Asian Research Journal of Agriculture

Volume 17, Issue 4, Page 662-672, 2024; Article no.ARJA.123490
ISSN: 2456-561X

Evaluation of Newly Released Open Pollinated Tomato Varieties for Yield and Yield Components Performance in Northwestern Zone of Tigray

Yohannes Gebremichael [a]*, Kiros Asgele [a] and Gebremedhin Gebretsadkan [a]

[a] *Shire-Maitsebri Agricultural Research Center, Po.box 241 Shire, Tigray, Ethiopia.*

Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

Article Information

DOI: https://doi.org/10.9734/arja/2024/v17i4573

Open Peer Review History:
This journal follows the Advanced Open Peer Review policy. Identity of the Reviewers, Editor(s) and additional Reviewers, peer review comments, different versions of the manuscript, comments of the editors, etc are available here: https://www.sdiarticle5.com/review-history/123490

Original Research Article

Received: 11/08/2024
Accepted: 17/10/2024
Published: 28/10/2024

ABSTRACT

Tomato is one of the most important horticultural cash crops in Tigray, Northern Ethiopia. However, tomato production and productivity is limited by several factors such as disease and pests, lack of improved varieties and poor agronomic practice. Therefore, field experiment was conducted in 2017 and 2018 irrigation season to select and identify the best and high yielder tomato varieties. Seven improved Open Pollinated Variety namely; Gelilama, Mersa, Sirinka-I, Woyno, Tekeze-1, Melkashola and Melkasalsa were tested for their yield and yield performance. Significant

**Corresponding author: E-mail: aglovekb19@gmail.com;*

Cite as: *Gebremichael, Yohannes, Kiros Asgele, and Gebremedhin Gebretsadkan. 2024. "Evaluation of Newly Released Open Pollinated Tomato Varieties for Yield and Yield Components Performance in Northwestern Zone of Tigray". Asian Research Journal of Agriculture 17 (4):662-72. https://doi.org/10.9734/arja/2024/v17i4573.*

differences were observed among the varieties across locations. The current findings showed that the highest marketable yield was obtained from Gelilama (55.58 t ha^{-1}) & (49.59 t ha^{-1}) followed by Melkasalsa (49.42 & 45.81 t ha^{-1}) in Tselemti and M/zana woreda's respectively. Based on the current study Gelilama and Melkasalsa varieties had given higher yield in both locations. Therefore, Gelilama and Melkasalsa varieties should be recommended for demonstration and scale-up in the study areas.

Keywords: Open pollinated variety; tomato; varieties; yield.

1. INTRODUCTION

Tomato (*Lycopersicon esculentum*. mill) is one of the most widely cultivated Solanaceae vegetable crops in the world. It is also one of the most important and widely grown vegetables in Ethiopia. The national average tomato fruit yield under farmers' conditions in Ethiopia is very low. Several improved varieties and other agronomic practices have been recommended to farmers to overcome the low productivity and quality of tomatoes in the country. And yet, the average national yield remains very low and is reported to be about 7 tons/ha [1], which is about one-fourth of the world average of 27 tons/ha. The production and productivity of the crop in Ethiopia is influenced by different factors among lack of improved variety, insufficient and inefficient use of fertilizers, inappropriate agronomic practices, and inadequate pest and disease management are major.

In Ethiopia, it is produced in altitudes between 700 and 2000 m.a.s.l., which is characterized as warm, dry day and cooler night with having annual precipitation of 700 to more than 1400 mm in different areas and different season, in different soil types and provides different yields [2]. Tomato is adapted and grows well in warm condition and requires optimum temperature of 20-25^{o}C during the day and 15-17^{o}C at night and can be grown in well-drained friable sandy or light loam soil with high organic matter content with pH 5 to 7.5 is preferable for early and high fruit yield [3]. It must be also noted that tomato flowers fail to set fruits as the result of poor nutrient imbalances and poor managements [4] and [2].

Increasing production of the crop has a great role to strengthen the growing vegetable industries in the country. Mehla et al. [5] also reported yield variation in tomato occurred due to disease and pests, lack of improved variety, and variation in cultural practices. Therefore, the present study was initiated to select and identify the best and high yielder tomato varieties in the study areas.

2. MATERIALS AND METHODS

2.1 Description of the Study Area

The experiment was conducted at Tselemti & Medebay zana woreda specific location at during 2017 & 2018 under irrigation condition. Tselemti woreda specific location Maitsebri research station is located 400 km west of Mekelle the capital of Tigray Region (Fig. 1). The research station lies at latitude 13^{0}05' N and longitude 38^{0}08' E and has an altitude of 1304 m.a.s.l. The mean annual temperature ranges from 18.4^{o}C to 32.7^{o}C and average annual rainfall is 1176.7 mm [6]. Medabay zana woreda specific location selekeleka research station is also located at 378 km west of Mekelle (Fig. 2). The research station lies at 14°6′43″ N, 38°27′50″E, and at an altitude of 1951 m.a.s.l. with mean annual rainfall is 680mm.

