Indian Journal of Weed Science 42(1&2) : 109-111, 2010 **Short communication**

Studies on the threshold values of horse purslane in onion

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ABSTRACT

A field investigation was carried out during *rabi* 2007 at Tamil Nadu agricultural University, Coimbatore to evaluate the threshold values of horse purslane (*Trianthema portulacastrum)* in onion. Increase in densities of *T. portulacastrum* increased the yield reduction linearly in onion crop. The maximum percentage of yield reduction was recorded with 64 weeds/m^2 (54.8%) over the zero weeds/m^2. The lowest yield reduction was with 4 weeds/m^2 (8.8%) followed by 8, 16, 32 weeds/m^2 (27.1, 38.61, 46.38% respectively). It is evident that a density of 4 weeds/m^2 was the threshold value of *Trianthema portulacastrum* for onion crop to avoid significant yield reduction.

Key words: Threshold level, *Trianthema portulacastrum*, Onion

Horse purslane (*Trianthema portulacastrum*) is an annual terrestrial weed and widely distributed in India, Srilanka, Africa and tropical America (Balyan and Bhan 1986). The seeds of *T. portulacastrum* are hard seeds coated (Tadulingam and Venkatanarayana 1932), hence persist in the soil seed bank for many years and infest the crops raised subsequently. Under irrigated conditions, *T. portulacastrum* is the dominating broad leaf weed and compete with the crop for various inputs and need to be controlled effectively when their intensity exceeds the critical limits. Its infests various agricultural and vegetable crops such as mustard, maize, pigeon pea, mung bean, potato, onion, cotton, soybean, pearl millet and sugarcane. The mechanical removal of plants during traditional weeding does not help in reducing weed infestation. A decrease in seed yield of mungbean due to weeds was reported by Punia *et al.* (2004). Upto 60-70% infestation of this weed was observed in soybean fields and 80-90% in maize and mustard (Aneja *et al.* 2000).

The inherent characteristics of onion such as slow initial growth, short stature, non branching habit, sparse foliage, shallow root system, coupled with liberal irrigation and fertilizer application encourage luxuriant growth of *T. portulacastrum* and offer severe competition to crop. However, for making sound weed management decision, it is very important to generate data regarding impact of weeds at different population levels on the yield reduction of crop. This will help to avoid the use of herbicide and decrease environmental pollution. This can be achieved by studying the relationship between weed density and onion yield. Keeping above in view, the present study was conducted to find out the threshold values of *T. portulacastrum*.

Field experiment was conducted during *rabi* 2007 at Department of Agronomy, Tamil Nadu Agricultural University, Coimbatore. The experimental field was sandy loam in texture which was having higher population of *T. portulacastrum*. The experiment was laid out in a randomized block design with different *T. portulacastrum* density (0, 4, 8, 16, 32 and 64 weeds m^2). Planting of onion was done with row spacing of 25 x 10 cm. A plot of one square meter was marked before applying first irrigation to the onion crop. The *T. portulacastrum* population levels were maintained after applying first irrigation to onion crop. Recounting was also done 15 days after maintaining the variable population levels and desirable population was ensured by uprooting the second flush of weeds. The density of *T. portulacastrum* was maintained as per treatment by thinning when weed plants were completely emerged. All other weeds were removed manually as and when required to eliminate the competition effects of other weeds. The uniform population of onion crop was also maintained in all the plots. The observations on growth and yield parameters of crop and weed were made on different growth stages.

