Indian Journal of Weed Science **44**(1): 18–20, 2012

Weed management practices on growth and yield of winter season brinjal under Chhattisgarh plain conditions

Kunti, Gaurav Sharma* and A.P. Singh[1]

Department of Horticulture, Indira Gandhi Krishi Vishwavidyalaya, Raipur, Chhattisgarh 492 012

Received: 7 May 2011; Revised: 20 November 2011

ABSTRACT

The present investigation was conducted to evaluate the effect of weed management practices on weeds as well as crop growth and yield parameters of brinjal along with the economics of weed management during winter season of 2009-10 at the Department of Horticulture, Indira Gandhi Krishi Vishwavidyalaya, Raipur. It was observed that the weed *Parthenium hysterophorus* dominated the experimental field. All the weed management treatments significantly reduced the dry matter of weeds and increased fruit yield of the crop significantly over unweeded check. Among the treatments, pendimethalin (Extra) (0.64 kg/ha) pre-transplanting + one hand weeding at 40 DAT + pendimethalin (Extra) (0.64 kg/ha) at 45 DAT as post-emergence resulted in better performance followed by pendimethalin (1.0 kg/ha) pre-transplanting + one hand weeding at 45 DAT with respect to growth and yield parameters due to effective weed management in brinjal. Maximum benefit: cost ratio was also obtained with pendimethalin (extra) (0.64 kg/ha) pre-transplanting + one hand weeding at 40 DAT + pendimethalin (Extra) (0.64 kg/ha) at 45 DAT.

Key words: Benefit : cost ratio, Economics, Hand weeding, Herbicides, *Solanum melongena*, Yield

Brinjal (*Solanum melongena* L.) is considered to be one of the most important crops among the vegetables. In India, it is cultivated in about 5.66 lakhs hectares with a production of 9.596 million tonnes and productivity of 16.9 t/ha (Anon 2008). Brinjal contributes 9 per cent of the total vegetable production of the country occupying a major share in the Indian diet. Weed menace is considered to be one of the major constraints for low productivity of brinjal. Weeds compete with crop for nutrients, soil moisture, sun light and reduce the crop yield. Yield reduction due to weed competition in brinjal is in the range of 49 to 90 per cent (Reddy *et al*. 2000). The use of herbicides along with cultural practices has been reported to suppress the fast growth of weeds in brinjal. However, reports on the efficacy of these herbicides in brinjal crop under Chhattisgarh plains are scanty and require thorough study. Hence, the present investigation was conducted to test the efficacy of various herbicides alone or in combination for obtaining higher brinjal yield under Chhattisgarh plain conditions.

MATERIALS AND METHODS

The present experiment was conducted at Indira Gandhi Krishi Vishwavidyalaya, Raipur which is situated in the central part of Chhattisgarh at 21°16' N latitude, 81°36' E longitude and at an altitude of 289.56 m from mean sea level. The soil of experimental field was clay - loam in texture with average fertility locally know as dorsa. Brinjal variety 'Mukta Keshi' was grown as test crop. The crop was fertilized with 100 kg/ha nitrogen in the form of urea, 80 kg/ha phosphorus in the form of single super phosphate and 60 kg/ha potassium in the form of muriate of potash. Total quantity of P_2O_5 and K_2O was applied as basal, while N was applied in four splits i.e. basal, 30, 60 & 90 days after transplanting (DAT). The experiment was laid-out in a randomized block design with three replications having 11 treatments comprising of hand weeding, mulching, pre-transplanting treatments with alachlor (2.0 kg/ha), pendimethalin (1.0 kg/ha), pendimethalin (extra) (0.64 kg/ha), post-transplanting treatment with glyphosate (1.5 kg/ha) and unweeded check. Spraying was done by hand operated knap-sack sprayer with flat-fan nozzle using water as carrier 500 liter/ha. The required quantity of herbicide was dissolved in measured quantity of water and sprayed uniformly over the plot. The blanket spray of alachlor, pendimethalin and pendimethalin (Extra) and directed spray of glyphosate was done as per treatment. Observations on various vegetative and flowering parameters *viz.*, plant height, number of branches per plant, leaf area, leaf area index (at 120 DAT), number and weight of fruits per plant, fruit yield as well as weed observations such as weed density, dry matter of weeds and weed control efficiency were recorded at harvest. The economics of these weed management practices were also worked out.

