerns in	Women and youth are the key adopters
adoption and scaling up	5 5 1
Gender related opportunities	Women and youth stand to benefit in production and trade
	in the product.
VMG issues and concerns in	Due to prejudice associated with their social status,
development and dissemination	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	Cheap nutritious food products made in their backyards
adoption and scaling up	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 succ	
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	Ready for up-scaling
(1. Ready for up-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
L	- 2017 21 007 771, 0 mult address. modužik e gildileom

Lead organization and scientists	KALRO, D	r. Rhoda A	. Nungo an	d Chrisp	ous O	duori
Partner organizations	ICRISAT	Nairobi;	MoALF,	MoH	in	Counties,
	EASTCOM	I Foods; PA	AWA Baker	s.		

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

2.4.4 TIMP Name	Finger Millet Cake Food Product.
Category (i.e. technology,	Innovation
innovation or management	linovation
practice)	
	gy, 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	n 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 futu	· · · · · · · · · · · · · · · · · · ·			
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, vulnera	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	KALRO, Dr. Rhoda A. Nungo and Dr. Chrispus Oduori
scientists	
Partner organizations	ICRISAT Nairobi; MoALF in Counties, EASTCOM
	Foods; PAWA Bakers and Wamama Tuamue women
	group.

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

2.4.5 TIMP Name	Finger Millet Chapatti Food Product.
Category (i.e. technology,	Innovation
innovation or management	
practice)	
A: Description of the techno	logy, innovation or management practice
Problem addressed	Limited finger millet utilization food products
What is it? (TIMP	A main meal dish made from a finger millet – wheat flour
description)	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	
	ion and scaling up/out approaches
Users of TIMP	Farmers, extension agencies, traders, and consumers
Approaches used in	On-farm experimentation, training and dissemination
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	Participatory Implementation, stakeholder capacity building
successful promotion	and networks; promotions involving Public Private partnerships (PPP).
Partners/stakeholders for	• Public and private partners –[MOALF&I) for extension,
scaling up	• 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 fut	
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.
	rable 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 su	access 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	KALRO, Dr. Rhoda A. Nungo and Dr. Chrispus Oduori
scientists	
Partner organizations	ICRISAT Nairobi; MoALF in Counties, EASTCOM Foods;
	PAWA Bakers and Wamama Tuamue women group.

1. Appropriate packaging and promotion

2.4.6 TIMP Name	Finger Millet Mandazi Food Product.
Category (i.e. technology,	Innovation
innovation or management	
practice)	
A: Description of the techno	logy, innovation or management practice
Problem addressed	Limited finger millet utilization food products
What is it? (TIMP	A snack food product made from a finger millet – wheat flour
description)	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	
	ion and scaling up/out approaches
Users of TIMP	Farmers, extension agencies, traders, and consumers
Approaches used in	On-farm experimentation, training and dissemination
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	Participatory Implementation, stakeholder capacity building
successful promotion	and networks; promotions involving Public Private
	partnerships (PPP).
Partners/stakeholders for	
scaling up	• ICRISAT for technical backstopping and promotion;
	• FIPs (Farmer Input Promotion) for promotion
	• Farmer Groups for activity implementation and promotion