2.2 Experimental Treatments, Design and Procedure

Seven improved and released Tomato verities collected from Melkasa, Sirinka and Humera Agricultural Research Centres namely Gelilama, Melkashola, Melkasalsa, Mersa, Sirinka-1, Woyno & Tekeze-1 were evaluated for their performance in the studies area (Table 1). The treatments were laid out in Randomized Complete Block Design (RCBD) with three replications. Each experimental plot has 21 plots a plot size of 4.0 m x 3.9 m, separated by 1 m between plots and 1.5 m b/n blocks. Each plot was consisted 5 rows of 4.0 m length with a spacing of 30 cm between plants and 80 cm between rows. Gross area 33.3 m x 15 m (499.5 m^2) and Net area 27.3 m x 12 m (327.6 m^2) was used for each location. All management practices (ploughing, cultivation, watering, weeding and others) was applied uniformly to all plots and planted at the same time at open field.

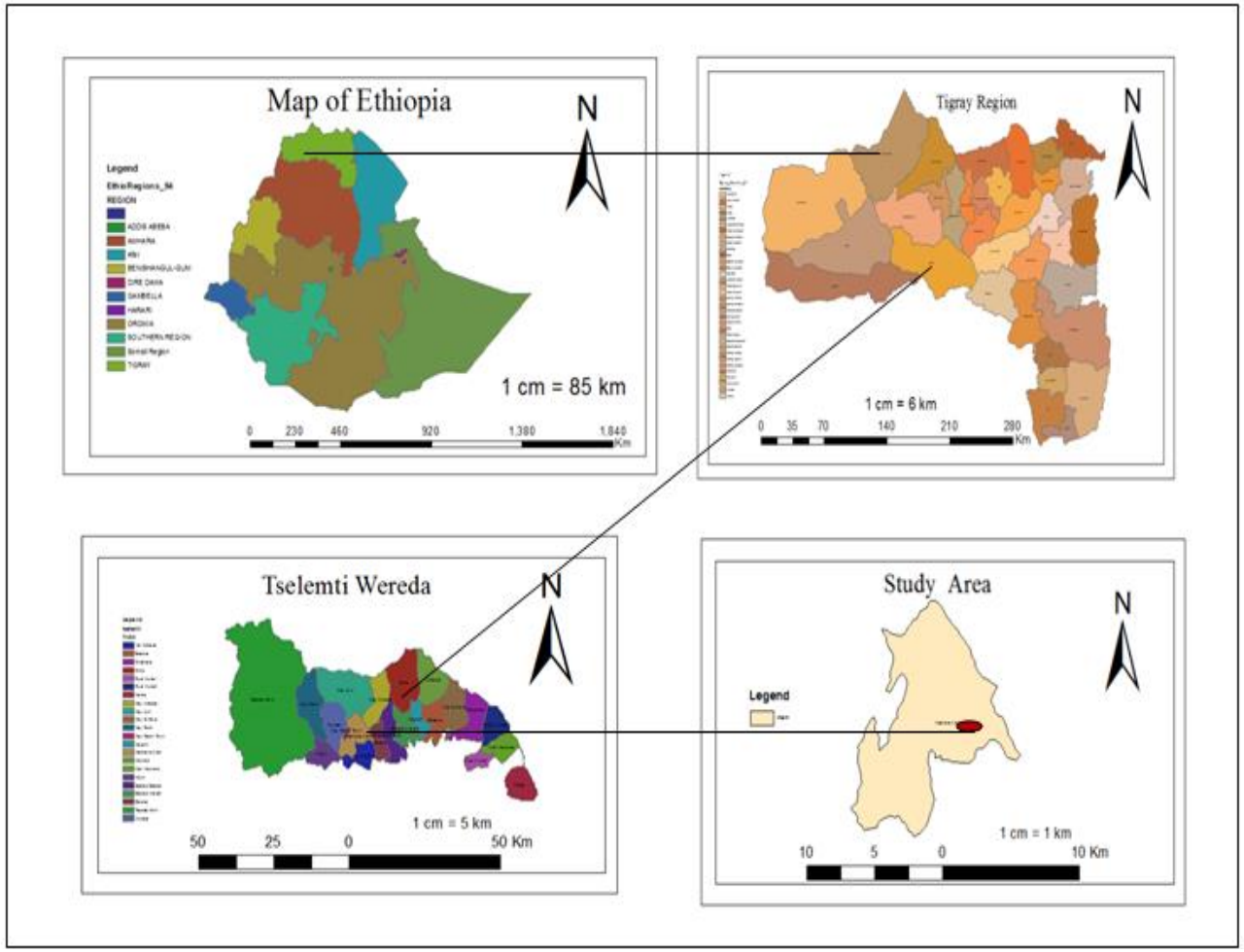

Fig. 1. Tselemti woreda (study area')

