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Performance evaluation of tomato varieties under mid-altitude of Mokokchung district of Nagaland

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ABSTRACT

Owing to the limited availability of improved varieties the yield of tomato in mid-hill altitude is very low. Hence identification of improved tomato varieties that are adaptable and high yielding is necessary. Therefore an experiment was conducted at Krishi Vigyan Kendra, Mokokchung, Nagaland to evaluate 5 tomato varieties for their growth and fruit yield using randomized block design with 3 replications under field conditions. Data were collected on growth parameters and yield components including plant height, number of branches, fruit length, fruit girth, fruit weight and total fruit yield per hectare. The study indicated that yield per hectare was highest in Megha-1 followed by Sel-1, Punjab Chuara and Sel-2. The lowest yield was obtained in Pusa Ruby. Considering yield and yield components variety Megha-1was found to be the best among all the varieties while the variety Pusa Ruby was the poorest performer for all the parameters. This investigation led to infer that Megha-1 was the best-performing variety with high tolerance to fruit borer infestation and therefore it could be recommended for commercial production.

Keywords: Tomato; evaluation; varieties; growth; yield

INTRODUCTION

Tomato (*Lycopersicon esculentum*) is one of the most important and highly profitable vegetable crops. It occupies an important position among the vegetables. It can be eaten either fresh or processed into different products. It is helpful in healing wounds because of antibiotic properties found in ripe fruits. It is good source of vitamins A, B and C (Baloch 1994). The climatic conditions of Mokokchung are highly conducive and congenial for the production of tomatoes. But this climatic suitability is not being exploited to the full extent due to many reasons among which is the unavailability of improved and high yielding cultivars coupled with less awareness of crop management. Due to low production of tomato crop most of the demand is met by transporting the produce from outside. The district is also prone to landslides and frequently remains cut off from rest of the

world. Hence it is imperative to get self sufficiency in tomato availability. This study was therefore conducted to identify/select the high yielding tomato varieties suitable for the climatic conditions of Mokokchung.

MATERIAL and METHODS

The experiment was conducted at Krishi Vigyan Kendra, Mokokchung, Nagaland during the Rabi season of 2013-14. Soil analysis was done before the planting for various traits. In the analysis pH, EC, OC and K were found to be 5.28, 0.1, 0.93 per cent and 40.32 kg/ha respectively. The experiment was arranged in randomized block design with 3 replications. Performance of Punjab Chuara, Pusa Ruby, Sel-1, Sel-2 and Megha-1was evaluated. Fertilizers @ 80 kg N, 75 kg P and 30 kg K/ha along with 15 metric ton FYM/ha were applied. Half of the nitrogen and full doses of Pand K were given at planting time and remaining half dose of nitrogen was top dressed in two equal splits at 30 and 50 days after transplanting. Neem oil @ 3ml/l of water was applied at fortnightly interval throughout the crop period to check pest incidence. The crop was maintained at 60 cm x 40 cm spacing. All the varieties were first raised in nursery beds and after 25 days the seedlings were transplanted in the experimental plots. Five plants were selected at random from each plot to record the observations on plant height, number of branches, fruit length, fruit girth, fruit weight and yield/plot at harvest. Plant height and number of branches/plant were recorded at different intervals viz 30, 60 and 90 days after transplanting. Observations on fruit borer infestation were also recorded. The mean data for all observations were pooled and statistically analyzed following standard procedure.

RESULTS and DISCUSSION

Plant height and number of branches

It is evident from Table 1 that plant height and number of branches per plant did not exhibit any significant differences among the different varieties at 30, 60 or 90 days after transplanting. The plant height varied from 15.17 to 16.94, 25.28 to 31.55 and 34.81 to 44.86 cm at 30, 60 and 90 DAS respectively. Similarly the number of branches varied from 5.39 to 6.75, 6.99 to 8.55 and 7.06 to 8.83 at 30, 60 and 90 DAS respectively. The work is not in agreement with the findings of earlier workers such as the findings of Haque et al (1988) who reported that line TMO 369 produced the tallest plant (116.60 cm) and line TMO 260 gave the shortest plants of 47.63 cm height during evaluation of tomato lines. Kallo et al (1998) and Manoj and Raghav (1998) also reported differences in plant height among varieties/hybrids of tomato put under evaluation and screening trials. Sharma and Rastogi (1993) have reported significant variation among the cultivars of

tomato for the number of branches per plant.

