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Chaudhari HC
M.sc Horticulture (Vegetable Science), ASPEE College of Horticulture and Forestry, NAU, Navsari, Gujarat, India

Patel SY
Assistant Professor (Vegetable Science), ASPEE College of Horticulture and Forestry, NAU, Navsari, Gujarat, India

Arvadiya LK
Associate Professor (Agronomy) ASPEE College of Horticulture and Forestry, NAU, Navsari, Gujarat, India

Gamit DR
M.sc Horticulture (Floriculture and Landscape Architecture) ASPEE College of Horticulture and Forestry, NAU, Navsari, Gujarat, India

Correspondence
Chaudhari, HC
M.sc Horticulture (Vegetable Science) ASPEE College of Horticulture and Forestry, NAU, Navsari, Gujarat, India

Yield and nutrient uptake by tomato as influenced by weed management practices

Chaudhari HC, Patel SY, Arvadiya LK and Gamit DR

Abstract
Field experiment was conducted during the year 2016-17 at *Navsari Agricultural University, Navsari*. The treatment weed free check (T_2) noted significantly the highest marketable fruit yield (31.67 t/ha) which remained at par with treatments T_5 and T_3. In case of uptake by tomato fruits, treatment T_2 reported significantly higher uptake of N and P_2O_5 but, it was at par with treatments T_5, T_3, T_{10}, T_9 and T_7. However, uptake of K_2O by fruits found significant higher in treatment T_5 and remained at par with treatments T_2, T_{10}, T_3, T_9, T_7 and T_6. Similarly, N and K_2O uptake by tomato plant was significantly higher with treatment T_2 and remained at par with treatments T_7, T_3, T_5 and T_9. While, P_2O_5 uptake by tomato plant was highest with treatment T_9 found at par with all the weed management practices except treatments T_4, T_6 and T_8. The N, P_2O_5 and K_2O uptake by weed was significantly lower in treatment T_2. The highest WCE (78.22 %) was recorded in treatment T_2 followed by the treatments T_3 and T_5. However, the B: C ratio of the treatment T_5 was higher, which was closely followed by the treatments T_2 and T_3.

Keywords: weed management, tomato, pendimethalin, interculture, hand weeding, nutrient uptake

Introduction
Tomato (*Solanum lycopersicum* L.) is one of the most important vegetable crops grown all over the world. It is warm season crop reasonably resistant to heat, drought and grows on wide range of soil and climatic conditions. India is the second largest producer of vegetables in the world. It covers an area of 809 thousand hectares with a production of 19.7 lakh MT with a productivity of 24.3 t/ha. It is cultivated more or less in all the districts of Gujarat. In Gujarat, it occupies an area of 46.40 thousand hectares with the total production of 1.32 lakh MT with a productivity of 28.43 t/ha (Anon., 2016-17) [1].

Weed is the major constraint that limiting the crop production and have most deleterious effect and ultimately causing the yield reduction of tomato by 53 to 67 per cent (Sanok*et al*., 1979) [11]. Present study was undertaken with a view to reduce the losses of economic production through effective weed control and solve the scarcity of labours to some extent.

Materials and Methods
The present study was conducted on *Regional Horticultural Research Station, Navsari Agricultural University, Navsari* during the winter season of 2016-17. The soil of the experimental site was dark greyish brown with more clay content. The tomato variety GT-2 was used in the experiment, proper size and healthy seedlings were transplanted at 60 cm X 45 cm in open field. The treatments comprised of twelve weed management practices *viz*., T_1 (Weedy check), T_2 (Weed free check (Pendimethalin 30% EC @ 1.0 kg/ha as PE + IC & HW at 20 DATP + 2 HW at 40 & 60 DATP)), T_3 (IC & HW at 20 & 40 DATP), T_4 (Pendimethalin 30 % EC @ 1.0 kg/ha as PE), T_5 (T_4+ IC & HW at 40 DATP), T_6 (Metribuzin 70 % WP @ 0.5 kg/ha as PE), T_7 (T_6 + IC & HW at 40 DATP), T_8 (Oxadiargyl 6 % EC @ 0.09 kg/ha as PE), T_9 (T_8 +IC & HW at 40 DATP), T_{10} (T_4 + Quizalofop-ethyl 5 % EC @ 0.05 kg/ha at 20 DATP), T_{11} (T_6 + Quizalofop-ethyl 5 % EC @ 0.05 kg/ha at 20 DATP) and T_{12} (T_8+ Quizalofop-ethyl 5 % EC @ 0.05 kg/ha at 20 DATP), which were arranged in randomized block design with three replications.