Effect of *T. portulacastrum* on growth and yield parameters of onion

The growth and development of onion was significantly affected with increase in densities of *T. portulacastrum* from 0 to 64 weeds/m^2. The increase in density of *T. portulacastrum* from 0 to 64 weeds/m^2 linearly reduced the plant height from 15.4 cm to 10.7 cm for zero and 64 weeds/m^2, respectively at 20 DAT and 23.2 cm to 11.0 cm for zero and 64 weeds/m^2, respectively at harvest stage. Likewise, the leaf area and dry matter production was also reduced with increase in densities

from zero to 64 weeds/m^2. But the reduction in plant height, dry matter production and leaf area was significant with the density above 4 weeds/m^2. The reduction in plant height at 8 weeds/m^2 was 13.9 and 18.7 cm at 20 DAT and harvest stage, respectively compared to the plant height of 15.4 and 23.2 cm at 20 DAT and harvest stage for zero weeds/m^2 and 15.2 and 23.5 cm for 4 weeds/m^2. The reduction in dry matter production was also significant with 8 weeds/m^2 compared to 0 and 4 weeds/m^2. The total dry matter production was 46.8, 34.7, 29.3 and 24.2 g/plant for 8, 16, 32 and 64 weeds/m^2, respectively compared to 61.1 and 60.2 g/plant for 0 to 4 weeds/m^2, respectively at harvest stage. The reduction in total dry matter production was linear with increase in densities of weed (Table 1).

The yield parameters also reduced significantly beyond 4 weeds/m^2 in onion crop. *T. portulacastrum* density of 8 weeds/m^2 recorded 5.8 numbers of bulbs/plant compared to 7.4 numbers of bulbs with zero weed density and 4 weeds/m^2. The maximum bulb yield was recorded with zero weed density (7489 kg/ha) followed by 4 weeds/m^2 (6829 kg/ha). The lowest bulb yield was recorded with the treatment 64 weeds/m^2 (3385 kg/ha). The reduction in bulb yield was significant with 8 weeds/m^2 and with the increasing densities of *T. portulacastrum*. The significant yield reduction with 8 weeds/m^2 was 5455 kg/ha (Table 2). The maximum percentage of yield reduction was recorded with 64 weeds/m^2 (54.8%) over the zero weeds/m^2. The lowest yield reduction was with 4 weeds/m^2 (8.8%) followed by 8, 16, 32 weeds/m^2 (27.1, 38.61, 46.38% respectively) (Fig. 1).

The results indicated that the increase in densities of *T. portulacastrum* increased the yield reduction linearly in onion crop. Similar results were also observed by Punia *et al.* (2004) and Walia and Manpreet Singh (2005).

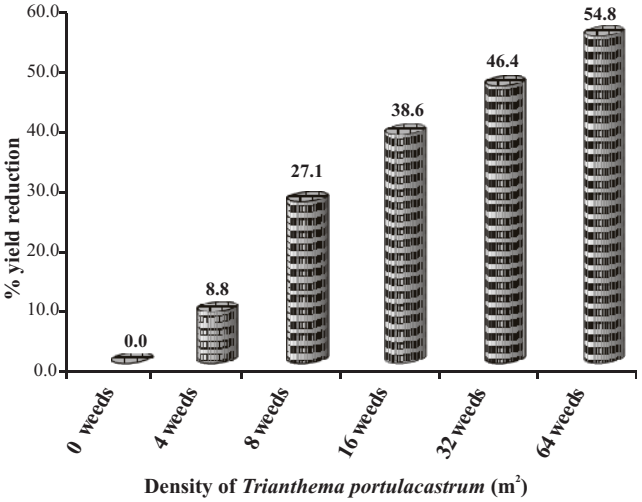

Fig. 1. Per cent yield reduction due to *Trianthema portulacastrum* in onion

However, the yield reduction was significant beyond the density of 4 plants of *T. portulacastrum*/m^2 in onion. From this experiment, it is evident that a density of 4 weeds/m^2 is the threshold value of *Trianthema portulacastrum* for onion crop to avoid significant yield reduction.