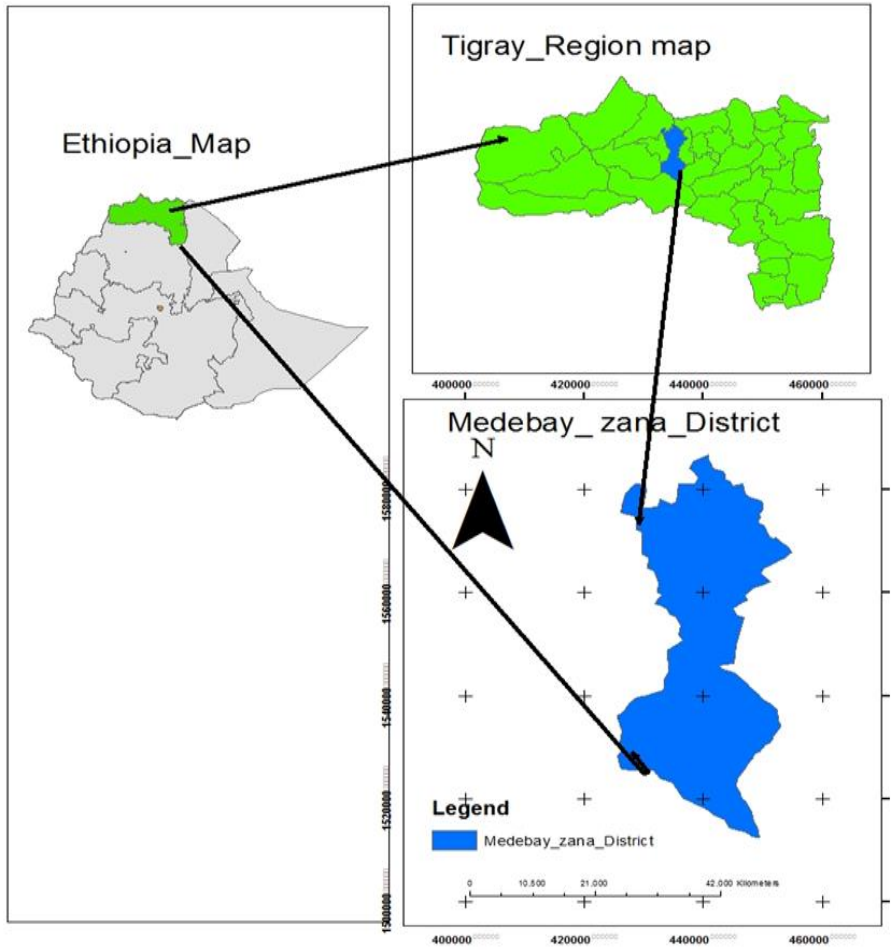

Fig. 2. Medebay zana woreda (study area')

Table 1. Released tomato varieties used for the study and some of their descriptions

Variety name	Year of release	Growth habit	Utilization	Days to maturity	Fruit size (gm)	Yield (t ha^{-1})		Responsible Research Center or Breeder/ Maintainer	Unique character
						Research field	Farmer`s field		
Gelilama	2015	Determinate	Processing	85-100	80-92	50	20-25	MARC	Firmness & Oval red fruit shape
Melkashola	1998	Determinant	Processing	100-120	60-70	43	14-18	MARC	Red Pear and Globular fruit shape
Melkasalsa	1998	Determinant	Fresh	100-110	40-50	45	13-17	MARC	Small fruit size, Slightly cylindrical fruit shape
Mersa	2006	Indeterminate	Fresh	100-120	42-50	27.6	15.9	SARC	Carman fruit shape
Sirinka-1	2006	Indeterminate	Fresh	95-100	60-65	38.2	14.4	SARC	small fruit size & Cardinal or Round fruit shape
Woyno	2006	Determinant	Fresh	85-90	40-50	24.9	14.4	SARC	small fruit size & Fireball or Oval fruit shape
Tekeze-1	2015	Determinant	Processing	70-75	34-38	40	30-35	Humera ARC/TAR	Very small fruit size & Oval red fruit shape

Source: Directory of released crop varieties & variety release booklet, Ministry of Agriculture, Addis Ababa [8]

2.3 Data to be Collected

All Agronomic data on yield and yield components were measured and taken from 6 randomly selected plants per plot. Parameters such as Days to 50% flowering, Days to maturity, Plant height (cm), Fruit number per plant, Fruit diameter (cm), Fruit length (cm), Fruit weight (gm) and Marketable yield (t ha^{-1}) were recorded.

