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Research Article

Evaluation of Vegetative Propagation Methods of Enset (*Ensete ventricosum* (Welw) Cheesman) in Southern Ethiopia

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Abstract

Background and Objective: Enset is traditionally propagated by vegetative techniques (whole corm) in most of the enset growing areas in Ethiopia. Previous research findings revealed the fact that the improved (half corm) propagation method performed better than the farmer's practice (whole corm). Hence, the on-farm trial was conducted to evaluate the enset propagation methods in Kembata and Hadiya zones, Southern Ethiopia. **Material and Method:** Two districts were selected from the two zones in Southern Ethiopia. Using the three enset cultivars as the test crops, both traditional and improved enset propagation methods for enset sucker production were evaluated and demonstrated on farmers' fields of five farmers as replications with RCB design at each zone. **Results:** An analysis of variance revealed that the propagation method had a significant effect on the majority of the growth parameters of the enset sucker of the three studied enset cultivars. The study showed that splitting the whole corm longitudinally through an apex into two parts and planting each piece in a different hole produced a greater number of vigorous suckers than the farmer's practice with all three varieties at both study sites. Similarly, the farmers' preferences were also consistent with the findings at both sites. **Conclusion:** Generally, all the tested cultivars responded positively to an improved method of propagation in the study areas. The mean number of suckers per corm and mean fresh weight per corm tend to increase significantly for the tested cultivars as a result of practising the improved (half corm) method at both study sites. Therefore, all the tested cultivars with halved corm propagation methods can be used to get more vigorous enset suckers than farmer's practice in the study areas as well as at locations with similar environmental conditions.

Key words: Evaluation, farmer's preference, enset, vegetative propagation, corm, sucker, apical meristem

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Data Availability: All relevant data are within the paper and its supporting information files.

INTRODUCTION

Enset (*Ensete ventricosum* (Welw.) Cheesman) is closely related to banana, belonging to the family *Musaceae*. Domesticated in Ethiopia, it is an important component of cropping systems, contributing to year-round food security and livelihoods for more than 20 million people, around 20% of the country's population mainly in the south and Southwestern Ethiopia^{1,2}. The amount of food obtained from 60 matured enset plants could be enough for an average family of 5-6 people over a year when consumed with other dietary components³. In addition to being a source of food for human beings and feed for livestock, enset corm also serves as a source of sucker production, which helps to maintain the clonal generation. Although enset can be propagated sexually by seed also, almost all enset growing farmers' planting material is vegetatively propagated in field nurseries through corms or corm pieces that originate from field-grown mother plants. Unlike banana plants, field-grown enset plants seldom produce suckers unless stimulated to do so. This is because the dominance of the apical meristem prevents the development of lateral buds⁴. Macro-propagation (i.e., cloning by using a corm piece with the apical meristem removed) of *Musaceae* is recognized as a cost-efficient way to obtain planting materials⁵. This vegetative method of propagation helps to obtain a sufficient number of vigorous suckers, but reduces the amount of accessible product for household consumption and, in turn, endangers the food security of farmers, particularly in the areas where whole corms are used for propagation.

Different studies have reported that there was a variation in the use of corm types for sucker production among the farmers in the enset growing areas in Ethiopia. Farmers in the Sheka zone commonly use quarter corm pieces, in Gamo gofa and Wolayita zones half corms are used but buried together in a single hole while in Kembata, Hadiya, Chebo-gurage, Gediyo and Sidama areas mainly the whole corm method is used⁶. People in these areas where the whole corm method has been used, on the other hand are completely depending on enset for their food and feed security. Since enset corm is an important economic and seed (planting material) source for farmers in these areas, more corm-demanding propagation method (whole corm) for both small and large scale sucker production coupling with corm reduction due to an expanding enset bacterial wilt disease effect could impede food and feed security in these areas.

Therefore, an improved enset propagation method must be tailored, particularly for those areas where the whole corm production practice is commonly undertaken, to enhance

enset sucker production effectively and efficiently for the small and large-scale enset production. In this line, the whole, half and quarter enset corm propagation methods were tested on station at the Areka Agricultural Research Center and revealed that the half-corm propagation method is more effective in producing a vigorous and sufficient number of suckers⁷.

Though the improved propagation method (half corm) has such an important effect on producing more vigorous suckers, the expansion of this method has been lagged yet to most enset producing areas. Thus, the current on-farm experiment was carried out to evaluate and demonstrate the enset sucker propagation in the study areas.

