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# Evaluation of Performance and Adaptability of Improved Hot Pepper (*Capsicum annuum* L.) Genotype at Fadis Agricultural Research Center

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**Abstract:** Pepper is an important spice used for flavoring, taste enhancer and coloring of food while providing vitamins and minerals. Despite its importance, production of hot pepper stayed due to the fact that poor varieties, poor cultural practices, the prevalence of fungal (blights) and bacterial as well as viral diseases. Hence, performance and adaptability of four improved hot pepper varieties were studied at fedis agricultural research center. Planting material for this study include Four improved hot pepper varieties (m/ fana, m/ awaze, m/ zala, and m/ shote) which are obtained from Fadis Agricultural research center and with one local check variety purchased from local market were evaluated for performance and adaptability during main rainy season of 2021 year. The analysis of variance indicated that there is statistically significant variation between varieties for all vegetative parameter studied except fruit length that shows no significant difference. The study revealed that, among the five varieties Melka fana gave maximum yield (27.33qt/ha) compared to local check followed by Melka awaze (26.67qt/ha) and Melka shote (25.33) respectively. Among the five varieties on the bases of their productivity, adaptability, resistance/tolerance to pests and diseases and farmer's preference Melka shote and Melka awaze were recommended for further production. Since they show relatively good agronomic characteristics and farmer's preference to utilize at green mature stage as compared to local check, Melka zala and Melka fana varieties it is better to recommend for further production.

**Keywords:** Performance, Adaptability, Hot Pepper, Variability

## 1. Introduction

Pepper is the worlds second important vegetable ranking next to tomatoes and is the most produced type of spice used for flavoring, taste enhancer and coloring of food while providing vitamins and minerals [12]. It is native of Mexico, which was brought into India from Brazil by Portuguese prior to 1785 AD. [14]. It is a common and widely distributed spices crop throughout the tropics. Over 100 species have been named under the genus Capsicum, but most workers recognize only two Species. Capsicum annum L. and Capsicum frutescens L. [11]. The genus Capsicum, which is commonly known as red chile, hot red pepper, chilli pepper, tabasco, paprika, cayenne, etc., belongs to the nightshade family Solanaceae [1]. Pepper is a domesticated class of the plant genus Capsicum in the family Solanaceae [8]. The fruit of hot pepper (Capsicum annum L.) is a berry and may be green or yellow and becomes red when ripe. In the past, some woody forms of this species have been called C. frutescent, but the features that were used to distinguish those forms appear in many populations of C. annuum and there is no consistently recognizable C. frutescent species [15]. *Capsicum annuum* can be difficult to separate from the cultivated C. chinense (the hottest pepper) and C. frutescens (tabasco pepper) and their morphological features can overlap. These three species have the same ancestral gene pool and are sometimes very confusing with pepper, chilli, chile, chili, aji, paprika, and capsicum all used interchangeably to describe the plant [6].

It is believed that chili was introduced to Ethiopia during

1520 to 1770 by the Portuguese. Today, Ethiopians consume chili in many different forms. Eating chili is a deeply rooted Ethiopian food habit. Nutritionally, chili is rich in vitamins A and C. A large part of the vitamin intake for Ethiopians comes from chili. The daily consumption of chili pepper is about 15 grams per person. In Ethiopia, chili is grown on approximately 246,000 ha, making it the second largest production area in the world. The crop is mainly cultivated on small patches of farmland. The average national yield is 400 kg ha-1 of dry fruit [3].

Despite its importance, the hot pepper production has stayed low with a national average yield of 7.6 t/ha for green pod and 1.6 t/ha for the dry pod [7, 4] respectively. The decline of hot pepper production is attributed to poor varieties, poor cultural practices, the prevalence of fungal (blights) and bacterial as well as viral diseases [7]. According to [2], the increased commercial interest in chili pepper fruit for fresh consumption or industrial and ornamental purposes has brought together a high demand for new chili pepper varieties combining high yield, food industry profitability, as well as aesthetic attractiveness. Improving productivity of chilli through developing high yielding varieties with desirable qualities could reverse the existing trend of low productivity of this crop. evaluation of improved hot pepper genotype at present site. Therefore, the aim of this study will be evaluation of performance of four improved hot pepper genotypes at Fadis agricultural research center, Eastern Ethiopia.