2.4 Data Analysis

The data was subjected to analysis of variance (ANOVA) using Gen Stat 14th edition statistical software according to Gomez and Gomez [7] statistical procedure. When the treatments were significant, least significance differences (LSD) by Dunken's multiple range comparison were used for mean separation at 5% probability.

3. RESULT AND DISCUSSION

3.1 Flowering & Maturity Date

The analysis of variance of 50 % flowering & maturity date in tselemti woreda (Maitsebri on-station) and medabay zana woreda (Selekeleka on-sation) showed significantly ($P<0.05$) among the varieties. The mean average 50 % flowering and 50% maturity date ranging from 38.83 to 47.33 and 84.17 to 103.83 respectively in tselemti woreda and 45.00 to 68.00 & 95.17 to 110.67 ranging 50 % flowering and maturity date respectively in medabay zana woreda. Tekeze-1 variety was matured earlier than the other varieties at about 38.83 & 84.17 days at flowering & maturity respectively in tselemti woreda and 45.00, & 95.17 days at flowering & maturity respectively in medebay zana woreda (Table 2).

The result in tselemti woreda found 50% flowering date is in agreement with the finding of Meseret et al. [8] and Debela et al. [9] reported that the period 50% flowering date ranged from 38 to 49 and 37.66 to 46.33 days respectively among the tomato varieties. In medabay zana woreda result of 50% flowering date also similarly with the finding of Masho et al. [10] reported among fourteen tomato verities mean average days to 50% flowering from 49.7 to 57.3. According to Parvej et al. [11], days to 50% flowering are one of important phonological parameters and determinant factors for growth and productivity of tomato plants. Moreover the difference in 50% flowering days can also be attributed by the genetic makeup of genotypes as observed by Abdelmageed et al. [12].

In the present study, the tomato varieties took 84.17 to 103.83 days and 95.17 to 110.67 days were matured in tselemti & medabay zana woreda respectively. Various researchers reported that tomato varieties give the first harvest in 70-120 days after transplanting [10,13]. Varieties such as Gelilama (100.50 days), Melkasalsa (102.00 days) and Melkashola (103.83 days) in tselemti woreda and Mersa (110.67 days) were matured late whereas Tekeze-1 (84.17 & 95.17 days) was matured earlier in tselemti & medabay zana woreda respectively.

Moreover, the delay in flowering can directly related to the delay in fruit maturity in tomato and the early or late maturity is influenced by genotypic character and environmental factors of the particular growing area [13].

Table 2. Effect of varieties on growth parameters of tomato

S/N	Variety	Tselemti (Maitsebri on-staion)			Medabay zana (Selekeleka on-staion)		
		FLD	MD	PH (cm)	FLD	MD	PH (cm)
1	Gelilama	46.33 c	100.50 c	63.16 c	62.00 ab	104.85 b	67.53 b
2	Sirinka-1	42.33 b	92.67 b	78.92 b	56.33 b	106.17 b	84.84 ab
3	Mersa	46.17 c	93.50 b	88.44 a	68.00 c	110.67 c	97.53 a
4	Woyno	42.17 b	92.67 b	78.86 b	56.33 b	106.34 b	104.67 a
5	Tekeze-1	38.83 a	84.17 a	40.25 d	45.00 a	95.17 a	44.72 c
6	Melkashola	45.00 c	103.83 c	54.53 c	62.67 ab	106.5 b	67.67 b
7	Melkasalsa	47.33 c	102.00 c	57.39 c	62.33 ab	105.52 b	63.14 b
Mean		44.02	95.62	65.9	58.95	105.03	76
CV (%)		4.7	4.8	10.8	1.9	1.9	11.1
LSD (0.05)		3.483	7.744	11.96	2.772	3.193	15.5

3.2 Plant Height

The analysis of variance revealed that the plant height showed significant (P<0.05) effect on plant height (Tble-2). The mean value of plant heights ranged from 40.25 to 88.44 cm in tselemti woreda and 44.72 to 106.67 cm in medabay zana woreda. The highest plant height was recorded from Mersa variety (88.44 cm) which is significantly higher than the other varieties in Tselemti woreda and Woyno (104.67cm) which were not statistically difference with Mersa (97.53 cm) and Sirinka-I (84.84 cm) varieties in medabay zana woeda. On the other hand shortest plant height was recorded from Tekeze-1 (40.25 & 44.72 cm) in tselemti and medebay zana woreda's respectively.