Results on the mean performance of varieties in respect of yield and yield attributes are presented in Table 2. The fruit length varied from 3.33 to 4.6 cm and the fruit girth from 8.85 to 14.67 cm. But there were no significant differences among the varieties for these two attributes. However significant differences were observed wrt fruit weight, yield and fruit borer infestation. Maximum fruit weight was observed in case of Megha-1 (52.5 g) and minimum in Pusa Ruby (21.42 g) which was at par with Sel-2 (24.16 g). Maximum yield was also recorded in case of Megha-1 (355.66 q/ha) and minimum in Pusa Ruby (220.66 q/ha). These findings are in conformity with the results of Kallo et al (1998). The considerable diversity in fruit characteristics of tomato varieties was also reported by Ahmad et al (2007). Similar marked differences in fruit yield of tomato varieties were reported by Mishra and Lal (1998), Rida et al (2002), Sandhu et al (1999) and Muthuvel et al (2000).

Table 1. Comparative performance in growth of tomato varieties

Variety	Plant height (cm)			# Branches/plant		
	30 DAT	60 DAT	90 DAT	30 DAT	60 DAT	90 DAT
Punjab Chuara	16.94	31.55	44.86	5.99	8.05	8.15
Pusa Ruby	16.55	26.57	36.46	5.93	7.76	8.30
Sel-1	15.17	25.28	34.81	6.75	8.55	8.83
Sel-2	15.44	25.83	35.33	5.88	7.89	8.17
Megha-1	16.69	28.0	37.30	5.39	6.99	7.06
$CD_{0.05}$	NS	NS	NS	NS	NS	NS

Table 2. Comparative performance in yield and yield attributes of tomato varieties

Variety	Fruit length (cm)	Fruit girth (cm)	Fruit weight (g)	Yield (q/ha)	Fruit borer infestation (%)
Punjab Chuara	4.6	12.75	32.66	262.33	34.11
Pusa Ruby	3.5	8.85	21.42	220.66	32.44
Sel-1	3.33	13.33	36.92	268.99	19.32
Sel-2	4.45	11.33	24.16	244.66	26.55
Megha-1	4.42	14.67	52.5	355.66	14.33
$CD_{0.05}$	NS	NS	4.02	5.01	10.1

Fruit borer infestation

Tomato fruit borer has been found to cause a yield loss of up to 35 per cent in tomato and up to 37.79 per cent in Karnataka (Dhandapani et al 2003). A number of plant characteristics are known to render the cultivars less suitable or unsuitable for the feeding, oviposition and development of insect pests (Rafiq et al 2008). It may be due to plant trichomes (Johnson 1956), phenol contents (Banerjee and Kalloo 1989) and quality of host plant (Bazzaz et al 1987). In contrast some characteristics like nutrients (Goncalves-Alvin et al 2004) improve the quality of host plant which resultantly favors the insects. Screening of tomato varieties for resistance/ susceptibility against tomato fruit borer was therefore included in the study to identify the borer resistant variety. From Table 2 it can be observed that there was a significant difference in borer infestation. Significant differences were recorded wrt fruit borer infestation among the test varieties. Maximum infestation was recorded in Punjab Chuara (34.11%) that was at par with Pusa Ruby (32.44%) and Sel-2 (26.55%). On the other hand minimum infestation was recorded in Megha-1 (14.33%) and Sel-1 (19.32%) the two being at par with each other. Chaudhuri et al (2002) also evaluated tomato variety Pusa Ruby and 6 hybrids for yield and resistance to insects and pests and revealed that considering overall performance with regard to relative tolerance to insect pest and yield Arjuna (84.34 t/ha) was recommended.

CONCLUSION

On the basis of these findings it can be concluded that Megha-1 was the best performing variety and hence it can be suggested for commercial cultivation under mid-hill conditions in the region. Sel-1 with moderately high yield and having equal tolerance against fruit borer might be regarded as other potential variety.

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