# 2. Methodology

### *2.1. Study Area*

Hot pepper adaptation trial was conducted at Fadis research station of Fadis agricultural research center. Fadis Agricultural Research Center is located in East Hararghe zone at 38 Kilometre from Haramaya University. It was established inthe year 2008. Fadis research station is situated in Fadis district and located at altitude of 1650 masl. Fadis district receive an annual rainfall of 820mm and minimum and maximum temperature of the area is 15°C and 30°C respectively [10].

### *2.2. Planting Material and Experimental Design*

Planting material for this study include Four improved hot pepper varieties (m/ fana, m/ awaze, m/zala, and m/ shote) which are obtained from Fadis Agricultural research center and with one local check variety purchased from local market were evaluated for performance and adaptability during main rainy season of 2021 year.

Experimental design that was used is randomized complete block design (RCBD) with four replications. Transplanting to the actual field was done when the seedlings attained 20 to 25 cm height and or at 40 days after sowing. Each seedling genotype was planted on plot size of 1.5 m x 2.8 m (with a total plot size of 4.20 $m^2$) and the distance between plots and between replication will be 1m and 1.5 respectively. Each plot within a replication consists four rows and each row contains five plants with a total of 20 plants per plot. The Seedlings will be spaced 50 cm between plants and 70 cm between rows. The experimental plots was fertilized with 200 kg/ha DAP as a side dressing during the transplanting operation in addition, 100 kg/ha UREA, half of it during the transplanting and half of it 15 days after transplanting was applied [5].

### *2.3. Data Collection and Analysis*

Ten plants were randomly sampled from middle two rows the following data were taken: FL=fruit length, DM days to maturity, NMB= number of main branch, CW= canopy width, SCH= stand count at harvest, DGM= days to green maturity, PH= plant height, FW= fresh weight, NPPP=number of pod per plant, YPP=yield per plot, YPH = yield per hectare, DPB= disease and pest (pod borer).

The collected data were subjected to analysis using SAS Software version 9.1 [13] and Least Significant Difference (LSD) was used to separate significantly different treatment means.

# 3. Result

ANOVA: Statistically significant variation was observed between varieties for all vegetative parameter except fruit length that shows no significant difference. The parameters were evaluated such as, plant height, average number of main branch per plant, canopy width, average number of pods per plant and stand count at harvest.

Fruit length: Statistically significant variation was not observed between varieties for fruit length. The highest fruit length was observed for Melka zala variety (11) and the least was observed for Melka shote (8.67).

Number of main branch: The analysis of variance revealed that the means of number of main branch between variety was statistically significant at ($p<0.05$). The highest number of main branch was recorded for melka zala (7) and that of melka shote was least (4).

Canopy width: There were highly significant differences ($P<0.01$) was observed among varieties in canopy width between variety. The largest and the smallest canopy width was recorded for melka zala (61) and local check (27.33) respectively.

Stand count at harvest: There were significant variation in stand count at harvest between varieties. The largest and the smallest canopy width was recorded for melka fana (27) and local check (10) respectively. This study is almost similar with [9].

Plant height: Statistically there were significant variation exists between varieties in plant height.