The result of the present investigation agrees with the results of this study, Meseret et al. [8], reported the mean range of plant heights 40.20 to 107cm. Debela et al. [9] reported the mean range of plant heights among the ten Tomato verities from 39.50 to 74.33 cm. The mean plant height of the fourteen tested tomato varieties was reported in the range of 51.7 cm to 115.5 cm [10]. Sirinka-1 (115.45 cm) was the tallest variety followed by Mersa (110.8 cm) and Eshet (102.20 cm) varieties. On the other hand Melkasalsa (51.7) was found to be the shortest variety among the 14 tested varieties [10]. Chernet and Zibelo [14] also obtained wide difference plant height (62.1-105.3 cm) among the nine tomato varieties evaluated in western lowland of Tigray, Northern Ethiopia. Hussain et al. [15] reported wide range of difference (61.6-126.5cm) in plant height among the ten tomato genotypes evaluated in Pakistan. Similar result Dufera [16] found wide difference (51.5-129.7 cm) for plant height in tomato.

3.3 Fruit Weight, Diameter and Length

Fruit weight, diameter and fruit length were recorded significantly at (P<0.05) difference (Table 3). The average range of fruit weight from 33.89 to 80.67gm in tselemti woreda and from 30.5 to 82.5 gm in medabay zana woreda. Accordingly, the highest fruit weight was recorded Gelilama (80.67 gm) followed by Melkasalsa (71.11 gm), Melkashoal (70.28 gm) and Mersa (70.83 gm) tomato verities. While, the lowest fruit weight was scored by Tekeze-1 (33.89 gm) followed by Woyno (50.83 gm) and Sirinka-1 (53.64 gm) of tomato varieties in tselemti woreda. In medabay zana woreda also the highest fruit weight was recorded Gelilama (82.5 gm) followed by Melkasalsa (65.46 gm), Sirinka-1 (65.5 gm), Weyno (62.17 gm), Melkashoal (62 gm) and Mersa (61 gm) tomato verities. While, the lowest fruit weight was scored by Tekeze-1 (30.5 gm) tomato variety.

According to the report, the average weight of tomato fruits is in the range of 20 to180 gm. The tomato fruits produced differ in size from small cherry types (20 gm) to extra-large of beefsteak (180 gm). The fruits that are commonly available in the markets can be categorized as small (less than 50 gm), medium (70 - 110 gm), big (100-170 gm) and very big (> 170 gm) sized. Medium and large fruit categories are preferred generally for fresh market.

The average ranging of fruit diameter from 40.38 to 66.57 mm in tselemti woreda and from 45.63 to 65.21 mm in medabay zana woreda. Larger fruit diameter were recorded Gelilama (66.57 mm) with no statistically difference with Melkasalsa (59.98 mm) & Melkashoal (56.33 mm) tomato verities. While, the shortest fruit diameter of tomato varieties were recorded Tekeze-1 (40.38mm) with no statistically difference with Sirinka-1 (47.35 mm), Woyno (48.20 mm) & Mersa (49.30 mm) in tselemti woreda. Larger fruit diameter were recorded Gelilama (65.21 mm) with no statistically difference with Mersa (64.02 mm) & Weyno (64.00 mm) followed by Melkashola (62.43 mm) tomato verities. While, the shortest fruit diameter of tomato varieties were recorded Tekeze-1 (45.63 mm) with no statistically difference with Sirinka-1 (54.39 mm) & Melkasalsa (59.24 mm) in medabay zana woreda.

The average ranging of fruit length from 40.85 to 87.18 mm in tselemti woreda and from 47.52 to 97.16 mm in medabay zana woreda. The tallest fruit length were recorded Mersa (87.18 mm) with no statistically difference with Gelilama (77.58 mm) & Melkasalsa (76.70 mm) followed by Melkashoal (72.40 mm) tomato verities. While, the smallest fruit length of tomato varieties were recorded Tekeze-1 (40.85 mm) with no statistically difference with Weyno (45.20 mm) and Sirinka-1 (46.43 mm) in tselemti woreda. The tallest fruit length were recorded Mersa (97.16 mm) with no statistically difference with Melkashola (86.26 mm), Melkasalsa (80.9 mm) & Gelilama (79.75 mm) tomato verities. While, the smallest fruit length of tomato varieties were recorded Tekeze-1 (47.52 mm) with no statistically difference with Sirinka-1 (53.25 mm) and Weyno (60.54 mm) in medabay zana woreda.

3.4 Number of Fruits per Plant and Fruit Yield per Plant (gm)

The results indicated that there was significantly difference (P<0.05) showed in the number of fruits per plant and fruit yield per plant (Table 4). The number of fruits per plant is averagely found from 36.67 to 62.83 fruits. The highest number of fruits per plant was recorded Tekeze-1 (62.83) followed by Melkasalsa (55.00), Gelilama (49.83) and Melkashola (48.33) tomato varieties. While, the lowest number of fruits per plant was recorded Sirinka-1 (36.67) followed by Mersa (42.67) and Woyno (42.67) tomato varieties in tselemti woreda. The number of fruits per plant is averagely ranging from 39.84 to 60 fruits of tomato verities. The highest number of fruits per plant was recorded Tekeze-1 (60) followed by Melkasalsa (56.72), Melkashola (55.83) and Gelilama (53.34) tomato varieties. While, the lowest number of fruits per plant was recorded Woyno (39.84) with no significant difference Mersa (40.17) and Sirinka-1 (43.84) tomato varieties in medabay zana woreda (Table 4).