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	KALRO, Dr. Rhoda A. Nungo and Dr. Chrispus Oduori
scientists	
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, inn	ovation or management practice
Problem addressed	Limited finger millet utilization food products
What is it? (TIMP description)	Flour products made from finger millet – wheat or
A CONTRACT OF CONT	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,
Most effective approach	leaflets etc. 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 scal	· · ·
Current extent of reach	Finger millet farming communities, processors, and manufacturers in western Kenya Counties of
	Kakamega, Busia, Bungoma, and Siaya.
Challenges in dissemination Recommendations for addressing the challenges	 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. 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	d marginalized groups (VMGs) considerations
Basic costs	Not yet estimated
Estimated returns	Not yet estimated
Gender issues and concerns in development and dissemination Gender issues and concerns in adoption and scaling up	Women and youth are the key adopters and the general public key consumers.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 disseminationDue to prejudice associated with their social statu VMGs are excluded from access to and benefit from improved technologies. Thus, affirmativ action is required to promote the crop for the VMG including value addition aspects.VMG issues and concerns in adoption and scaling upAffordable nutritious food products made in the backyards will lead to enhanced production and consumption by VMGs hence enhancing the		
Image: Provide a concerns in adoption and scaling up from improved technologies. Thus, affirmative action is required to promote the crop for the VMC including value addition aspects. VMG issues and concerns in adoption and scaling up Affordable nutritious food products made in the backyards will lead to enhanced production and scaling up		
action is required to promote the crop for the VMO including value addition aspects.VMG issues and concerns in adoption and scaling upAffordable nutritious food products made in the backyards will lead to enhanced production and one and scaling up		
including value addition aspects.VMG issues and concerns in adoption and scaling upAffordable nutritious food products made in the backyards will lead to enhanced production and		
including value addition aspects.VMG issues and concerns in adoption and scaling upAffordable nutritious food products made in the backyards will lead to enhanced production and		
VMG issues and concerns in adoption and scaling upAffordable nutritious food products made in the backyards will lead to enhanced production and one and scaling up		
and scaling up backyards will lead to enhanced production and		
health and incomes.		
VMG related opportunities Opportunity to produce, trade in, and consum		
locally produced nutritious food products		
E: Case studies/profiles of success stories		
Success stories Cottage production of the products in weste		
Kenya like by EASTCOM Foods and PAWA bake		
in Siaya and Busia respectively.		
Application guidelines for users Finger millet Blended and Composite Flo		
production leaflet		
F: Status of TIMP Readiness (1. Requires validation;		
Ready for up-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 addres		
rhodazik@gmail.com		
Lead organization and scientists KALRO, Dr. Rhoda A. Nungo and Dr. Chrisp		
Oduori		
Partner organizations ICRISAT Nairobi; MoALF in Countie		
EASTCOM Foods; PAWA Bakers.		

- Appropriate packaging and promotion
 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 techr	nology, innovation or management practice
Problem addressed	Limited finger millet utilization food products
What is it? (TIMP	Snack food product made from finger millet – wheat flour
description)	composite.

Justification	-Diversification of finger millet food products will enhance
	consumption of finger millet, enhance demand and thus spur
D	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 dissemin	ation 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 f	uture 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, vuln	erable and marginalized groups (VMGs) considerations
Basic costs	Not yet estimated
Estimated returns	Not yet estimated

	** * 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
Gender issues and	Women and youth are the key adopters and the general public
concerns in development	key consumers.
and dissemination	
Gender issues and	Women and youth are the key adopters, children, youth, men
concerns in adoption and	and women the key consumers.
scaling up	
Gender related	Women and youth stand to benefit in production and trade in
opportunities	the product.
VMG issues and concerns	Due to prejudice associated with their social status, VMGs are
in development and	excluded from access to and benefits from improved
dissemination	technologies. Thus, affirmative action is required to promote
	the crop for the VMGs including value addition aspects.
VMG issues and concerns	Affordable nutritious food products made in their backyards
in adoption and scaling up	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	Cottage production of the products in western Kenya like by
	EASTCOM Foods and PAWA bakers in Siaya and Busia
	respectively.
Application guidelines for	Finger millet Biscuit snack production leaflet
users	Thigh miner Discut shack production learner
F: Status of TIMP	Requires validation;
Readiness (1. Ready for	Requires valuation,
up-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	KALRO, Dr. Rhoda A. Nungo and Dr. Chrispus Oduori
scientists	
Partner organizations	ICRISAT Nairobi; MoALF in Counties, EASTCOM Foods;
	PAWA Bakers.
a	

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