***Table 1.*** *Mean of all parameter of hot pepper varieties.*

| VAR. | FL | NMB | CW | SCH | PH | FW (kg) | NPPP | YPP (kg) | YpH (qnt) | DIPB (0-5) |
|---|---|---|---|---|---|---|---|---|---|---|
| m/zala | 11 | 7 | 61 | 24 | 69.33 | 21.87 | 40 | 1.13 | 22.67 | 1 |
| m/awaze | 9.33 | 6 | 58 | 25 | 63.33 | 20 | 60 | 1.33 | 26.67 | 0 |
| m/shote | 9.67 | 4 | 53.33 | 11 | 56.33 | 18.67 | 59 | 1.27 | 25.33 | 0 |
| m/fana | 8.67 | 6 | 50 | 27 | 67.33 | 28.8 | 65 | 1.37 | 27.33 | 2 |
| l/check | 9.33 | 6 | 27.33 | 10 | 52.33 | 10.27 | 38 | 0.9 | 18.00 | 2 |
| SE (N= 3) | 0.25 | 0.69 | 8.98 | 6.39 | 5.70 | 5.94 | 10.46 | 0.25 | 5.09 | |
| LSD5% | 0.81 | 2.25 | 29.29 | 20.85 | 18.59 | 19.37 | 34.11 | 0.83 | 16.60 | |
| PValue (5%) | 0.002 | 0.24 | 0.16 | 0.16 | 0.26 | 0.36 | 0.31 | 0.70 | 0.70 | |

Keys: FL=fruit length, DM days to maturity, NMB= number of main branch, CW= canopy width, SCH= stand count at harvest, DGM= days to green maturity, PH= plant height, FW= fresh weight, NPPP=number of pod per plant, YPP=yield per plot, YPH = yield per hectare, DPB= disease and pest (pod borer).

Accordingly, The largest and the smallest canopy width was recorded for melka zala (69.33) and local check (52.33) respectively.

Fresh weight: Statistically there were significant variation exists between varieties in plant height. Accordingly, The largest and the smallest canopy width was recorded for melka zala (21.87) and local check (10.27) respectively.

Number of pod per plant: There were significant variation in stand count at harvest between varieties. The largest and the smallest canopy width was recorded for melka fana (65) and local check (38) respectively.

Yield per plot: Statistically there were significant variation exists between varieties in plant height. Accordingly, The largest and the smallest canopy width was recorded for melka fana (1.37) and local check (0.9) respectively.

Yield per hectare: There were significant variation in stand count at harvest between varieties. The largest and the smallest canopy width was recorded for melka fana (27.33) and local check (18) respectively.

Disease and pest (pod borer): The major recorded diseases of hot pepper at the studied areas were pod.

# 4. Conclusion

Pepper is the worlds second important vegetable ranking next to tomatoes and is the most produced type of spice used for flavoring, taste enhancer and coloring of food while providing vitamins and minerals (Rehima, 2006). Nutritionally, chili is rich in vitamins A and C. A large part of the vitamin intake for Ethiopians comes from chili. The daily consumption of chili pepper is about 15 grams per person. Despite its importance,

The hot pepper production has stayed low and the main reason for such decline in production are poor varieties, poor cultural practices, the prevalence of fungal (blights) and bacterial as well as viral diseases.

Hence, performance and adaptability of four improved hot pepper varieties were studied at fedis agricultural research center. The study revealed that, among the five varieties Melka fana gave maximum yield (27.33qt/ha) compared to local check followed by Melka awaze (26.67qt/ha) and Melka shote (25.33) respectively. According to farmers feedback Melka shote is preferable for its market demand, productivity and for its attractive light brown red color and high pungency. Melka fana and Melka zala show that sweet taste with little pungency characters as compared to the others. So it needs further quality analysis at Fadis agro ecology though it has to be for all varieties. According to the observation on experimental field 25% of Melka fana variety was infested by pod borer and Melka zala rarely infested by pod borer and termite. Among the five varieties on the bases of their productivity, adaptability, resistance/tolerance to pests and diseases and farmer's preference Melka shote and Melka awaze were recommended for further production. Since they show relatively good agronomic characteristics and farmer's preference to utilize at green mature stage as compared to local check, Melka zala and Melka fana varieties it is better to recommend for further production.

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