The present study is similar with the study of Mulualem and Tekeste [17] who reported that the average number of fruits per plant is 38.25 to 53.45 tomatos. The number of fruits per plant is affected by the number of flowers & fruits per cluster [8]. In general, the higher the number of fruits per plant the more fruit yield is expected, although fruit size also determines the yield estimation [18].

The fruit yield per plant is averagely occurred from 1800 to 4400.55 gm fruits per plant. The highest fruit yield per plant was recorded Gelilama (4019.79 & 4400.55 gm) with no significant difference Melkasalsa (3911.05 & 3712.89 gm) and followed by Melkashola (3396.63 & 3461.46 gm) and Mersa (3022.32 & 2450.37gm) in tselemti & medabayzana woreda respectively. On the other hand, the lowest fruit yield per plant was recorded from Sirinka-1 (1966.98 gm) & Woyno (2168.92 gm) in tselemti woreda but Tekeze-1 (2129.31 & 1800 gm) lowest fruit yield was obtained in tselemti and medabayzana woreda respectively (Table 4). Chernet and Zibelo [14] and Balcha et al. [19] reported the average fruit yield ranged from 5343 to 8640 gm and 140 to 950 gm fruit yield per plant respectively. Therefore, the higher the fruit yield per plant the more fruit yield is expected [18].

Table 3. Effect of varieties on fruit weight (gm), Fruit diameter and length

S/N	Variety	Tselemti (Maitsebri on-staion)			M/zana (Selekeleka on-staion)		
		FW (gm)	FD (mm)	FL (mm)	FW (gm)	FD (mm)	FL (mm)
1	Gelilama	80.67 a	66.57 a	77.58 ab	82.5 a	65.21 a	79.75 ab
2	Sirinka-1	53.64 c	47.35 bc	46.43 c	65.5 b	54.39 bc	53.25 c
3	Mersa	70.83 b	49.30 bc	87.18 a	61 bc	64.02 ab	97.16 a
4	Woyno	50.83 c	48.20 bc	45.20 c	62.17 bc	64.00 ab	60.54 c
5	Tekeze-1	33.89 d	40.38 c	40.85 c	30.5 d	45.63 c	47.52 cd
6	Melka shola	70.28 b	56.33 ab	72.40 b	62 bc	62.43 b	86.26 ab
7	Melka salsa	71.11 b	59.98 ab	76.70 ab	65.46 b	59.24 bc	80.9 ab
Mean		61.6	52.6	63.8	61.5	59.05	72.35
CV (%)		12.5	10.6	13.7	9.8	10.9	12..5
LSD (0.05)		12.91	18.02	14.68	10.98	11.52	16.08

Table 4. Effect of varieties on number of fruits per plant, fruit yield per plant (gm) and Marketable yield per hectare (t ha^{-1})

S/N	Variety	Tselemti (Maitsebri on-staion)			M/zana (Selekeleka on-staion)		
		NFpP	FYpP (gm)	MYpHa (t ha^{-1})	NFpP	FYpP(gm)	MYpHa (t ha^{-1})
1	Gelilama	49.83 bc	4019.79 a	55.58 a	53.34 b	4400.55 a	49.59 a
2	Sirinka-1	36.67 e	1966.98 c	38.95 d	43.84 c	2871.52 b	37.21 b
3	Mersa	42.67 de	3022.32 b	40.73 cd	40.17 c	2450.37 b	35.25 b
4	Woyno	42.67 def	2168.92 c	38.03 d	39.84 c	2476.85 b	37.65 b
5	Tekeze-1	62.83 a	2129.31 c	33.28 e	60 a	1800 c	31.99 c
6	Melkashola	48.33 bc	3396.63 b	43.12 c	55.83 b	3461.46 ab	44.13 a
7	Melkasalsa	55.00 b	3911.05a	49.42 b	56.72 b	3712.89ab	45.81 a
Mean		48.29	2945. 0	42.73	49.96	3024.81	40.22
CV (%)		10.3	16.3	7.4	7.55	8.7	6.55
LSD (0.05)		8.329	509.4	5.325	7.81	403.25	4.69

3.5 Marketable Fruit Yield (t ha^{-1})

According to Pandey et al. [18] marketable fruit yield is the major determinant variable for selection of a particular tomato variety, as it directly affects commercialization and thus income generation of the farms. In the present study the highest marketable fruit yield was recorded by variety Gelilama (55.58 & 49.59 t ha^{-1}) followed by Melkasalsa (49.42 & 45.81 t ha^{-1}) & Melkashola (43.12 & 44.13 t ha^{-1}) in tselemti and medabayzana woreda respectively. While, the lowest marketable yield was recorded also Tekeze-1 (33.28 & 31.99 t ha^{-1}) in both location (Table 4).

