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EFFECT OF WEED INTERFERENCE ON TRANSPLANTED TOMATOES (*LYCOPERSICON ESCULENTUM* MILL.)

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ABSTRACT

Four weed control durations viz., weedy check (no weeding), hand-weeding for four and two weeks and throughout the growing period, were tested in transplants of three cultivars of tomato (Pearson, Gressilesse and Pates druze). The data were recorded on fruit yield (kg ha^{-1}), fruit yield plant^{-1} (kg), days to 50% flowering, number of flower clusters/plant, number of branches/plant and weed density (m^{-2}). The response of all three varieties and their interaction with the weed competition durations was similar for all the parameters examined, however, different weed control treatments significantly affected the yield and yield components of tomato. Weeding throughout the growing season out classed the rest of the treatments in controlling the weeds m^{-2} and increasing the yield of tomato and all other yield components, followed by weeding for four weeks. Hand-weeding for two weeks after transplanting also proved better than no weeding. Our findings reveal that tomato crop should be maintained weed free for at least six weeks after transplanting for obtaining rich harvests.

Key words: *Tomato, weed competition*

INTRODUCTION

Tomato (*Lycopersicon esculentum* Mill.) is one of the most important widely used vegetable crops. Like others, this crop is also affected greatly by weed interference, including allelopathy (Inderjit, 1996) that results in great economic loss throughout the world. Weeds reduce yield, quality and value of the crops, they increase production and harvesting costs, reduce yield of crop due to allelopathy and competition for nutrients, water, space and light. Bhowmik and Reddy (1988a) reported that season long interference of common lambsquarters reduced marketable tomatoes fruit number and also marketable fruit weight ranging from 17% at 16 plants m^{-2} to 36% at 64 plants m^{-2}. In another study, they (Bhomik and Reddy, 1988b) observed that season long interference of barnyardgrass reduced marketable fruit number and fruit weight at all densities compared to weed free plots. They further reported that Ca and Mg concentration in tomato leaves was unaltered by barnyardgrass competition.

Marana *et al.*, (1986) communicated the critical period of weed competition is 30-40 days after sowing, therefore they recommended that weeds should be removed for 40-50 days after sowing. They further noted that the presence of weeds reduced fruit yield by 70% depending on the stage and duration of competition. Shadbolt *et al.*, (1956) also concluded from their studies that first four weeks were critical in many vegetable crops, whereas studies of Armelina (1985) Weaver *et al.*, (1985) revealed that about first 9 weeks were critical for the direct seeded tomatoes.

Govindra *et al.*, (1986) found that weedy conditions resulted in 57.6% reduction in tomato yield

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when compared with weed free conditions. They further reported that one hand weeding in addition to herbicide application significantly increased yield.

Monaco *et al.*, (1981) reported that jimson weed *(Datura stramonium* L.*)*, tall morning glory *(Ipomoea purpurea* L.*)* and common cocklebur *(Xanthium pensylvanicum* Waller) at densities of 11, 43, and 86 plants m^{-2} reduced tomato yield. They further reported that season long interference by large crabgrass *(Digitaria sanguinalis)* reduced tomato yield at densities of 55, 215, and 430 plants m^{-2}. They however, reported that tomato fruit quality, as measured by soluble solids, acidity, and color was not influenced by the various weeds and by their densities.

In Pakistan, tomato crop being a cash commodity is kept weed free from time to time using manual labor. But, scientific studies regarding duration and threshold of weed interference with the crops are lacking in this part of the world. The yield of tomato can be increased by agronomic practices including weed control. The present study is an attempt in such a direction to investigate and provide information regarding the impact of weed interference on yield and yield components of tomato.

Methods And Materials

The present research project was carried out at Malkandher farm, N.W.F.P Agricultural University, Peshawar, during the summer season of 1989. The transplants of three tomato cultivars namely, 'Pearson', 'Gressilesse' and 'Pates druze' were transplanted to well prepared field on March 14, 1989. The experiment was laid out in Randomized Complete Block design with split plot arrangement having four replications. The three cultivars were placed in the main plots, while the four weed management regimes, viz., weedy check, hand-weeding for 4, and 2 weeks and throughout the growing season 15 days interval starting from 2 weeks after transplanting) were allotted to the sub-plots. Each sub-plot consisted of four rows, 10 feet (3.3 m) long and spaced at 3 feet (90 cm). The plant to plant distance was kept at 60 cm and rows were kept 1 m apart. Fertilizer application, irrigation, pest and disease control measures were applied according to the optimum requirements of the crop.

The data were recorded on parameters like total yield (kg ha^{-1}), fruits yield/plant (g), number of branches/plant, flower clusters/plant, days to flowering and weed density m^{-2}. The data for the individual trait were subsequently subjected to the ANOVA technique and the significant means were separated by using LSD test (Gomez and Gomez, 1984).

