



## Growth and Yield Attributes of Tomato during Off-Season

Vanlalliani\* and C Lalfakawma

Krishi Vigyan Kendra, Lawngtlai District, Lawngtlai - 796891, Mizoram, India

### ABSTRACT

Tomato is one of the world's most used and popular vegetable crops. It is one of the vegetables with its highest production in Mizoram and growers used as a source of income due to its cash value nature. Tomato variety Arka abhed is a high yielding  $F_1$  hybrid with multiple disease resistance to tomato leaf curl disease, bacterial wilt, early blight and late blight. It is suitable for summer, *kharif* and *rabi* cultivation. Unlike other part of the country, Mizoram receives a high rainfall during monsoon which leads to higher incidence of foliar and fruit rot diseases in tomato. As such, these diseases incidence resulted in low crop productivity and affects the farmers' income during off-season. Therefore, KVK Lawngtlai District is taking up cultivation of multiple disease resistant tomato variety Arka abhed during off-season (May - September) to help the farmers increase tomato production with higher rates. A field experiment was conducted at different locations during 2020-23 as off season crops with an objective to determine the growth and yield attributes of tomato during off season. The present result indicates that indeterminate tomato type can produce high fruit yield during off season.

**Key Words:** Yield Attributes, Off Season, Summer Tomato.

### INTRODUCTION

The tomato (*Lycopersicon esculentum* Mill.), a member of the family Solanaceae and belonging to the relatively small genus *Lycopersicon* is one of the most important vegetable crops grown throughout the world. The leading tomato growing countries in the world are the China, India and Turkey. In India, tomato has become the leader of all the vegetable crops in terms of commercialization of fresh production, utilization in processing and hybrid seed production. Tomato production is increasing every year. According to the F.A.O (2023) report tomato is produced worldwide on an approx. 5.05 million hectares land with fruit production of 186.82 million metric tonnes per year.

Production of tomato can provide higher incomes, and reduce malnutrition (Ferdous *et al*, 2016; Weinberger, 2013). It can be grown on a small scale in the kitchen garden, where a few plants yielding fruits for the whole family and a commercial scale as a cash crop by the vegetable growers (Gentilcore, 2010). Growing vegetables during the off-season has a lot of prospects for export in foreign countries as well as a good earn

by the farmers. Among different off-season vegetables, tomato has prime importance as its demand persists throughout the year. It is also the most important horticultural crop worldwide (FAO, 2006; Brown *et al*, 2005).

In Mizoram, the demand for tomato is constantly high throughout the year and cultivated in an area of 2.8 ha with a total production of 27.10 tonnes (Anonymous, 2023). However, the production is limited during off-season months, particularly in extreme dry (February-March planting) months or wet (June-July planting) months in Mizoram. Tomato production is high during the cooler months (October to February), which is the regular growing season. Keeping in view the impact of cultivation of off-season summer tomato on the economic returns, a field demonstration was conducted in Lawngtlai District.