The marketable yields of the above mentioned tomato varieties were relatively good compared to the findings of Masho et al. [10] and Chernet and Zibelo [14] who reported the marketable fruit yield ranging from 29.51 to 58.75 t ha^{-1} and 17.89 to 56.07 t ha^{-1} respectively. The marketable yield averagely found from 14.88 to 47.55 t ha^{-1} also reported by Balcha et al. [19]. However Lemma [4] and Meseret et al. [8] reported the marketable yield of tomatoes in the range of 30 to 73.9, 37.1 to 76.2 and 6.46 to 82.50 t ha^{-1}. The observed varietal differences of marketable yields in the present study might be due to the difference in fruit pericarp thickness [20].

4. SUMMERY AND CONCLUSIONS

Tomato is one of the important and widely grown vegetable crops, both in the rainy and dry seasons for their fruits by smallholder farmers and commercial state and private farms in Tigray Northern Ethiopia. However, tomato production and productivity is limited by several factors such as disease and pests, lack of improved varieties and poor agronomic practice.

Seven improved and released Tomato verities collected from Melkasa, Sirinka & Humera Agricultural Research Centres namely Gelilama, Melkashola, Melkasalsa, Mersa, Sirinka-1; Woyno and Tekeze-1 were evaluated for their performance in the studies area (Table 1). The treatments were laid out in Randomized Complete Block Design (RCBD) with three replications.

The varieties namely Gelilama, Melkashola, Melkasalsa, Mersa, Sirinka-1, Woyno & Tekeze-1 performed differently in growth, yield and yield parameters. Tekeze-1 variety is significantly earlier than the other varieties at about 38.83 & 84.17 days at flowering & maturity respectively in tselemti woreda and 45.00 & 95.17 days at flowering & maturity respectively in medebay zana woreda. The tallest plant was recorded by Mersa Tomato variety (88.44 cm) which is significantly higher than the other varieties in tselemti woreda and Woyno (104.67cm) which were not statistically difference with Mersa (97.53 cm) and Sirinka-I (84.84 cm) Tomato verities in medabay zana woeda. While, the shortest plant was recorded Tekeze-1 (40.25 & 44.72 cm) in tselemti and medebay zana woreda respectively followed by Melkashola (54.53 & 67.67 cm), Melkasalsa (57.39 & 63.14 cm) and Gelilama (63.16 & 67.53 cm) which were not statistically difference among the verities in tselemti and medebay zana woreda respectively.

The highest fruit weight was recorded from Gelilama (80.67 & 82.5 gm) followed by Melkasalsa (71.11& 65.46 gm), Melkashoal (70.28 & 62gm), and Mersa (70.83 & 61 gm) tomato verities. While, the lowest fruit weight was scored from Tekeze-1 (33.89 &30.5 gm) varieties in tselemti & medabay zana woreda respectively. Larger fruit diameter was recorded Gelilama (66.57 & 65.21 mm) tomato verities While, the shortest fruit diameter of tomato variety was recorded by Tekeze-1 (40.38 & 45.63 mm) in tselemti & medabay zana woreda. The tallest fruit length was recorded Mersa (87.18 & 97.16 mm) While, the smallest fruit length of tomato variety was recorded Tekeze-1 (40.85 &47.52 mm) in Tselemti & Medabay zana woreda.

The highest number of fruits per plant was recorded from Tekeze-1 (62.83 & 60) While, the lowest number of fruits per plants were recorded Sirinka-1 (36.67 & 43.84) and Woyno (42.67 & 39.84) tomato varieties in tselemti and medabay zana woreda respectively. The highest fruit yield per plant was recorded Gelilama (4019.79 & 4400.55 gm) with no significant difference Melkasalsa (3911.05 & 3712.89 gm) and followed by Melkashola (3396.63 & 3461.46 gm) and Mersa (3022.32 & 2450.37gm) in tselemti and medabay zana woreda respectively. While, the lowest fruit yield per plant was recorded Sirinka-1 (1966.98 gm) & Woyno (2168.92 gm) in Tselemti woreda but Tekeze-1 (2129.31 & 1800 gm) lowest fruit yield in tselemti & medabay zana woreda respectively.