MATERIALS AND METHODS

Description of the study sites: On-farm evaluation and demonstration trials of enset propagation methods were carried out in two Districts, Kadida Gamela District from Kembata zone and Lemo District from Hadiya zone of Southern Ethiopia during the 2019 cropping season. Kadida Gamela is bordered on the East and South by an exclave of Hadiya zone, on the west by Kacha Bira District, on the North-West by Angecha District, on the north by Damboya District and on the northeast by Bilate River which separates it from Alaba zone. Its altitude ranges from 1700-3028 meters above sea level and geographical location ranges between 7°15'48" N and 37°53'28" E. Whereas, Lemo is situated in the Western margin of the Great Ethiopian Rift Valley and at the fringe of the Gurage mountains in the northern part of the region. It is geographically located at 7°30'36" N latitude and 37°50'42" E longitude. It has an altitude ranging from 1780-2780 meters above sea level with a long-term maximum and the minimum monthly average temperature of 15 and 21, respectively and with an average annual rainfall of 1000-1200 mm.

Treatments and experimental design: The recommended halved corm (improved) and whole corm (Farmer's practice) enset propagation methods combined with three released cultivars of enset (Yambule, Kelisa and Zereta) were arranged in six treatments (Table 1). The experiment was laid out as a randomized complete block design with five farmers as replications per location.

The three-year-old enset clone parent corms were up-rooted, pseudostem was cut leaving a 15 cm piece of pseudostem attached to the corm and then longitudinally split into two halves and apical buds removed and were left in the open air under shade for twenty-four hours, following the

Table 1: Description of the treatments

Treatments	Descriptions
FP+Yambule	Farmers' practice and Yambule cultivar
FP+Kelisa	Farmers' practice and Kelisa cultivar
FP+Zereta	Farmers' practice and Zereta cultivar
IM+Yambule	Improved method and Yambule cultivar
IM+Kelisa	Improved method and Kelisa cultivar
IM+Zereta	Improved method and Zereta cultivar

Table 2: Description of the cultivars

Cultivars	Squeezed kocho yield (tons/ha/year)	Altitude (masl)	Rainfall (mm)	Year of release
Yambule	22.8	1200-3100	1100-1500	2009
Kelisa	21.80	1200-3100	1100-1500	2010
Zereta	23.71	1200-3100	1100-1500	2010

traditional corm burial procedure. The experimental field was first cleared and well ploughed before planting. Corm pieces were planted separately in new planting holes at depth of 30 cm. Three improved enset varieties, namely Yambule, Kelisa and Zereta were selected among the available varieties in the country, based on their yield and adaptation record (Table 2). The spacing between plant and row was 1.5 and 1.5 m, respectively. All the other agronomic managements (manure application, weeding, cultivation etc.) were carried out properly and equally for all treatments per the existing recommendation. The farmers evaluated the overall performances of each treatment based on the given leading preference criteria for evaluation.

Data collection and analysis: Data on six main quantitative morphological characteristics such as number of leaves per plant, the height of suckers, length of pseudostem, the circumference of pseudostem, number of suckers per corm and fresh weight of suckers were recorded from ten randomly selected suckers per hole at physiological maturity.

Moreover, the selected enset producing farmers were invited to evaluate the overall on-farm performances of the treatments at the physiological maturity based on the given ranking criteria for evaluation. To this end, a five-point Likert scale method was used (1, 2, 3, 4 and 5 being very good, good, average, poor and very poor, respectively) and finally, farmers' preferences were recorded and summarized.

Analyses of variances for characteristics were employed for each location since the test of interaction effect was significant. All the analysis was done by using the GLM procedure of the SAS software package (version 9.3). Treatment means were compared using LSD at 0.05 levels.

RESULTS AND DISCUSSION

Effect of enset vegetative propagation methods on sucker growth in Kembata zone

Number of green leaves per sucker: Analysis of Variance (ANOVA) showed that the mean number of leaves per sucker was highly significantly ($p < 0.01$) affected by propagation methods (Table 3). More leaves per sucker (7) were recorded with the halved corm of the Yambule cultivar, whereas a lower number of green leaves per sucker (4.8) were recorded with the farmer's practices (whole corm) of Kelisa cultivar (Table 4). Nevertheless, all tested cultivars responded positively to an improved method of propagation in the study area. The mean number of green leaves per sucker was tend to increase for all tested cultivars as a result of practising the improved (half corm) method in the study area. This may be due to early emergence and hence vigour growth of suckers from half corms compared to those from whole corms.

