Int.J.Curr.Microbiol.App.Sci (2018) *7*(10): 1543-1548

International Journal of Current Microbiology and Applied Sciences
***ISSN: 2319-7706* Volume 7 Number 10 (2018)**
Journal homepage: http://www.ijcmas.com

Original Research Article https://doi.org/10.20546/ijcmas.2018.710.172

Influence of Pre and Post Emergence Herbicides on Fruit Quality and Yield Parameters in Tomato cv. Arka Vikas

M. Venkateswara Reddy*, K. Umajyothi, P. Syam Sundar Reddy and K. Sasikala

Dr. YSR Horticultural University, College of Horticulture and Research Institute, Venkataramannagudem, W.G (dt), A.P., India

**Corresponding author*

Keywords

Pendimethalin, Oxyflourfen, Imazethapyr, Quizalofopethyle, Growth parameters

Article Info

Accepted:
12 September 2018
Available Online:
10 October 2018

A B S T R A C T

A field experiment was conducted to study the influence of pre and post emergence herbicides on fruit quality and yield parameters in Tomato cv. *Arka vikas* during rabi 2011-12 and 2012-13. The experiment consisted of 10 treatments of Pre and post emergence herbicides (Pendimethalin, Oxyflourfen, Imazethapyr and Quizalofop ethyle) and their combinations which were replicated in Randomized block design. All the weed control treatments significantly influenced the average fruit weight, No. of Fruits per plant and Fruit yield, but quality parameters such as TSS and Ascorbic acid content are not significantly influenced by the weed treatments. Pre emergence herbicides coupled with Quizalofop ethyle found to be on par with Hand weeding. Though Imazethapyr apllied as post emergence effectively controls the weeds but found to be extremely toxic to the crop. The maximum yield of tomato was recorded with Hand weeding, which is on par with the application of pre emergence herbicides combined with Quizalofop ethyle @ 75g a.i per ha.

Introduction

Tomato (*Solanum lycopersicon* L.) is one of the most popular and widely grown vegetables in the world, ranking second in importance to potato in many countries. The fruits are eaten raw or cooked. Tomato supplies vitamin C and adds variety of colours and flavours to the foods. Tomato is also rich in medicinal value. The pulp and juice is digestible, promoter of gastric secretion and blood purifier. It is also considered to be intestinal antiseptic. It is one of the richest vegetables which keep our stomach and intestine in good condition. At present, the production share of tomato is 11.2 per cent of the total vegetable production with 9.6 percent of the total vegetable area in the country. In India it is being grown in an area of 8.7 lakh hectares with a production of 182.2 lakh tonnes and the productivity is 20.7 tonnes per hectare. Andhra Pradesh is leading state in tomato production, it accounts 28.63 percent of total tomato production in India. In Andhra Pradesh it is cultivated in an area of 2.60 lakh hectares with a production of 52.18 lakh tonnes and the average productivity is 20tonnes per hectare. (Indian Horticultural Database, 2013) Tomato being a cash vegetable crop brings good income to farmers and particularly around big cities. Weeds in

tomato pose a serious problem and as such weed competition is severe during early stages of the crop. Wider spacing, frequent irrigations and liberal use of manures and fertilizers in the cultivation of tomato provide favourable conditions for the luxuriant weed growth particularly during early stages of the crop (Govindra Singh *et al.,* 1984). Manual weeding is a common practice and herbicides are hardly used for the purpose. Hence, commonly used herbicides can find a place in vegetable cultivation. Therefore the present investigation was undertaken to find out the effect of pre and post emergence herbicides alone and their combination on fruit quality and yield attributes in tomato crop.

Materials and Methods

An experiment was conducted at Horticultural college and Research Institute, Dr. Y.S.R Horticultural University, Venkataramannagudem, Tadepalligudem, West Godavari District, A.P during Rabi season of 2011-12 and 2012-13. The experimental farm is situated at 16.83^0N latitude and 81.5^0E longitude. The soil was acidic in reaction and medium in NPK availability. The texture of the soil was sandy loam. The experiment was laid out in Randomised block design with three replications in a plot size of 4X3 m^2.