In the present study the highest marketable fruit yield was recorded by variety Gelilama (55.58 & 49.59 t ha^{-1}) followed by Melkasalsa (49.42 &

45.81 t ha^{-1}) & Melkashola (43.12 & 44.13 t ha^{-1}) in tselemti and medabay zana woreda respectively. While, the lowest marketable yield was recorded also Tekeze-1 (33.28 & 31.99 t ha^{-1}) in both locations. Therefore, Gelilama will be promoted for demonstration, followed by Melkasalsa and Melkashola varities in the study area.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of this manuscript.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Central Statistical Agency CSA. Agricultural sample survey 2008/2007. Report on area and production of crops (Private peasant holdings, main season). Stat. Bull., Addis Ababa, Ethiopia. 2009;01-446.
2. Birhanu K, Ketema T. Fruit yield and quality of drip-irrigated tomato under deficit irrigation. African Journal of Food, Agric, Nutr. Dev.; 2010.
3. Gen stat VSN International Ltd. Biometrics Gen Stat Procedure Library Manual 13th edition. VSN International Ltd. UK.; 2010.
4. Lemma D. Tomato Research experience and production prospects. Ethiopian Agricultural Research Organization, EARO. 2002;Research Report No 43.
5. Mehla CP, Srivastava VK, Jage S, Mangat R, Singh J, Ram M. Response of tomato varieties to N and P fertilization and spacing. Indian Journal of Agricultural Research. 2000;34(3):182-184.
6. Metrological data. Tigray, Mekelle Metrological data of six years average; 2016.
7. Gomez KA, Gomez AA. Statistical Procedures of Agricultural Research, second edition, Johan Wiley and Sons Inc. Toronto. 1984;680.
8. Meseret D, Ali M, Kassahun B. Evaluation of Tomato (*Lycopersicon esculentum* L.) genotypes for yield and yield component. The African Journal of Plant Science and Biotechnology. 2012;45-49.
9. Debela, Belew D, Nego J. Evaluation of Tomato (*Lycopersicon Esculentum* Mill.) varieties for growth and seed quality under Jimma Condition, South Western Ethiopia. International Journal of Crop Science and Technology. 2016;2(2):69-77.
10. Masho Aklile, Melkamu Alemayehu, Getachew Alemayehu. Performance evaluation of tomato varaieties for irrigation production system in Mecha District of west Gojiam Zone, Amhara Region, Ethiopia. College of Agriculture and Environmental Sciences, Bahir Dar University. 2016;145-154.
11. Parvej MR, Khan MAH, Awal MA. Phenological development and production potentials of tomato under polyhouse climate. The Journal of Agricultural Science. 2010;5(1):19-31.
12. Abdelmageed AH, Gruda N, Geyer B. Effect of high temperature and heat shock on tomato (*Lycopersicon esculentum* Mill.) genotypes under controlled conditions. In Conference for International Agricultural Research for Development. 2003;1-7.
13. Ahmad F, Khan O, Sarwar S, Hussain A, Ahmad S. Performance evaluation of tomato cultivars at high altitude. Sarhad Journal of Agriculture. 2007; 23(3):581.
14. Chernet S, Zibelo H. Evaluation of tomato varieties for yield and yield components in western lowland of Tigray, Northern Ethiopia. Int J Agri Res. 2014;9:64-259.
15. Hussain SI, Khokhar KM, Laghari MH, Mahmud MM. Yield potential of some exotic and one local tomato cultivars grown for summer production. Pakistan Journal of Biological Science. 2001;4:1215-1216.
16. Dufera JT. Evaluation of agronomic performance and Lycopene variation in tomato (*Lycopersicon esculantumm* Mill.) genotypes in Mizan, Southwestern Ethiopia. World Applied Sci. J. 2013;27:1450-1454.
17. Mulualem, Tekeste. Evaluation of improved tomato *(Solanum lycopersicum* Mill*.)* varieties in Southern Ethiopia. Herald Journal of Agriculture and Food Science Research. 2014;3(2):055–060.
18. Pandey YR, Pun AB, Upadhyay KP. Participatory varietal evaluation of rainy season tomato under plastic house condition. Nepal Agric. Res. Journal. 2006;7:11-15.

19. Balcha K, Belew D, Nego J. Evaluation of Tomato (*Solanum lycopersicum* Mill.) varieties for seed yield and yield components under Jimma Condition, South Western Ethiopia. J Agron. 2015;14:292-97.

20. Capuno OB, Gonzaga ZC, Loreto MB, Briones ED, Tulin AT, Gerona RG, Rogers GS. Cultivation of tomato (*Lycopersicon esculentum* Mill.) under a rain shelter and in the open field in Cabintan Ormoc City, Leyte, Philippines; 2007.

Peer-review history:
The peer review history for this paper can be accessed here:
https://www.sdiarticle5.com/review-history/123490