The required quantity of herbicides were applied as per treatment by knapsack sprayer with spray volume of 500 L/ha. Hand weeding and inter-culturing were carried out with the help of *Khurpi* and power weeder, respectively. The recommended dose of fertilizer 100:50:50 kg NPK/ha in the form of urea, single super phosphate and muriate of potash were applied to all

plots uniformly. Full dose of SSP and MOP with half dose of urea were applied at 30 DATP, while remaining half dose of urea was applied at 60 DATP. The WCE was calculated by formula given by Kondap and Upadhyay (1985). The crop was harvested in six pickings and summed up for total yield. Representative samples of crop and weed were taken separately from each net plot for estimation of N, P_2O_5 and K_2O content at final harvest while, the fruit sample taken at 4th harvest. The oven dried samples and nutrient content and their uptake by fruits, plants and weeds were determined following the standard procedures (Jackson, 1973) [5]. The data recorded was statistically analyzed for interpretation (Gomez and Gomez, 1984) [3]. The economics based on the prevailing market prices was calculated.

Result and Discussion

Effects on weed

Predominant monocot weed species were: *Cynodon dactylon* L. and *Echinochloa crus-galli* L. and dicot weeds were *Boerhavia diffusa* L., *Digera arvensis* L., *Portulaca oleracea* L., *Tridax procumbens* L., *Parthenium hysterophorus* L. and *Euphorbia hirta* L. and among sedges *Cyperus rotundus* L. The highest WCE (78.22 %) was recorded in weed free check which was closely followed by treatments T_3 (55.30 %) and T_5 (51.52 %). This is attributed to luxurious crop growth dominated over the weeds under treatments T_2 and T_5. The findings were in conformity with results by Samant and Prusty (2014) [10]. who also reported that the treatment of two HW gave highest WCE (80.9 %).

Yield and yield attributes

All the weed management treatments recorded significant effect on marketable fruit yield over weedy check. The treatment T_2 gave significantly the highest marketable fruit yield (31.67 t/ha), which was at par with treatments T_5 and T_3. The chemical followed by IC & HW resulted high enough quantitative traits. Nandal and Sharma (2005) [8]. also reported that the significant highest tomato fruit yield was noted in weed free check, which was at par with pendimethalin @ 1.0 kg/ha *fb* hand weeding at 40 DAT. Kumar *et al*. (2015) also noted that application of pendimethalin @ 1.5 kg/ha, fluchloralin @ 1.0 kg/ha being equally effective and two hand weeding at 30 and 60 DATP were statistically at par with each other.

Nutrient depletion by fruits, crops and weeds

The nitrogen, phosphorus and potassium uptake (kg/ha) differed significantly with all the weed management treatments as compared to weedy check (T_1). Significantly highest N and P_2O_5 uptake (31.60 and 11.81 kg/ha, respectively) were recorded under the treatment T_2, which was at par to treatments T_5, T_3, T_{10}, T_9 and T_7. But, highest K_2O uptake (26.00 kg/ha) was noted in treatment T_5 which was at par with treatments T_2, T_{10}, T_3, T_9, T_7 and T_6. It likely happened due to the luxurious growth intend the more nutrients uptake ability of plants ultimately diverted to fruits by integration of chemical with subsequent IC and HW as well as synergic effect of pendimethalin + quizalofop ethyl were more effective as compared to rest of treatments.