The seeds of Tomato cultivar "Arka vikas" were sown for nursery raising and transplanting were done on ridge and furrow system by adopting spacing of 60X45 cm. The ten treatments consists of T_1- Pendimethalin @ 0.75 Kg a.i / ha as pre emergence application, T_2- Oxyfluorfen @ 0.125 Kg a.i / ha as pre emergence application, T_3- Imazethapyr @ 100 g a.i / ha as post emergence application (20 DAT), T_4- Quizalofop ethyl @ 75 g a.i / ha as post emergence application (20 DAT), T_5- Pendimethalin @ 0.75 Kg a.i / ha as pre emergence application + Imazethapyr @ 100 g a.i / ha as post emergence application (20 DAT), T_6- Pendimethalin @ 0.75 Kg a.i / ha as pre emergence application+ Imazethapyr @ 100 g a.i / ha as post emergence application (20 DAT), T_7- Oxyfluorfen @ 0.125 Kg a.i / ha as pre emergence application + Quizalofop ethyl @ 75 g a.i / ha as post emergence application (20 DAT), T_8- Oxyfluorfen @ 0.125 Kg a.i / ha as pre emergence application + Quizalofop ethyl @ 75 g a.i / ha as post emergence application (20 DAT), T_9- Weed free (Hand weeding) and T_{10}- Weedy check. Twenty five days old seedlings were used for transplanting. All the package of practices to raise the good crop was done in the experimental field and weed control treatments applied as per the treatments. Observations such as average fruit weight, No. of fruits per plant, fruit yield (t ha^{-1}) and quality parameters like TSS (Total soluble solids) and ascorbic acid content were recorded.

Results and Discussion

Average fruit weight (g)

Average fruit weight of tomato was significantly influenced by different weed management practices and the data is presented in Table 1. Significantly higher average fruit weight was recorded with T9 (Weed free -Hand weeding at 20, 40 and 60 DAT) over all other treatments, which was statistically on par with T8 (Oxyfluorfen @ 0.125 kg a.i / ha as PE + Quizalofop ethyl @ 75 g a.i / ha as POE), T6 (Pendimethalin @ 0.75 kg a.i / ha as PE + Quizalofop ethyl @ 75 g a.i / ha as POE), T2 (Oxyfluorfen @ 0.125 kg a.i / ha as PE) and T1 (Pendimethalin @ 0.75 kg a.i / ha as PE) during both the years. All the weed management practices except T3 (Imazethapyr @ 60 g a.i / ha as POE), T5 (Pendimethalin @ 0.75 kg a.i / ha as PE + Imazethapyr @ 60 g a.i / ha as POE) and T7

(Oxyfluorfen @ 0.125 kg a.i / ha as PE Imazethapyr @ 60 g a.i / ha as POE) recorded higher values over the weedy check (T10),whereas T3, T5(Pendimethalin @ 0.75 kg a.i / ha as PE+ Imazethapyr @ 60 g a.i / ha as POE) and T7 (Oxyfluorfen @ 0.125 kg a.i / ha as PE Imazethapyr @ 60 g a.i / ha as POE) recorded the lower values than T10 (weedy check).

Lowest average fruit weight was recorded with T3 (Imazethapyr @ 60 g a.i / ha as POE) but it remained on par with T5 (Pendimethalin @ 0.75 kg a.i / ha as PE + Imazethapyr @ 60 g a.i / ha as POE) and T7 (Oxyfluorfen @ 0.125 kg a.i / ha as PE, Imazethapyr @ 60 g a.i / ha as POE) similar trend was observed in both the years.

