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## Nutrient uptake in tomato (*Solanum lycopersicum* L.) as influenced by tillage and weed management practices

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### Abstract

The nutrient uptake by tomato (*Solanum lycopersicum* L.) as influenced by tillage and weed management practices was studied with two main plots (conventional tillage and deep tillage) and six weed management practices (weedy check, weed free, metribuzin (pre-emergence) with one hand weeding at 45 DAT, oxyfluorfen (pre-emergence) with one hand weeding at 45 DAT, metribuzin (pre-emergence) + quizalofop ethyl (post-emergence) at 45 DAT, oxyfluorfen (pre-emergence) + quizalofop ethyl (post-emergence) at 45 DAT) in sub-plots. The deep tillage practice significantly increased the nutrient uptake by the crop as compared to conventional tillage. Weed-free treatment (S2) (N-160.84 kg ha<sup>-1</sup>, P-65.82 kg ha<sup>-1</sup> and K-118.32 kg ha<sup>-1</sup>) recorded significantly higher nutrient uptake. However, Weed-free treatment (S2) was on par with the herbicidal treatments metribuzin along with one hand weeding at 45 DAT (S3) (N-154.62 kg ha<sup>-1</sup>, P-64.57 kg ha<sup>-1</sup> and K-116.00 kg ha<sup>-1</sup>) and oxyfluorfen (pre-emergence) (0.15 kg/ha) + one hand weeding at 45 DAT (N-150.99 kg ha<sup>-1</sup>, P-62.86 kg ha<sup>-1</sup> and K-114.76 kg ha<sup>-1</sup>). The complete Weed-free condition in weed-free plot was directly correlated with nutrient uptake and reduced weed growth by metribuzin and oxyfluorfen in the initial growth stage and one hand weeding at 45 DAT thereafter reduced the weed growth drastically which in turn increased the nutrient uptake by tomato as compared to the herbicidal combination plots due to no effect of quizalofop ethyl on broad-leaved weeds and sedges.

**Keywords:** Deep tillage, conventional tillage, nutrient uptake

### 1. Introduction

In terms of global vegetable production, the tomato ranks second only to the potato in terms of popularity and nutritional value. To prevent some cancers and cardiovascular disorders, tomatoes are a vital source of minerals and antioxidants such as carotenoids, lycopene, vitamins C and E, and phenolic compounds. It is normally considered as 'Protective food' primarily based on its nutritive value and antioxidant properties because of the presence of lycopene and flavonoids. Tomato is a very poor competitor with weeds because of its extremely slow growth in the initial emergence phase. Weeds emerge fast and grow rapidly competing with the crop severely for growth resources, viz., nutrients, moisture, sunlight and space during the entire vegetative and early reproductive stages of tomato. Due to extensive weed growth, there is a severe deviation of nutrient uptake by the crop towards weeds, which directly affects plant growth.

### 2. Materials and Methods

A field experiment was conducted during *rabi*, 2021-2022 at College of Horticulture, Anantharajupeta, Dr. Y.S.R Horticultural University, Andhra Pradesh. The experiment was laid out in a split-plot design with two main plots and six plots with three replications. The main plot treatments comprised of two tillage practices viz., M1: conventional tillage and M2: Deep tillage. Subplots treatments included S1: Weedy check, S2: Weed-free through hand weeding, S3: Metribuzin (pre-emergence) (0.37 kg/ha) + one hand weeding at 45 DAT, S4: Oxyfluorfen (pre-emergence) (0.15 kg/ha) + one hand weeding at 45 DAT, S5: Metribuzin (pre-emergence) (0.37 kg/ha) + Quizalofop ethyl (post-emergence) (0.05kg/ha) at 45 DAT, S6: Oxyfluorfen (pre-emergence) (0.15 kg/ha) + Quizalofop ethyl (post-emergence) (0.05kg/ha) at 45 DAT. The land was tilled according to the main plot treatments and weed management treatments were allotted to plots randomly and were replicated thrice.