Results and Discussion

Total fruit yield (kg ha^{-1}): The Total yield was statistically similar among the varieties and the interaction of varieties with the weed competition durations was also non-significant statistically. However, different weed competition durations significantly affected the yield (Table 1). Numerically highest yield among the cultivars was obtained in Pates druze (3349 kg ha^{-1}). Among the durations, the highest yield (4038 kg ha^{-1}) was obtained in plots where weeding was practiced throughout the season, followed by T_2 (3476 kg ha^{-1}), where weeding was practiced for four weeks and T_3 (2979 kg ha^{-1}), where weeding was done for two weeks. Weedy plots (no weeding done throughout the growing season) gave the least yield of only 2639 kg ha^{-1}. The plots with maximum infestation gave the lowest yield because weeds reduce yield of crop due to competition for light, nutrients, water and space. Similar observations were reported by Govindra *et al.*, (1986) who observed that weedy conditions resulted in 57.6% reduction in yield when compared with weed-free conditions. Similarly Rajagopal and Sankaran (1980); Marana *et al.*, (1986), Bhomik and Reddy (1988a) and Bhomik and Reddy (1988b) also reported that presence

T_1 where weeding was practiced only for two weeks 15 days after transplantation (Table 3). The cause might be the weed interference. Weed and crop have basically the same requirements for normal growth and development. Weed compete successfully with crop plants by being more aggressive in growth habit, obtaining and utilizing the essentials for growth at the expense of the crop plant. Monaco *et al.*, (1981) noted that the fresh weight of tomato shoot decreased with all the weed densities studied.

Table 3. Effect of weed interference on number of branches/plant

Varieties	Competition Durations				Means for Varieties
	No Weeding	Weeding for four weeks	Weeding for two weeks	Weeding throughout the season	
Pearson	29.75	30.25	22.50	32.50	28.75
Gressilesse	27.25	30.00	28.25	37.50	30.75
Pates druze	25.75	30.50	28.25	37.00	30.38
Means for treatments	27.58C	30.35B	26.33C	35.67A	

$LSD_{0.05}$ value for weed competition durations (treatments) 3.80

Fruit yield/plant (kg): The analysis regarding fruit weight/plant revealed that fruit weight plant was not greatly affected by varieties and there was no interaction between varieties and treatments for fruit weight plant, whereas the weed competition durations had significantly affected the fruit yield plant (Table 4). It is evident from the mean values of different treatments that maximum fruit weight plant (6.45 kg) was observed in those plots where weeding was done throughout the growing season (T_4), followed by T_2 (5.54 kg) where weeds were controlled for four weeks continuously 15 days after transplantation and T_3 (4.29); where weeding was practiced for two weeks. Minimum fruit weight/plant (3.62 kg) was noted in T_1 where no weeding was done throughout the growing season. Quite analogous results were reported by Bhowmik *et al.*, (1988b) that season long interference of common lambsquarters reduced fruit weight from 17% to 36%.

Table 4. Effect of weed interference on fruit yield/plant (kg) in different varieties of tomato

Varieties	Competition Durations				Varietal Means
	No Weeding	Weeding for four weeks	Weeding for two weeks	Weeding throughout the season	
Pearson	3.125	5.25	4.00	6.37	4.688
Gressilesse	4.125	6.00	4.75	6.37	5.313
Pates druze	3.625	5.37	4.125	6.621	4.938
Duration Means	3.621D	5.541B	4.29C	6.45A	-

$LSD_{0.05}$ value for weed competition durations 0.35

Number of flower clusters/plant: Number of flower clusters plant were significantly affected by different weed control treatments but different varieties and interaction did not show any significant effect (Table 5). Maximum number (50.33) of flower clusters plant were noted in T_4 where weeding was practiced throughout the season, followed by T_2 (45.42) and T_3 (39.75), whereas the minimum number of flower clusters/plant (38.08) were noted in T_1 where no

weeding was done (Table 5). Among the interactions, the maximum number of flower clusters/plant (15) were recorded in the cultivar Gressilesse where weeding was practiced throughout the growing season and minimum number of flower clusters/plant were also recorded in Gressilesse under the no weeding regime.

Table 5. Effect of weed interference on number of flower clusters/plant in different varieties of tomato.

Varieties	Competition Durations				Varietal Means
	No Weeding	Weeding for four weeks	Weeding for two weeks	Weeding throughout the season	
Pearson	39.25	47.00	41.75	50.00	44.50
Gressilesse	35.50	46.50	39.00	51.00	43.00
Pates druze	39.50	42.75	38.50	50.00	42.68
Duration Means	38.08C	45.42B	39.75C	50.33A	-

$LSD_{0.05}$ value for competition durations = 2.33

Weeds m^{-2}: Different varieties did not show any significant response to weeds m^{-2} whereas different weed control treatments significantly altered the weed population. There was no interaction between varieties and treatments against weeds m^{-2} (Table 6). Maximum number (98.33) of weeds m^{-2} were recorded in no weeding in full growing season followed by T_3 (96.08); where weeding was practiced for two weeks. Minimum number (0.00) of weeds were recorded in T_4 followed by T_2 (42.67) where continuous weeding throughout the season and weeding 15 days after transplanting for four weeks were practiced, respectively. It clearly depicts that the competition was critical even after 4 weeks of transplanting. These findings are in great analogy with the work reported by Marana *et al.*, (1986) who reported 30-40 days after sowing as the critical period of weed competition in tomato. These densities in the different treatments were influential in determining the yield and yield components of tomato crop.

Table 6. Weed density (m^{-2}) as influenced by different weed competition durations in different varieties of tomato.

Varieties	Competition Durations				Varietal Means
	No Weeding	Weeding for four weeks	Weeding for two weeks	Weeding throughout the season	
Pearson	91.75	40.25	96.00	0	57.00
Gressilesse	97.25	42.00	89.00	0	57.06
Pates druze	106.00	45.75	103.25	0	63.57
Duration Means	98.33B	42.67 C	96.08 B	0 A	-

$LSD_{0.05}$ value for weed competition durations = 7.02

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