Height of sucker: Propagation methods had shown a significant ($p < 0.05$) effect on the mean height of sucker in the study area (Table 3). Significant differences in the mean height of suckers were observed among treatments. The mean height of the sucker varies from 1.81-2.94 m due to treatments. The shortest mean height (1.81 m) was recorded with the farmer's practice (whole corm method) of the Kelisa cultivar, whereas the longest mean height of sucker (2.94 m) was recorded with the halved corm of the Yambule cultivar (Table 4). The height of sucker for all tested cultivars tends to increase due to improved propagation methods compared to farmer's practice in the study area. This may be due to well stimulation of early emergence and hence vigour growth of suckers caused by halved corm method. Suckers from half corms emerged earlier than those from whole corms.

Table 3: Mean square values of growth parameters of enset suckers in Kembata zone (2019)

Source	DF	Mean squares					
		# NGL	HS	LPS	CP	NS	FWS
		^o MS	MS	MS	MS	MS	MS
Rep	4	2.53**	0.191 ^{ns}	20.09 ^{ns}	8.76 ^{ns}	50.6	114.3
Treatment	5	3.09**	0.723*	673.04**	143.01**	3993.0**	3231.9**
Error	20	0.49	0.136	18.38	17.03	32.4	72.1
CV		11.97	16.3	7.86	12.19	9.0	14.6
LSD (0.05)		0.92	0.48	5.65	5.44	7.5	11.2

#NGL: No green leaves, HS: Height of suckers, LPS: Length of pseudo stem, CPS: Circumferences of pseudo stem, NS: Number of suckers per corm, FWS: Fresh weight of suckers per corms, ^oMS: Mean square values ^{ns}, *, **Non-significant, significant at (p<0.05) and highly significant at (p<0.01), respectively

Table 4: Effect of vegetative propagation methods on sucker growth in Kembata zone (2019)

Treatments	Mean values of growth parameters					
	NGL***	HS (m)	LPS (cm)	CPS (cm)	NS	FWS (kg)
**F+Yambule	5.2 ^{cd*}	2.2 ^{bc}	51.9 ^{bc}	40.3 ^a	42.0 ^{de}	78 ^b
F+Kelisa	4.8 ^d	1.8 ^c	42.1 ^d	28.0 ^c	37.4 ^e	30.2 ^e
F+Zereta	5.8 ^b ^c	2.1 ^{bc}	50.7 ^{bc}	30.2 ^{bc}	49.4 ^{cd}	41.3 ^{de}
IM+Yambule	7.0 ^a	2.9 ^a	76.3 ^a	40.1 ^a	109.8 ^a	98.4 ^a
IM+Kelisa	6.2 ^{ab}	2.4 ^b	50.1 ^c	34.5 ^b	56.8 ^c	46.1 ^{cd}
IM+Zereta	6.2 ^{ab}	2.2 ^{bc}	56.2 ^b	30.1 ^{bc}	85.0 ^b	55.4 ^c
CV (%)	16.3	7.86	12.19	9.0	14.6	11.97
LSD (0.05)	0.48	5.65	5.44	7.5	11.2	0.92

*Means with the same letter in the column are not significantly different, **F: Farmer's practice (the whole corm burying), IM: Improved method (halved corm burying), ***NGL: No green leaves, HS: Height of suckers, LPS: Length of pseudo stem, CPS: Circumferences of pseudo stem, NS: Number of suckers per corm and FWS: Fresh weight of suckers per corms

Length of pseudostem: Analysis of Variance (ANOVA) showed that the length of pseudostem was highly significantly (p<0.01) affected by propagation methods for all tested cultivars (Table 3). The mean length of pseudostem varied from 42.1-76.3 cm in the study. The shortest pseudostem (42.1 cm) was recorded with farmer's practice (whole corm) of the Kelisa cultivar, whereas the longest (76.32 cm) pseudostem was recorded with halved corm of the Yambule cultivar (Table 4). Generally, cultivars responded positively to improved propagation methods. Pseudostem length tended to increase for all tested cultivars with an improved propagation method compared to farmer's practice in the study area.