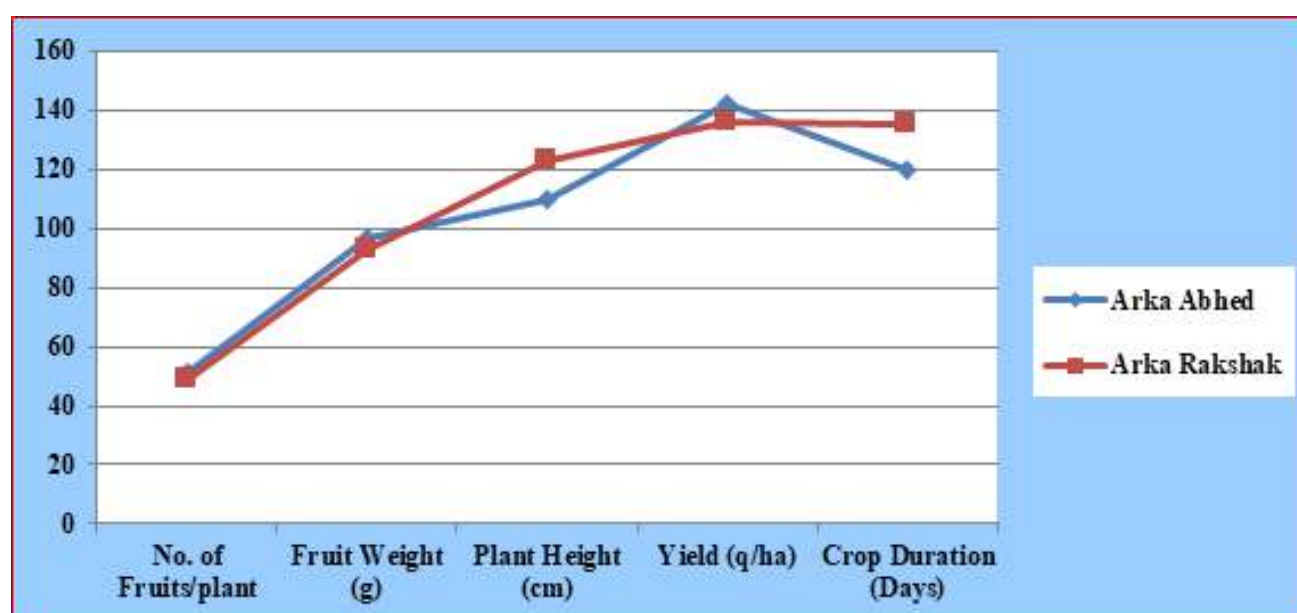
### MATERIALS AND METHODS

The present experiment was carried out by Krishi Vigyan Kendra, Lawngtlai District during *Kharif* season at three farmers' fields in three locations namely, Chawnhu, Lawngtlai and Bualpui NG. The treatments comprised of  $T_1$  technology demonstrated (Arka abhed) and  $T_2$  farmers' practice (Arka rakshak). The total

## Growth and Yield Attributes of Tomato during Off-Season

**Table. Growth and Yield Performance of Arka abhed and Arka rakshak during Off-Season.**

Parameter	T <sub>1</sub> Technology demonstrated (Arka a bhed)	T <sub>2</sub> Farmers' Practice (Arka r akshak)	SE (m)	CD <sub>0.05</sub>	CV
No. of Fruits/plant	58	46	1.225	8.024	4.079
Fruit Weight (g)	98.1	92.4	0.636	4.169	1.157
Plant Height (cm)	110	123	1.633	10.698	2.428
Yield (q/ha)	144	134	1.080	7.076	1.346
Crop Duration (Days)	120	138	2.550	16.702	3.423
Net return (Rs.)	6,33,198	2,88,358	-	-	-
BC Ratio	6.8:1	3.6:1	-	-	-



**Fig.: Growth & Yield Performance of Arka abhed & Arka rakshak during Off-Season**

experimental area was 0.1 ha having sandy loam soil. The tomato seeds were purchased from IIHR, Bangalore, India through online seed portal. Other inputs such as fertilizers and plant protection chemicals for nursery soil and planting materials treatment were purchased from local store *i.e.*, Tuallawt Enterprise, Lawngtlai, Mizoram.

Tomato nursery was raised at experimental field itself during May. The nursery bed was treated with Chlorpyrifos and Carbendazim as a prophylactic measures before sowing. The tomato seedlings were ready for transplanting after 21 days from sowing. Pits were prepared in the field at a spacing of 45 cm between plants and 60 cm between rows. Before transplanting the pits were thoroughly prepared by filling with well decomposed farmyard manure and insecticide and

fungicide were sprayed. Transplanting was done during June. All the agronomic and plant protection measures were followed as per the package of practices. All the observations were recorded from 20 randomly selected plants. Economic analysis such as cost of cultivation (Rs/ha) was calculated considering the prevailing charges of agricultural operations and market price of inputs involved. Gross returns were obtained by converting the harvest into monetary terms at the prevailing market rate during the course of studies. Gross return (Rs/ha) = (fruit yield x price), Net returns were obtained by deducting cost of cultivation from gross return. The benefit: cost ratio was calculated by dividing Gross returns (Rs/ha) and cost of cultivation (Rs/ha).

## RESULTS AND DISCUSSION

The number of fruits per plant recorded in Arka abhed was 58 whereas 46 in Arka rakshak. The fruit weight was found to be 98.1 g and 92.4 g in Arka abhed and Arka rakshak, respectively. Arka abhed and Arka rakshak recorded plant height of 110 cm and 123 cm, respectively. Different responses to plant height might be due to genetic characteristic of genotypes and adaptability to a particular environment (Khan *et al*, 2013). The fruit yield of Arka abhed (144 q/ha) was comparatively higher than Arka rakshak (134 q/ha). The potential yield of the genotypes during rainy season often depends on their tolerance or resistance to particular diseases and pests. More yields in different genotypes may be due to optimum plant survival, which ultimately contributed significantly towards final yield (Khan *et al*, 2013). The performance of a cultivar mainly depends on interaction of genetic makeup and environment. The crop duration of 120 and 138 days were observed in Arka abhed and Arka rakshak, respectively.