Number of fruits per plant

The data recorded on number of fruits per plant, Fruit yield per plant (kg) and Fruit yield (t/ha.) were presented in Tabl-2. Number of fruits per plant was significantly influenced by different weed management practices. Significantly highest number of fruits per plant was recorded in T9 (Weed free -Hand weeding at 20, 40 and 60 DAT), treatment followed by T8 (Oxyfluorfen @ 0.125 kg a.i / ha as PE + Quizalofop ethyl @ 75 g a.i / ha as POE). The treatments T6 (Pendimethalin @ 0.75 kg a.i / ha as PE + Quizalofop ethyl @ 75 g a.i / ha as POE), T2 (Oxyfluorfen @ 0.125 kg a.i / ha as PE),T1 (Pendimethalin @ 0.75 kg a.i / ha as PE) and T4 (Quizalofop ethyl @ 75 g a.i / ha as POE) produced significantly higher number of fruits per plants over the weedy check (T10), while T3 (Imazethapyr @ 60 g a.i / ha as POE), T5 (Pendimethalin @ 0.75 kg a.i / ha as PE + Imazethapyr @ 60 g a.i / ha as POE) and T7 (Oxyfluorfen @ 0.125 kg a.i / ha as PE Imazethapyr @ 60 g a.i / ha as POE) produced lower number of fruits per plant than the T10 treatment. The lowest number of fruits per plant was recorded in T3 (Imazethapyr @ 60 g a.i / ha as POE) followed by T7 (Oxyfluorfen @ 0.125 kg a.i / ha as PE Imazethapyr @ 60 g a.i / ha as POE) and T5 (Pendimethalin @ 0.75 kg a.i / ha as PE + Imazethapyr @ 60 g a.i / ha as POE). Similar trend was observed during both years.

Fruit yield per plant (kg)

Highest fruit yield per plant was recorded in T9 (Weed free -Hand weeding at 20, 40 and 60 DAT) treatment which was significantly superior over all other treatments, whereas T8 (Oxyfluorfen @ 0.125 kg a.i / ha as PE + Quizalofop ethyl @ 75 g a.i / ha as POE) and T6 (Pendimethalin @ 0.75 kg a.i / ha as PE + Quizalofop ethyl @ 75 g a.i / ha as POE) treatments were statistically on par with each other.

The treatment T2 (Oxyfluorfen @ 0.125 kg a.i / ha as PE), T1 (Pendimethalin @ 0.75 kg a.i / ha as PE) and T4 treatments were comparable with one other. Lower fruit yield per plant was recorded with T3 (Imazethapyr @ 60 g a.i / ha as POE) treatment, however it was comparable with T5 (Pendimethalin @ 0.75 kg a.i / ha as PE+ Imazethapyr @ 60 g a.i / ha as POE) and T7 (Oxyfluorfen @ 0.125 kg a.i / ha as PE Imazethapyr @ 60 g a.i / ha as POE).

Fruit yield (t ha^{-1})

All the weed management practices except T3 (Imazethapyr @ 60 g a.i / ha as POE), T5 (Pendimethalin @ 0.75 kg a.i / ha as PE + Imazethapyr @ 60 g a.i / ha as POE) and T7 (Oxyfluorfen @ 0.125 kg a.i / ha as PE Imazethapyr @ 60 g a.i / ha as POE) produced significantly higher yield of tomato per ha overT10 (weedy check). Among the treatments, maximum fruit yield of tomato per ha was recorded in T9 (Weed free -Hand weeding at 20, 40 and 60 DAT) treatment which was statistically on par with T8 (Oxyfluorfen @ 0.125 kg a.i / ha as PE + Quizalofop ethyl @ 75 g a.i / ha as POE).