Circumference of pseudostem: For all cultivars studied, Analysis of Variance (ANOVA) revealed that propagation methods had a highly significant (p<0.01) impact on the circumference of the pseudostem (Table 3). Significant differences in the circumference of pseudostem were observed among treatments. The mean circumference of pseudostem varied from 27.9-40.1 cm in the study. The smallest pseudostem circumference (27.9 cm) was recorded with farmer's practice (whole corm) of Kelisa cultivar, whereas the largest (40.1 cm) pseudostem circumference was recorded with a halved corm of the Yambule cultivar (Table 4). This

variation in the circumference of the pseudostem may be mainly due to the effect of enset propagation methods than cultivars. Since using the whole corm method decreased the number of suckers (plant population) per hole, as a result, the competition level among suckers to growth resources was less and caused an increase in the circumference of the pseudostem. Conversely, the half corm method increased the number of suckers per corm, as a result, the competition level among suckers to growth resources was high and caused a decrease in the circumference of the pseudostem. This finding agrees with Taye⁸ who reported that the number of suckers per corm was significantly and negatively correlated with pseudostem circumference.

Number of suckers per corm: There was a highly significant (p<0.01) variation among the treatments in the mean number of suckers per corm (Table 3). The average number of suckers produced per corm ranged from 37.4 and 109.8. The lowest mean sucker number (37.4) per corm was recorded with farmer's practice (whole corm method) of the Kelisa cultivar, while the highest (109.8) was recorded with half corm of Yambule cultivar (Table 4). All the tested cultivars highly responded to the improved propagation method. For instance, the Yambule cultivar produced more than double suckers per corm due to an improved method compared

Table 5: Farmers' preferences of sucker propagation methods in Kembata zone (2019)

Practice+variety	Preference criteria**							Rank
	Early emergence	Sucker vigour	Sucker number	Sucker height	Sucker size	Overall score	Average score	
*F+Yambule	3	2	5	4	3	17	3.4	4
F+Kelisa	4	5	2	5	5	21	4.2	6
F+Zereta	5	5	1	3	4	18	3.6	5
IM+Yambule	1	1	1	1	1	5	1	1
IM+Kelisa	2	3	3	2	2	12	2.4	3
IM+Zereta	2	1	2	2	2	9	1.8	2

*F: Farmer's practice, **Numerical values "1, 2, 3, 4 and 5 " under each growth parameter for treatments mean very good, good, average, poor and very poor, respectively

to farmer's practice, other cultivars also produced significantly higher suckers due to improved methods compared to the farmer's practice in the study area. This may be due to a higher failure of the sucker to emerge in the case of the whole corm method. Moreover, the good removal of bud apex in the half corm method might have stimulated multiple suckers' production compared to the whole corm method. This is consistent with Karlsson *et al.*⁹ who justified the fact that cutting off the corm into various sized pieces and removing the shoot apex increased the number of suckers produced compared with whole corms. This improved method can be used as one of the various technologies that have been developed to increase enset sucker production¹⁰.

Fresh weight of suckers per corm: Analysis of Variance (ANOVA) showed that the mean fresh weight of suckers per corm was highly significantly ($p < 0.01$) affected by propagation methods for all tested cultivars (Table 3). More fresh weight of suckers (98.4 kg) was recorded with the half corm method of the Yambule cultivar, whereas the less fresh weight of suckers (30.2 kg) was recorded with farmer's practice (whole corm) of the Kelisa cultivar (Table 4). Mean fresh weight of suckers of all tested cultivars tended to increase with improved propagation method compared to farmer's practice in the study area. This may be due to the early emergence and vigour overall growth of suckers as a result of good stimulatory actions imposed in the half corm method compared to the whole corm method.

Farmers' preferences in Kembata zone: The following section deals with results from the evaluation of the efficacy of enset propagation methods and enset cultivars by farmers in the Kembata zone. The demonstration of improved propagation methods of enset cultivars for sucker production ensured farmers were a participant in the selection of effective sucker propagation method and enset variety in comparison with a local check (farmers' practice) based on their preference criteria. To this end, a five-point Likert scale method was used (1 being very good and 5 very poor). The calculated mean

values indicate the weight of the perception by farmers about a performance of a given method. Among the treatments, treatment four (improved propagation method with Yambule cultivar) was ranked first by farmers. It agrees with statistical analysis that showed this treatment performed significantly better than other treatments. This treatment was ranked as the most reliable enset propagation method. Whereas, improved propagation method of Zereta cultivar was ranked second by farmers. Performance of farmer's practice of Kelisa was the least ranked with sixth position (Table 5).

