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EVALUATION OF DIFFERENT TOMATO (*SOLANUM LYCOPERSICUM* L.) VARIETIES FOR BEST PERFORMANCE IN WEST KAMENG DISTRICT ARUNACHAL PRADESH INDIA

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ABSTRACT

This study evaluated the performance of different tomato entries and varieties for their productivity, resistance to pests and diseases and postharvest fruit quality in West Kameng and the experimental conducted at the KVK Farm from 2022-23. Among the Four varieties of tomato in the rainy season and winter season were evaluated. Varieties that were well adapted, better yielded, disease resistant and with good fruit quality were identified. Major plant diseases observed included tomato yellow leaf curve disease (TYLCD), bacterial wilt, bacterial leaf spot, Late blight. However, late blight was the major problem during the season. The Rockey variety of Tomato was the most affected from blight in both the seasons, although its total yield was affected. Arka Abhed was one of the most susceptible varieties to blight bacterial wilt and Leaf curl Disease. Tomato Arka Abhed provided the highest fruit yield (34 t/ha), while Rockey provided the lowest (28 t/ha) in the both seasons. Production season clearly influenced yield, disease occurrence and severity in Rockey variety, as well as postharvest fruit qualities.

The study identified better disease-resistant and yielding tomato entries suitable for both growing seasons, which can be considered and scaled up for production so that farmers in West Kameng can produce tomato all year-round Tomato is an important vegetable crop and plays a major role in the food and nutrition security of the people of West Kameng. Production has increased in the recent decades but improvement in the fruit yield and quality remains suboptimal. Limited access to the best-adapted tomato varieties to the local conditions, pests and diseases are the major limiting factors for improving productivity.

Keywords: Tomato cultivars, yield, adaptation; growing season; fruit quality

Introduction

Tomato is a predominantly kharif & Rabi crop of West Kameng district of Arunachal Pradesh. the available agricultural technology does not serve its purpose till it reaches and adopted by its ultimate users, the farmers. Technology transfer refers to the spread of new ideas from originating sources to ultimate users (*Prasad et al.* 1987). This rapid growth under area of Tomato in Arunachal Pradesh, particularly in West Kameng district was developed, up-grade and dissemination of the technology under real farming conditions. The tomato crop was a cash crop from this area of farming community of the district. With an object to combat the causes of yield increase and high economic returns, dissemination of recommended technology through front line demonstration was successfully attempted.

This crop area and production is very good in district. However, the Considerable scope of enhancement to higher production exists, especially in

West Kameng region, which is earmarked as important Agro Export Zone for Tomato in the country. It is feasible through regular surveys, farmers meetings and field diagnostics visit followed by persuasion for provision of balanced and adequate nutrition and timely management of water in Tomato and balanced use of Organic manure, by conducting Font Line Demonstration of proven technologies, yield potential and net income from Tomato cultivation can be enhanced to a great extent with increase in the income level of the farming community. The west Kameng District of the state Arunachal Pradesh located at 91^0 30'' to 92^0 40" E longitude and 26^0 54" to 28^0 01" N latitudes with its unique and diverse topography and climate condition harbors different varieties of temperate fruits. It is estimated that approximately 4700 Sq. Km. is alpine while approximately 33,500 Sq.Km. is in temperate Zone in North East covering areas of Tawang, Sela pass, Dirang, Bomdila, in West Kameng District of Arunachal Pradesh. The average annual rainfall 143.3 mm, maximum temperature in Summer 16.87 deg C, minimum temperature in winter -0.5 deg C and highest Peak in the district is Kangte with an altitude of 7090 meters above mean sea level, where exotic fruits disporas has added new dimensions in scientific Horticulture production in Apple and Kiwi which has started from tiny Tainzing Gaon, Tibetan settlement of West Kameng District in Arunachal Pradesh.

Tomato is grown worldwide for its edible fruits, with antioxidants benefits, it has been reported that consumption of raw tomato and tomato-based products is associated with reduce risk of cancer and cardiovascular disease (Giovannucci *et al*., 2002). The organic production system aims at supporting and sustaining healthy eating habits, ecosystems, soil, farmers, community, and the economy. There are rising numbers of customers who are in search of healthier, increasing the demand for organic produce. A large proportion of commercially grown tomato have been developed and adapted to conventional agriculture systems, which employ synthetic chemicals in its culture (Brady 2011; Santos *et al*., 2013). Performance of cultivars developed for conventional cropping systems differ in organic production system (Ahmad *et al*., 2007, Murphy *et al*., 2007). The objective of this study was to evaluate the yield performance and other agronomic characteristics of Tomato cultivars grown in organic management systems.

Material and Method

The Tomato research variety were selected from Indian Institute of Horticulture Research Bangluru and for control variety selected from Private company. The Seedlings of these entries and varieties were raised in the nursery at the KVK office campus West Kameng Dirang Arunachal Pradesh. The tomato grown in both (Kharif and Rabi) season in year 2023-24. The field was plowed by a tractor, levelled and plot layout was prepared. Locally prepared compost from cow dung and Sheep manure into the plots five days prior to transplanting. Seedlings in rainy season and dry season trials were transplanted at the 4–5 leaf stages. Each entry/variety was planted in two rows with a spacing of 60x45 cm between and within rows to rows and Plant to Plant. Plants were watered as time of needed and no synthetic or organic pesticides were applied to control diseases, insects and weeds.