Table.1 Influence of pre and post emergence herbicides on TSS (%), ascorbic acid (mg per 100g fruit weight) and average fruit weight (g)

	Treatment	TSS (%)		Ascorbic acid content (mg per 100g fruit weight)		Average Fruit weight (g)	
		2011-12	2012-13	2011-12	2012-13	2011-12	2012-13
T_1	Pendimethalin @ 0.75 kg a.i / ha as PE	4.12	4.15	15.68	15.75	77.46	74.83
T_2	Oxyfluorfen @ 0.125 kg a.i / ha as PE	4.45	4.36	16.23	16.25	80.70	80.15
T_3	Imazethapyr @ 60 g a.i / ha as POE (20 DAT)	3.89	3.76	14.83	15.12	25.85	25.68
T_4	Quizalofop ethyl @ 75 g a.i / ha as POE (20 DAT)	4.84	4.57	15.26	15.53	68.57	68.68
T_5	Pendimethalin @ 0.75 kg a.i / ha as PE + Imazethapyr @ 60 g a.i / ha as POE (20 DAT)	4.02	4.14	14.93	15.36	27.66	27.64
T_6	Pendimethalin @ 0.75 kg a.i / ha as PE + Quizalofop ethyl @ 75 g a.i / ha as POE (20 DAT)	4.83	4.79	15.84	16.12	84.32	83.56
T_7	Oxyfluorfen @ 0.125 kg a.i / ha as PE Imazethapyr @ 60 g a.i / ha as POE (20 DAT)	3.93	4.02	14.52	14.64	30.04	29.62
T_8	Oxyfluorfen @ 0.125 kg a.i / ha as PE + Quizalofop ethyl @ 75 g a.i / ha as POE (20 DAT)	4.73	4.68	15.47	15.53	85.63	85.67
T_9	Weed free (Hand weeding at 20, 40 and 60 DAT)	4.94	5.02	16.38	16.52	86.41	86.19
T_{10}	Weedy Check	4.65	4.87	15.12	15.2	55.85	55.49
	S.Em±	0.28	0.28	1.18	1.29	3.36	3.81
	CD (P=0.05)	NS	NS	NS	NS	9.96	11.40

Table.2 Influence of pre and post emergence herbicides on yield parameters like number of fruits per plant, Fruit yield per plant (kg) and Fruit yield (t/ha.)

	Treatment	Number of fruits per plant		Fruit yield per plant (kg)		Fruit Yield (t/ha)	
		2011-12	2012-13	2011-12	2012-13	2011-12	2012-13
T_1	Pendimethalin @ 0.75 kg a.i / ha as PE	20.00	22.37	0.82	0.90	18.52	20.24
T_2	Oxyfluorfen @ 0.125 kg a.i / ha as PE	23.86	25.28	0.84	0.93	18.87	20.86
T_3	Imazethapyr @ 60 g a.i / ha as POE (20 DAT)	5.02	6.82	0.17	0.16	3.88	3.78
T_4	Quizalofop ethyl @ 75 g a.i / ha as POE (20 DAT)	18.34	21.73	0.75	0.79	16.92	17.84
T_5	Pendimethalin @ 0.75 kg a.i / ha as PE + Imazethapyr @ 60 g a.i / ha as POE (20 DAT)	8.58	9.65	0.26	0.34	4.25	4.13
T_6	Pendimethalin @ 0.75 kg a.i / ha as PE + Quizalofop ethyl @ 75 g a.i / ha as POE (20 DAT)	24.66	26.36	0.96	1.04	21.59	23.42
T_7	Oxyfluorfen @ 0.125 kg a.i / ha as PEImazethapyr @ 60 g a.i / ha as POE (20 DAT)	9.84	10.15	0.39	0.41	4.66	4.59
T_8	Oxyfluorfen @ 0.125 kg a.i / ha as PE + Quizalofop ethyl @ 75 g a.i / ha as POE (20 DAT)	30.88	32.17	0.98	1.06	21.98	23.91
T_9	Weed free (Hand weeeding at 20, 40 and 60 DAT)	32.54	34.84	1.19	1.30	26.50	29.20
T_{10}	Weedy Check	13.98	15.16	0.57	0.59	12.85	13.24
	S.Em±	1.18	1.21	0.06	0.05	1.38	1.16
	CD (P=0.05)	3.53	3.61	0.18	0.15	4.12	3.46