Effect of enset vegetative propagation methods on sucker growth in Hadiya zone

Number of green leaves per sucker: Analysis of Variance (ANOVA) showed that the number of leaves per sucker was not significantly ($p > 0.05$) affected by enset propagation methods for all tested cultivars in Hadiya zone (Table 6). Though treatments were at par statistically, More leaves per sucker (6.6) were recorded with halved corm of Yambule cultivar whereas, less number of green leaves per sucker (5.2) was recorded with farmer's practices (whole corm) of Kelisa cultivar (Table 7). This may be due to early emergence and hence vigour growth of suckers from half corms compared to those from whole corms, in addition to other factors. This early emergence might result in better sucker growth and more number of the leaves.

Height of sucker: Enset propagation methods had no significant ($p > 0.05$) effect on the mean height of suckers of all tested cultivars in the Hadiya zone (Table 6). However, the half corm of the Yambule cultivar produced the highest height (2.5 m) of suckers than others, though they are at par statistically (Table 7). This little variation among treatments to the height of sucker may be due to the effect of the genetic makeup of the cultivars.

Length of pseudostem: There was a highly significant ($p < 0.01$) variation among treatments in the mean length of pseudostem (Table 6). The longest (64.9 cm) pseudostem was

Table 6: Analysis of variance of growth parameters of onset suckers in Hadiya zone (2019)

		Mean square values					
		#NGL	HS	LPS	CPS	NS	FWS
Sources	DF	^o MS	MS	MS	MS	MS	MS
Rep	4	0.38 ^{ns}	1.46 **	28.22 ^{ns}	47.409 ^{ns}	178.78*	101.217 ^{ns}
Treatment	5	1.07 ^{ns}	0.277 ^{ns}	140.87*	72.712 ^{ns}	3606.1**	2162.67**
Error	20	0.92	0.124	35.252	38.399	58.263	99.557
CV		16.66	16.04	9.85	15.33	11.03	13.38
LSD (0.05)		1.27	0.47	7.83	8.18	10.1	13.17

#NGL: No green leaves, HS: Height of suckers, LPS: Length of pseudo stem, CPS: Circumferences of pseudo stem, NS: Number of suckers per corm, FWS: Fresh weight of suckers per corms, ^oMS: Mean square values and ^{ns}, *, **Non-significant, significant at (p<0.05) and highly significant at (p<0.01), respectively

Table 7: Effect of vegetative propagation methods on sucker growth in Hadiya zone (2019)

Mean values of growth parameters						
Treatments	NGL ***	HS (m)	LPS (cm)	CPS (cm)	NS	FWS (kg)
**F+Yambule	5.6*	2.5	63.8 ^a	46.6	43 ^d	83.4 ^b
F+Kelisa	5.2	2.0	50.3 ^b	37.0	42.6 ^d	43.2 ^d
F+Zereta	5.8	2.1	62.7 ^a	38.5	57.4 ^c	64.8 ^c
IM+Yambule	6.6	2.5	60.6 ^a	42.4	112 ^a	104.6 ^a
IM+Kelisa	5.8	2.1	59.2 ^a	36.7	81.4 ^b	68.6 ^c
IM+Zereta	5.6	2.0	64.9 ^a	41.3	78.8 ^b	82.8 ^b
CV (%)	16.7	16.0	9.85	15.3	11.0	13.4
LSD (0.05)	NS	NS	7.83	NS	10.1	13.17

*Means with the same letter in the column are not significantly different, **F: Farmer's practice (the whole corm burying), IM: Improved method (halved corm burying), ***NGL: No green leaves, HS: Height of suckers, LPS: Length of pseudo stem, CPS: Circumferences of pseudo stem, NS: Number of suckers per corm, FWS: Fresh weight of suckers per corms

recorded with halved corm method of the Zereta cultivar whereas the shortest pseudostem (50.3 cm) was recorded with farmer's practice (whole corm) of Kelisa cultivar. Generally, the responses of cultivars to propagation methods were inconsistent with the length of the pseudostem in the study area (Table 7).

Circumference of pseudostem: Analysis of variance showed that the mean circumference of the onset sucker was not significantly (p>0.05) affected by the propagation methods of all tested cultivars in the Hadiya zone (Table 6). Though they are at par statistically, the widest (46.6 cm) pseudostem circumference was recorded with the whole corm method of Yambule cultivar whereas the narrowest pseudo stem circumference (36.7 cm) was recorded with the half corm method of Kelisa cultivar (Table 7). There was a little variation in the circumference of the pseudostem due to the effect of onset cultivars. In contrast, the onset propagation methods highly affected the circumference of the pseudostem. For instance, the whole corm method decreased the number of suckers (plant population) per hole, as a result, the competition level among suckers to growth resources was less and caused an increase in the circumference of the pseudostem. Conversely, the half corm method increased the

number of suckers per hole, as a result, the competition level among suckers to growth resources was high and caused a decrease in the circumference of the pseudostem. This finding is consistent with Taye⁸ who reported that the number of suckers of corm was significantly and negatively correlated with pseudostem circumference.