The recommended dose of fertilizers by Dr. YSR Horticultural University was applied to the field. The nitrogen, phosphorous and potassium content from the plant samples collected at harvest was estimated by adopting microkjeldhal, calorimetric (Jackson, 1973) [5], and flame photometry (Jackson, 1973) [5] methods respectively. The uptake of nitrogen, phosphorus and potassium at harvest was arrived by multiplying the respective dry matter production with nutrient content and expressed as kg ha<sup>-1</sup>. The data on nutrient uptake by tomato crop was subjected to statistical analysis. The data were analyzed using computer software programmed by the method of variance outlined by Panse and Sukhatme (1985) [6].

### 3. Results and Discussion

Nitrogen, phosphorus and potassium (NPK) uptake by tomato crop was significantly affected by different tillage and weed management practices. The results are presented in the subheads below.

#### 3.1 Effect of tillage practices

The crops nitrogen (N), phosphorus (P) and potassium (K) uptake by the crop was significantly affected due to different tillage practices. The highest nutrient uptake was recorded by the tomato plants in deep tillage as it removed 139.02 kg ha<sup>-1</sup> N, 50.86 kg ha<sup>-1</sup> P and 98.14 kg ha<sup>-1</sup> K as compared to conventional tillage which recorded the uptake of 128.91 kg ha<sup>-1</sup> N, 48.17 kg ha<sup>-1</sup> P and 93.34 kg ha<sup>-1</sup> K (Table 1). The

maximum nutrient uptake was recorded under deep tillage this might be due to high dry matter accumulation of tomato crop in deep tillage and reduced weed growth compared to conventional tillage and may be due to better root growth, a larger amount of nutrients would have been absorbed from the soil. The highest nutrient uptake by deep tillage could be due to the increased disturbance in soil by tilling to that depth wherein it reduced the weed's diversity and density (Cardina *et al.*, 1991) [1].

#### 3.2 Effect of weed management practices

Weed management practices significantly affected the nutrient uptake by tomato crop (Table 1) which was calculated by the end of the cropping season.

##### 3.2.1 Effect of weed management on uptake of nitrogen (N)

The nitrogen uptake by the tomato plants grown in weed-free plot (S2) was recorded to be highest with 160.84 kg ha<sup>-1</sup> which was on par with the treatments metribuzin (pre-emergence) (0.37 kg/ha) + one hand weeding at 45 DAT (S3-154.62 kg ha<sup>-1</sup>) and oxyfluorfen (pre-emergence) (0.15 kg/ha) + one hand weeding at 45 DAT (S4-150.99 kg ha<sup>-1</sup>) of nitrogen. The lowest nitrogen uptake was recorded in weedy check treatment (S1) with an uptake of 78.89 kg ha<sup>-1</sup>.

##### 3.2.2 Effect of weed management on uptake of phosphorus (P)

**Table 1:** Effect of tillage and weed management practices on uptake of nitrogen, phosphorus and potassium (kg ha<sup>-1</sup>) by crop

Weed management practices	Tillage practices								
	Nitrogen			Phosphorus			Potassium		
	M1	M2	Mean	M1	M2	Mean	M1	M2	Mean
S1	76.71	81.07	78.89	23.70	24.41	24.05	55.71	57.16	56.44
S2	154.88	166.80	160.84	64.04	67.60	65.82	115.22	121.42	118.32
S3	148.79	160.46	154.62	62.80	66.35	64.57	112.92	119.09	116.00
S4	145.23	156.75	150.99	61.09	64.62	62.86	112.13	117.39	114.76
S5	125.80	136.48	131.14	41.58	44.14	42.86	85.89	90.94	88.41
S6	122.05	132.59	127.32	35.79	38.05	36.92	78.19	82.87	80.53
Mean	128.91	139.02		48.17	50.86		93.34	98.14	

Factors	CD	S.E(m)	CD	S.E(m)	CD	S.E(m)
M	0.374	0.057	0.07	0.01	0.06	0.01
S	9.941	3.346	3.42	1.16	3.76	1.27
S at M	NS	0.14	NS	1.64	NS	1.80
M at S	NS	4.32	NS	1.50	NS	1.65

M1: Conventional tillage M2: Deep tillage

NS: Non-significant

S1: Weedy check

S2: Weed free through hand weeding

S3: Metribuzin (pre-emergence) (0.37 kg/ha) + 1 hand weeding at 45 DAT S4: Oxyfluorfen (pre-emergence) (0.15 l/ha) + 1 hand weeding at 45 DAT