The nutrient uptake by tomato plants significantly differed due to different weed management practices. Significantly highest nitrogen and potassium uptake (44.07 and 41.07 kg/ha, respectively) was found in treatment T_2, which remained at par with the treatments T_7, T_3, T_5 and T_9 for nitrogen and T_7, T_5, T_3, T_9 and T_{10} for potassium. The significant highest phosphorus uptake (14.56 kg/ha) was found under treatment T_9 which remained at par with the all the treatments except T_4, T_6 and T_8. Significantly minimum nitrogen, phosphorus and potassium uptake was found under the weedy check (T_1). The better performance of treatment T_2 was probably due to less crop weed competition for nutrients as compared to other treatments. This was likely reason of unfavourable condition to emerge out weeds in early stage of crop growth and laterally weeds free condition through IC and HW treatments resulted higher nutrients uptake by respective treatments than the others. This was in confirmation with Samant and Prusty (2014) [10]. Who revealed that significantly maximum nutrients uptake by tomato plant was recorded under straw mulch 28.32, 2.84 and 24.25 kg NPK/ha, which was followed by metribuzin (0.5 kg/ha) having nutrient uptake by tomato plants and Sable *et al*. (2013) [9]. who noted that significant the higher nutrient uptake (Kg/ha) by plants 51.01 kg N, 9.80 kg P_2O_5 and K_2O 29.89 kg recorded in the weed free check in onion.

The nutrient uptake by weeds was differed significantly due to different weed management practices. Significantly minimum nitrogen, phosphorus and potassium uptake (6.51, 2.24 and 7.05 kg/ha, respectively) by weeds was recorded in treatment T_2 while, significantly highest nutrient uptake by weeds was found with the weedy check. This might be due to lower weed biomass was observed in herbicide alone, herbicide followed by IC and HW and post emergence herbicide compared to weedy check. It indicated that all the treatments effective to proportionally diminish the crop weed competition for nutrients. The results are supported by Banjare *et al*. (2013), found that maximum uptake by weeds (14.02 kg N/ha) was observed under unweeded check whereas, minimum removal (1.78 kg N/ha) was registered under pendimethalin (extra) 37.8 CS at 0.64 kg/ha pre transplanting + one HW at 40 DAT + pendimethalin (extra) 37.8 CS at 0.64 kg/ha at 45 DAT in brinjal.

Economics

The highest benefit cost ratio (1.47) was obtained with treatment T_5 followed by treatments T_2 (1.41) and T_{10} (1.40), while the lowest value (0.85) noted with the treatment weedy check (T_1). Kumar *et al*. (2015) also reported that the highest B: C ratio (5.01) under the treatment pendimethalin @ 1.5 kg a.i./ha (PE).

Conclusion

The treatmentT_5 (Pendimethalin 30 % EC @ 1.0 kg/ha as PE+ IC&HW at 40 DATP) secured effective weed control with economic crop production and so helps in solving the labour crises.

Table 1: Effect of different weed management practices on WCE, yield, nutrient uptake and BCR in tomato

Trts.	Yield (t/ha)	Nutrient uptake by fruits (kg/ha)			Nutrient uptake by plants (kg/ha)			Nutrient uptake by weeds (kg/ha)			WCE (%)	BCR
		N	P_2O_5	K_2O	N	P_2O_5	K_2O	N	P_2O_5	K_2O		
T_1	19.50	19.50	6.80	16.42	14.10	5.03	14.10	30.59	11.58	39.92	-	0.85
T_2	31.60	31.60	11.81	25.77	44.07	14.06	44.07	6.51	2.24	7.05	78.22	1.41
T_3	28.86	28.86	10.64	24.62	42.62	13.83	42.62	13.02	5.29	16.92	55.30	1.31