The Demonstration on Tomato, Three variety Arka Rakshak, Arka Samrat, Arka Abhed and Rockey hybrid variety were conducted for control by our Krishi Vigyan Kendra, West Kameng campus and 10 nos, trail were conducted through on Farm Trial and Front Line Demonstration under real farming situations between year 2022 to 2023 at Three different villages, namely Sangti, Dirang basti, and Yewang, The area under each demonstration was 0.5 ha. Through survey, farmers meeting and field diagnostic visit during the cropping period, yield of tomato was conceived due to imbalanced use of Pesticides and indiscriminate practice to manage the blight on tomato. To manage assessed problem, improved and recommended technologies were followed as intervention during the course of front-line demonstrations programme. Well before the conduct of demonstrations, training to the farmers of respective villages was imparted with respect to envisaged technological interventions.

Results and Discussion

The sowing of all the Four varieties was performed in the First week of April and Third week of September. The average soil moisture content at sowing time and good germination of the crop. The data in table 1 show the FLD and it was noticed that Tomato variety Arka Abhed, Arka Rakshak Arka Samarat and Control variety Rockey guidance of KVK scientist. The seeds were taken from IIHR Bangluru and some private company, and provided farmers under Front Line demonstration by KVK, seeds were timely sown and weeds control by mechanical and Mulching method was also by Oak tree leaf.

Table 1 : Yield attributes obtained under demonstration in Tomato Year (2022-23) (Two Session data)

Hybrid/ variety	Plant height (cm)	Fruits/ Plant (kg)	Days taken to harvest	Fruit diameter (cm)	Fruit weight (gm)
Arka Abhed	81.50	3.1	140.10	7.5	122.98
Arka Rakshak	94.20	2.6	145.15	6.0	73.3
Arka Samarat	84.32	2.0	144.10	5.9	68.0
Rockey	84.35	1.5	148.15	5.5	42.0
S.E.(d)±	2.80	0.08	1.67	0.08	3.82
C.D. (5% LOS)	6.85	0.20	4.09	0.20	9.35
C.V.	3.98	4.35	1.42	1.61	6.11

Yield data was collected from demonstration plots Plant height, Fruits/plant, Days taken to harvest Fruit diameter, Fruit weight and Yield etc were computed and analyzed. The data (Table 1) reveled that Plant height was significantly higher in Arka Rakshak (94.20 cm) compared to Arka Samarat (84.32 cm), Arka Abhed (81.50 cm), and control variety Rockey (84.35). Arka Abhed variety recorded significantly highest fruits per plant 3.1 kg followed by Arka Rakshak 2.6 kg, followed by Arka Samarat 2.0 kg and Control variety Rockey was recorded 1.5 kg, Analysis of data showed significant difference among the varieties for number of days taken to harvest (Table 1). The control variety rockey maximum days taken in harvest 148.15 days and lowest days taken in harvest variety Arka Abhed 140.10 days. The tomato fruit size varied significantly among different varieties (Table 1). Arka Abhed had greater fruit size 7.5 cm followed by Arka Rakshak, 6.0 cm Arka Samarat 5.9 cm and minimum fruit size control variety rockey 5.5 cm. The Maximum fruit weight was recorded in Arka Abed 122.98 gm followed by Arka Rakshak 73.3 gm, Arka Samarat 68 gm and Minimum weight recorded in variety rockey 42 gm. The data demonstrated that Arka Abhed produced maximum tomato fruits 34t/ha and minimum fruit yield was recorded in Rockey 28t/ha and the next highest fruit yield was recorded observed in Arka Samarat 32t/ha followed by Arka Samarat 31 t/ha.

Table 2 : Economic of Tomato cultivation under FLD in Year (2022-23)

Hybrid/ variety	Yield (t/ha)	Gross returns	Cost of cultivation	Net return	B.C
Arka Abhed	34	4,080,000	60,000	4,020,000	6.8
Arka Rakshak	32	3,20,0,000	60,000	2,60,000	5.3
Arka Samarat	31	3,10,000	60,000	2,50,000	5.1
Rockey	28	2,80,000	55,000	2,25,000	5.0
S.E.(d)±	1.41				
C.D. (5% LOS)	3.46				
C.V.	5.54				

The Economic indicators i.e. gross expenditure, gross returns, net returns and BC ratio of front line demonstrations are presented in Table 2.

The economics of Tomato calculated in three variety, I have found gross cost of is same in three variety Rs. 60,000/- , and control variety Gross cost Rs. 55,000/- and Highest Gross return Rs.4,080,000/- in Arka Abhed variety, followed by Arka Rakshak Rs. 3,20,000, Arka Samarat Rs. 3,10,000/- and control variety Rockey gross returns Rs. 2,80,000/-

The Net return calculated I have found significantly more return in Arka Abhed variety Rs. 4,20,000/-, compared to Arka Rakshak variety Rs. 2,60,000/- found. The Arka Samarat variety net return found 2,50,000/- and control variety Rockey net return found Rs 2,25,000/- and Benefit cost ratio found 6.8 in Arka Abhed followed by Arka Rakshak 5.3, Arka Samarat 5.3 and control variety Rockey Benefit cost ratio found 5.0.

The data clearly revealed that, the net returns from the recommended practice were substantially higher than others variety of Tomat, i during all the years of demonstration. Economic analysis of the yield performance revealed that cost benefit ratio of demonstration plots was observed significantly higher than others variety of Tomato plots. The variation in cost benefit ratio during different years may mainly be on account of yield performance and input output cost in that particular year.

Conclusion

It is concluded that different tomato cultivars behaved significantly different from each other concerning various parameters. Among tested cultivars, Arka Abhed resulted in the highest production. Varieties were found superior in terms of fruit quality to other varieties. The results concluded that organic regime gave the best also organic tomato management is encouraged due to various advantages such as food safety, free from any chemical fertilizers and environment friendly.

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