It is necessary to know the economics of the experiment as no technology can be suggested while not knowing its profit and loss (Sadique Rahman *et al*, 2020). It can be seen that higher net return was obtained in Arka abhed as compared to farmers' practice or Arka rakshak. The data revealed that Arka abhed tomato recorded higher net monetary returns (Rs 6,33,198/-) than Arka rakshak (Rs 2,88,358/-). The higher benefit cost ratio was obtained with treatment Arka abhed (6.8) as compared to Arka rakshak (3.6). Due to higher income off-season tomato growers were able to spend more on consumption. Ali *et al* (2017) indicated that off-season tomato cultivation is profitable. Karim *et al* (2009) also indicated that off-season tomato growers were able to increase their socioeconomic status due to higher income.

## CONCLUSION

It could be concluded that appropriate management of tomato from nursery stage till harvest with variety selection could be practiced to increase the yield and quality of tomato plant during off season. Thus, Tomato (Arka abhed variety) growers around the study area can be benefited if they cultivate during off season (May-

September). It may be concluded that among the two varieties studied, Arka abhed was found to obtain superior quality attributes with higher net return and benefit cost ratio than Arka rakshak, thereby making it suitable for cultivation during off-season. Efforts are needed to disseminate the off-season tomato cultivation technique to different parts of the country. Cost of production is higher for off-season tomato cultivation compared to winter season tomato cultivation.

## REFERENCES

- Ali Q, Ashfaq M and Khan M T I (2017). An economic analysis of off-season tomato production in Punjab. *The J Anim Pl Sci* 27(1): 294-301
- Anonymous (2023). Department of Agriculture and Farmers Welfare. CEIC Data.
- Brown P, Lumpkin T, Barber S, Hardie E, Kraft K, Luedeling E, Rosenstock T, Tabaj K, Clay D, Luther G, Marcotte P, Paul R, Weller S, Youssefi F and Demment M (2005). Global Horticulture Assessment. ISHS. Gent-Oostakker, Belgium.
- FAO (2006). Agricultural data FAOSTAT. Food and Agriculture Organization of the United Nations. Rome, Italy from "Gautam I P, Khatri B and Paudel G P (2006). Evaluation of Different Varieties of Onion and Their Transplanting Times for Off-Season Production in Mid Hills of Nepal. *Nepal Agric Res J* 7:21-26" "Evaluation of Different Varieties of Onion and Their Transplanting Times for Off-Season Production in Mid Hills of Nepal" as "Evaluation of different varieties of onion and their transplanting times for off-season production in Mid Hills of Nepal."
- FAO (2023). World Food and Agriculture - Statistical Yearbook 2023. Rome. <https://doi.org/10.4060/cc8166en>
- Ferdous J, Datta A, Anal A K, Anwar M and M R Khan A S M (2016). Development of home garden model for year-round production and consumption for improving resource-poor household for food security in Bangladesh. *NJAS-Wagen J Life Sc* 78:103-110. doi: 10.1016/j.njas.2016.05.006.

## Growth and Yield Attributes of Tomato during Off-Season

- Gentilcore D (2010). *A History of the Tomato in Italy*. Columbia University Press. pp 25-31
- Karim M R, Rahman M S and Alam M S (2009). Profitability of summer BARI hybrid tomato cultivation in Jessore district of Bangladesh. *J Agri and Rural Dev* 7(1 & 2):73-79. DOI: 10.3329/jard.v7i1.4424
- Khan T N, Ramzan A, Jillani G and Mehmood T (2013). Morphological performance of peas (*Pisum sativum*) genotypes under rainfed conditions of Potowar region. *J Agric Res* 51(1): 51-59
- Sadique Rahman Md, Manjira S, Majumder M K and Rahman S (2020). Socio-economic determinants of off-season summer tomato cultivation. *Int J Veg Sci* 27(3), 252 – 259. DOI: 10.1080/19315260.2020.1771503
- Weinberger K (2013). Home and community gardens in southeast Asia: Potential and opportunities for contributing to nutrition-sensitive food systems. *Food Security* 5:847–856. doi: 10.1007/s12571-013-0299-z.

*Received on 16/2/2024 Accepted on 25/4/2024*