Number of suckers per corm: There was a highly significant (p<0.001) variation among treatments in the mean number of suckers per corm (Table 6). The average number of suckers produced per corm varied between 42.6 and 112 due to treatments (Table 7). More suckers (112) were recorded with halved corm of Yambule cultivar whereas less number of suckers (42.6) was recorded with farmer's practices (whole corm) of Kelisa cultivar (Table 4). This may be due to higher stimulation of the corm pieces to produce more suckers in the case of the half corm propagation method, though the rate of sucker production depends also on many other factors such as types of cultivars, size of corm etc. Moreover, the suitability of removing bud apex adequately in the half corm method might have stimulated multiple suckers' production compared to the whole corm method. This finding agrees with Diro *et al.*⁷ who obtained a higher number of suckers using half corms than whole corms in their separate field experiments.

Table 8: Farmers' preferences on enset sucker production methods in Hadiya zone (2019)

Practice+variety	Preference criteria**							
	Early emergence	Sucker vigour	Sucker number	Sucker height	Sucker size	Overall score	Average score	Rank
*F+Yambule	4	2	1	3	4	14	2.8	4
F+Kelisa	3	4	5	5	4	21	4.2	6
F+Zereta	5	5	2	3	5	20	4	5
IM+Yambule	1	1	1	1	1	5	1	1
IM+Kelisa	2	2	2	2	2	10	2	2
IM+Zereta	3	3	3	1	3	13	2.6	3

*F: Farmer's practice, **Numerical values under each growth parameter for treatments "1, 2, 3, 4 and 5" Mean very good, good, average, poor and very poor, respectively

Fresh weight of suckers per corm: Analysis of Variance (ANOVA) showed that the fresh weight of suckers per corm was highly significantly ($p < 0.01$) affected by propagation methods for all tested cultivars (Table 6). Significant differences in fresh weight of suckers per corm were observed among treatments. More fresh weight of suckers (104.6 kg) was recorded with halved corm of Yambule cultivar whereas the less fresh weight of suckers (43.2 kg) was recorded with farmer's practices (whole corm) of Kelisa cultivar (Table 7). Mean fresh weight of suckers of all tested cultivars tended to increase with improved propagation method compared to farmer's practice in the study area. This may be due to the early emergence and overall vigour growth of suckers as a result of good stimulatory actions imposed in the half corm method compared to the whole corm method.

Farmers' preferences in Hadiya zone: The demonstration of enset propagation methods ensured farmers were participants in the selection of improved sucker propagation method with the best responsive enset cultivar in comparison with a local check (farmers' practice) based on their preference criteria. To this end, a five-point likert scale method was used (1 being very good and 5 very poor). The calculated mean values indicate the weight of the perception by farmers about a performance of a given method. Among the treatments, treatment four (improved propagation method with Yambule cultivar) was ranked first by farmers. It agrees with the statistical analysis that showed this treatment performed significantly better than other treatments. This treatment was ranked as the most reliable enset propagation method. The second-ranked treatment by farmers of Hadiya zone was an improved propagation method with Kelisa cultivar. Whereas, the least ranked treatment was that of the farmer's propagation method with Kelisa cultivar (Table 8).

CONCLUSION

The study showed that splitting the whole corm longitudinally through an apex into two parts and planting

each in a different hole produced more vigour suckers than the whole corms (farmer's practice) at both study sites. Generally, all tested cultivars responded positively to an improved method of propagation in the study areas. The mean number of suckers per corm and mean fresh weight per corm tend to increase significantly for all tested cultivars as a result of practising the improved (half corm) method at both study sites. Therefore, all the tested cultivars with halved corm propagation methods can be used to get more vigorous enset suckers in the study areas as well as at other locations with similar environmental conditions.

SIGNIFICANCE STATEMENT

This study discovers the possible effect of enset crop propagation methods on the growth of suckers in Southern Ethiopia where this crop is dominantly grown. It reveals the effective practice that can be beneficial for enset producing farmers in particular and also for those parties involved in the business related to the enset seedling production and marketing activities in general. This study will help the researcher to uncover the critical area of improving the traditional enset propagation method that many researchers were not able to explore. Thus a new theory on the improvement of the traditional way of enset crop propagation may be arrived at.

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