Growth and reproductive potential of *Trianthema portulacastrum*

Observation on weed characters revealed that there was a linear decrease in all the observed characters of *Trianthema portulacastrum* with increasing densities of weed but all the observed parameters recorded linear increase over stages of observation from 20 DAT to maturity. The various densities of *T. portulacastrum* significantly affected the growth and development of its own population. The linear decrease in growth and yield parameters of *T. portulacastrum* is mainly due to the competition among themselves and between weed and crop. There was a significant reduction in number of

Table 1. Effect of increasing densities of *T. portulacastrum* on growth parameters of onion after different days of transplanting

Treatments	20 DAT			40 DAT			60 DAT		
	Plant height (cm)	Leaf area (cm^2/plant)	Dry matter production (g/plant)	Plant height (cm)	Leaf area (cm^2/plant)	Dry matter production (g/plant)	Plant height (cm)	Leaf area (cm^2/plant)	Dry matter production (g/plant)
0 weeds/m^2	15.4	56.3	1.50	22.3	119.5	11.0	25..0	227.8	36.3
4 weeds/m^2	15.2	48.5	1.37	22.6	110.9	10.1	24.7	208.8	33.5
8 weeds/m^2	13.9	46.4	1.20	20.2	88.3	7.0	24.4	176.4	26.8
16 weeds/m^2	11.8	38.5	1.17	17.0	73.2	6.8	16.1	168.9	22.3
32 weeds/m^2	11.2	32.6	1.17	15.3	70.8	6.1	13.5	159.5	18.6
64 weeds/m^2	10.7	28.5	0.77	13.7	59.4	5.5	11.1	136.9	14.2
LSD (P=0.05)	2.8	7.1	0.32	3.8	5.5	1.7	3.8	12.2	4.4

DAT - Days after transplanting

Table 2. Effect of increasing densities of *T. portulacastrum* on yield and yield parameters of onion

Treatments	Plant height (cm)	Leaf area + (cm^2/plant)	Dry matter production (g/plant)	No. of bulbs/plant	Bulb yield (kg/ha)
0 weeds/m^2	23.2	154.5	61.1	7.5	7489
4 weeds/m^2	23.5	142.9	60.2	7.5	6829
8 weeds/m^2	18.7	117.3	46.8	5.8	5455
16 weeds/m^2	16.9	110.2	34.7	5.5	4597
32 weeds/m^2	12.4	108.8	29.3	5.0	4015
64 weeds/m^2	11.0	95.4	24.2	5.3	3385
LSD (P=0.05)	3.4	11.3	8.1	2.3	107

Table 3. Growth and reproductive parameters of *T. portulacastrum* after different days of transplanting

Treatments	20 DAT			40 DAT			60 DAT			Yield parameters		
	Plant height (cm)	Leaf area (cm^2/plant)	Dry matter production (g)	Plant height (cm)	Leaf area (cm^2/plant)	Dry matter production (g)	Plant height (cm)	Leaf area (cm^2/plant)	Dry matter production (g)	No. of flowers/ plant	No. of seeds/ flower	Total seeds/ plant
0 weeds/m^2	0.0	0.0	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4 weeds/m^2	7.3	18.2	0.13	35.4	129.9	13.7	68.0	631.4	12.7	56.2	5.0	281.0
8 weeds/m^2	8.2	16.8	0.13	32.7	122.5	12.1	63.1	591.4	12.0	55.3	5.0	276.5
16 weeds/m^2	7.3	16.2	0.10	32.2	98.3	11.6	61.6	550.3	8.1	48.1	5.0	240.5
32 weeds/m^2	6.0	14.1	0.10	30.9	89.5	9.3	56.4	487.9	7.8	41.3	5.0	206.5
64 weeds/m^2	5.4	11.0	0.03	30.4	84.8	9.1	52.4	485.4	7.5	34.2	5.0	171.0
LSD (P=0.05)	1.5	3.1	0.05	5.1	12.8	6.4	14.5	23.5	4.3	3.9	-	10.0

DAT - Days after transplanting

flowers and number of seeds/plant with increase in densities. The maximum number was recorded with the density 4 weeds/m^2 (56.2) followed by 8 weeds/m^2 (55.3) but there was no change in number of seeds/flower[1] due to increased population of *T. portulacastrum.* The seed production potential ranged from 281 seeds to 171 seeds for 4 weeds/m^2 and 64 weeds/m^2.

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