T_4	23.18	23.18	8.40	19.94	34.32	12.23	34.32	19.86	7.61	26.10	33.40	1.12
T_5	30.08	30.08	11.15	26.00	42.61	14.01	42.61	13.89	5.55	18.92	51.52	1.47
T_6	24.24	24.24	8.17	21.98	33.83	12.18	33.83	19.89	7.49	25.97	34.71	1.11
T_7	27.24	27.24	9.97	23.32	42.95	14.14	42.95	16.83	6.33	21.71	42.29	1.31
T_8	22.33	22.33	7.53	20.64	30.75	10.24	30.75	23.45	9.18	30.70	21.72	0.91
T_9	27.27	27.27	9.99	23.47	41.31	14.56	41.31	17.88	6.78	23.12	39.63	1.25
T_{10}	27.79	27.79	10.36	25.00	38.76	13.84	38.76	18.83	7.46	23.74	37.58	1.40
T_{11}	24.60	24.60	8.85	21.05	36.89	13.62	36.89	18.40	7.32	25.16	36.65	1.16
T_{12}	23.34	23.34	8.66	21.16	36.74	13.14	36.74	20.17	7.61	26.71	32.78	1.08
S.Em±	1.38	1.56	0.70	1.52	1.68	0.53	1.80	1.57	0.50	1.69		
C.D. @ 5%	4.03	4.56	2.07	4.47	4.94	1.54	5.27	4.60	1.47	4.95		
C.V.%	9.55	10.43	13.04	11.76	7.98	7.25	9.23	14.87	12.38	12.25		

References

1. Anonymous. Indian Horticulture Database, 2017. *www.nhb.gov.in.*
2. Elizabeth KS, Geetha K. Evaluation of pre emergence and post emergence herbicides and soil solarisation for weed management in Brinjal (*Solanum melongena* L.). I. J Weed Sci., 2007; 39(1 & 2):109-111.
3. Gomez KA, Gomez AA. Statistically procedure for Agricultural Research (IIndedn.). An International Rice Research Institue Book, John Willey and Sons, Inc., New York, 1984.
4. Gupta Versha, Singh SP, Yadav RS. Yield performance and nutrient uptake as influenced by integrated weed management in cluster bean. Ind. J Weed Sci. 2015; 47(1):82-84.
5. Jackson ML. Soil Chemical Analysis" Prentice Hall of India. Pvt. Ltd., New Delhi. 1967, 183-192.
6. Kondap SM, Updhyay UC. A practical manual on weed control, Oxford and IBH Co., New Delhi. 1985, 55.
7. Kumar A, Manuja S, Singh J, Chaudhary DR. Integrated weed management in tomato (*Lycopersicon esculentum* Mill.) under dry temperate climate of western Himalayas. J Crop and Weed. 2015a; 11(1):165-167.
8. Nandal TR, Sharma R. Integrated weed management studies in Tomato crop of sub-Montane and low hills sub-tropical conditions of Himachal Pradesh. I. J Weed Sci., 2005; 37(3 & 4):283-284.
9. Sable PA, Kurubar AR, Hugar A. Effect of weed management practices on weed control and nutrient uptake in onion (*Allium cepa* L.). The Asian J Hort. 2013; 8(2):444-447.
10. Samant TK, Prusty M. Effect of weed management on yield, economics and nutrient uptake in tomato (*Lycopersicon esculentum* Mill.). Adv. Res. J Crop Improv. 2014; 5(2):144-148.
11. Sanok WJ, Shelleck GW, Greighton JF. Weed problems and phytotoxicity with herbicides in five tomato varieties. Proceedings of the North Eastern Weed Sci. Soc. Deptt. of Rort. Uni. of Maryland, College park 20742, USA. 1979; 33:332-335.
12. Singh G, Bhan VM, Tripathi SS. Effect of herbicides alone and in combination with weeding on tomato and associated weeds. I. J Weed Sci., 1984; 16(4):262-266.
13. Ved P, Srivastava A. Crop-weed competition studies in tomato (*Lycopersicon esculentum* L.) under Mid-Hills of North-West Himalayas. I. J Weed Sci. 2006; 38(1&2):86-88.
14. Vishnu V, Asodaria KB, Suthar A. Weed management in *rabi* onion. Agric. Sci. Digest. 2015; 35(2):130-133.