PE- Pre emergence POE- Post emergence DAT- Days after transplanting

Treatments T6 (Pendimethalin @ 0.75 kg a.i / ha as PE + Quizalofop ethyl @ 75 g a.i / ha as POE), T1 (Pendimethalin @ 0.75 kg a.i / ha as PE), T2 (Oxyfluorfen @ 0.125 kg a.i / ha as PE) and T4 (Quizalofop ethyl @ 75 g a.i / ha as POE) produced significantly higher yield over weedy check (T10) during both the years of study. Significantly lower yield in weedy check may be due to severe competition for plant nutrients, water and light between crop and weeds. Similar results were also reported by Balraj Singh (1994), Ram *et al.*, (1994), Muniyappa *et al.*, (1995), Tumbare and Ilhe (2004) and Warade *et al.*, (2008). T3 (Imazethapyr @ 60 g a.i / ha as POE), T5 (Pendimethalin @ 0.75 kg a.i / ha as PE + Imazethapyr @ 60 g a.i / ha as POE) and T7 (Oxyfluorfen @ 0.125 kg a.i / ha as PE Imazethapyr @ 60 g a.i / ha as POE) produced lower fruit yield than weedy control during both the years of study. Among the three treatments, lowest fruit yield was

recorded in T3, however it remained on par with T5 (Pendimethalin @ 0.75 kg a.i / ha as PE+ Imazethapyr @ 60 g a.i / ha as POE) and T7 (Oxyfluorfen @ 0.125 kg a.i / ha as PE Imazethapyr @ 60 g a.i / ha as POE).

Total soluble solids (%) and ascorbic acid content (mg per 100 g fruit weight)

The data recorded on total soluble solids and ascorbic acid content of tomato fruits as influenced by different weed management practices are presented in Table 1. Different weed management practices did not exhibit significant influence on quality parameters of total soluble solids and Ascorbic acid content of tomato. TSS values ranged from 3.89 to 4.94 during first year, while 3.76 to 5.02 during the second year, whereas Ascorbic acid varied from 14.83 to 16.38 and 14.64 to 16.52 during first and second year respectively. Similar results were reported by Manjunatha (2005).

References

Balraj Singh. 1994. Weed control studies in tomato. *Vegetable Science*. 21: 26-28.

Indian horticulture database. 2013. www.nhb.gov.in.

Manjunatha, R. 2005. Integrated weed management in transplanted onion (*Allium cepa* L.) under irrigated alfisol. *M.Sc. (Agri.) Thesis*, University of Agricultural Sciences, Dharwad.

Muniyappa, T.V., Dev, N.P. Andani, G. and Gowda, A. 1995. Economics or integrated weed control in hybrid tomato. *Indian Journal of Agronomy*. 40: 339-41.

Ram, B., Singh, V.P. and Singh, J.P. 1994. Weed management in kharif tomato in low hill or valley regions of U.P Hills. *Vegetable Science*. 21: 20-22.

Tumbare, A.D. and Ilhe, S.S. 2004.Response of tomato to napropamide during Rabi season. *Indian Journal of Weed Science.* 36 (1&2): 153-54.

Warade, A.D, Gonge, V.S, Ghawade, S.M. and Ambare, T.P. 2008. Influence of integrated weed management on horticultural characteristics and yield on onion. *Asian Journal of Horticulture*. 3(1): 33-35.

How to cite this article:

Venkateswara Reddy, M., K. Umajyothi, P. Syam Sundar Reddy and Sasikala, K. 2018. Influence of Pre and Post Emergence Herbicides on Fruit Quality and Yield Parameters in Tomato cv. Arka Vikas. *Int.J.Curr.Microbiol.App.Sci.* 7(10): 1543-1548.
doi: https://doi.org/10.20546/ijcmas.2018.710.172