S5: Metribuzin (pre-emergence) (0.37 kg/ha) + Quizalofop ethyl (post emergence) (0.05 l/ha) at 45 DAT S6: Oxyfluorfen (pre-emergence) (0.15 l/ha) + Quizalofop ethyl (post emergence) (0.05 l/ha) at 45 DAT

Phosphorus uptake by crop was significantly higher in weed-free plot (S2-65.82 kg ha<sup>-1</sup>) as compared with other weed management practices. However, it was on par with metribuzin (pre-emergence) (0.37 kg/ha) + one hand weeding at 45 DAT (S3-64.57 kg ha<sup>-1</sup>) and oxyfluorfen (pre-emergence) (0.15 kg/ha) + one hand weeding at 45 DAT (S4-62.86 kg ha<sup>-1</sup>) of phosphorus. Among the herbicidal treatments tried Weedy check treatment (S1-24.05 kg ha<sup>-1</sup>) recorded the lowest uptake of phosphorus.

##### 3.2.3 Effect of weed management of uptake on potassium (K)

Weed-free plot (S2-118.32 kg ha<sup>-1</sup>) recorded the highest uptake of potassium uptake compared with other weed management practices. However, it was in parity with treatments metribuzin (pre-emergence) (0.37 kg/ha) + one hand weeding at 45 DAT (S3-116.00 kg ha<sup>-1</sup>) and oxyfluorfen (pre-emergence) (0.15 kg/ha) + one hand weeding at 45 DAT (S4-114.76 kg ha<sup>-1</sup>). Amidst all the weed

management practices weedy check (S1-56.44 kg ha<sup>-1</sup>) treatment recorded the lowest uptake of potassium.

Overall, the weed-free treatment recorded highest uptake of nutrients (NPK). Mitra *et al.* (2014) [2] also reported similar findings wherein among the weed management practices, the highest nutrient uptake was noticed in weed-free treatment and the lowest in weedy check treatment due to season-long weed competition. The results confirm with the findings of Deshveer and Amar Singh (2002) [3]. Among the herbicidal treatments metribuzin (pre-emergence) (0.37 kg/ha) + one hand weeding at 45 DAT recorded the highest uptake of nutrients (NPK), this might be because there were fewer weeds in the treated area and metribuzin is an effective herbicide with herbicide efficiency, supplying the crop with the most nutrients possible. The herbicidal combination treatments of pre and post-emergence herbicides couldn't compete with the sole herbicidal treatment due to the ineffectiveness of quizalofop ethyl towards broad-leaved weeds and sedges. The findings are in accordance with Kumar *et al.* (1999) [4] in tomatoes.

#### 4. Conclusion

The nutrient uptake was significantly influenced by varied tillage and weed management practices. It can be concluded by the findings of the present study that deep tillage with weed-free environment is most effective for the crop to efficiently uptake and utilize the nutrients which in turn can give a better yield.

#### 5. References

1. Cardina J, Regnier E, Harrison K. Long-term tillage effects on seed banks in three Ohio soils. *Weed Sci.* 1991;39:186-194.
2. Mitra B, Mookherjee S, Das S. Performances of wheat (*Triticum aestivum* L.) under various tillage and nitrogen management in sub-Himalayan plains of West Bengal. *Journal of Wheat Research.* 2014;6(2):150-153.
3. Deshveer CL, Amarsingh. Weed management studies in maize based intercropping systems. *Indian Journal of Weed Sciences.* 2002;34(3-4):236-240.
4. Kumar V, Madhavi M, Chandrasekhar Reddy K. Rao AM. Integrated Weed Management in Tomato (*Lycopersicon esculentum* Mill.) Doctoral dissertation, University of Agricultural Sciences; c1999.
5. Jackson WA, Flesher D, Hageman RH. Nitrate uptake by dark-grown corn seedlings: some characteristics of apparent induction. *Plant Physiology.* 1973 Jan;51(1):120-7.
6. Panse VG, Sukhatme PV. *Statistical methods for Agricultural workers.* 4th edn. ICAR, New Delhi; c1985.