***Corresponding author:** sharmagaurav1@rediffmail.com

[1]*Department of Agronomy, Indira Gandhi Krishi Vishwavidyalaya, Raipur, Chhattisgarh 492 012*

RESULTS AND DISCUSSION

In the experimental field broad leaved weeds were found predominantly throughout the period of study. It was observed that *Parthenium hysterophorus* dominated the field followed by *Cynodon dactylon, Alternenthera triandra, Cyperus iria, Sonchus arvensis, Chenopodium album, Physalis minima* and *Euphorbia hirta*. Pendimethalin (Extra) (0.64 kg/ha) pre-transplanting + one hand weeding at 40 DAT + pendimethalin (extra) (0.64 kg/ha) at 45 DAT resulted in better performance with respect to growth parameters. Significantly taller plants (85.36 cm), maximum number of total branches per plant (31.53), leaf area per plant (9352 cm^2) and maximum leaf area index per plant (3.46 cm^2) were recorded with pendimethalin (extra) (0.64 kg/ha) pre-transplanting + one hand weeding at 40 DAT + pendimethalin (extra) (0.64 kg/ha) at 45 DAT (Table 1). With respect to yield parameters, significantly highest number of fruits per plant (5.26), weight of fruits per plant (85.00g) and fruit yield (25.18t/ha) were also recorded with pendimethalin (extra) (0.64 kg/ha) pre-transplanting + one hand weeding at 40 DAT + pendimethalin (extra) (0.64 kg/ha) at 45 DAT followed by pendimethalin (1.0 kg/ha) pre-transplanting + One hand weeding at 45 DAT. The higher yield may be attributed to lower dry matter accumulation by weeds and decrease in their population that helped in increasing the yield attributes which ultimately led to higher yield (Mekki *et al.* 2010).

Minimum weed density (4.10/m^2) was observed with application of pendimethalin (Extra) (0.64 kg/ha) pre-transplanting + one hand weeding at 40 DAT + pendimethalin (Extra) (0.64 kg/ha) at 45 DAT (Table 2). The variability in weed density in different treatments can be attributed to the fact that some herbicides are more effective for weed control than others (Khan *et al.* 2008). Meena (2004) also found similar results in brinjal crops. The minimum dry matter weight (3.00g/m^2) under application of pendimethalin (Extra) (0.64 kg/ha) pre-transplanting + one hand weeding at 40 DAT + pendimethalin (Extra) (0.64 kg/ha) at 45 DAT might be due to longer persistence of this herbicide up to harvest. This may also be attributed to better control of weeds thereby lower weed population and suppression of weed growth which might have resulted in lower accumulation of dry matter of weeds (Biradar *et al.* 1999). Similarly, application of herbicides which recorded slightly higher density of weeds and their dry weight may be due to lower herbicidal activity of these chemicals, which could not control newly emerged weeds up to longer period (Patel *et al.* 2006). Maximum weed control efficiency (79.67%) was also recorded under pendimethalin (extra) (0.64 kg/ha) pre-transplanting + one hand weeding at 40 DAT + pendimethalin (Extra) (0.64 kg/ha) at 45 DAT. The weed control efficiency is inversely related to dry matter production of weeds. This may be due to lower accumulation of dry matter of weeds at the later stage of crop growth, under all the herbicide treat-

Table 1. Effect of different weed management practices on growth, yield attributes and yield in brinjal

Treatment	Plant height (cm)	Number of branches /plant	Leaf area /plant(cm^2)	Leaf area index (120 DAT)	Number of fruits /plant	Weight of fruits /plant(g)	Fruit yield (t/ha)
Unweeded check	70.8	18.4	4385	1.6	1.7	42.3	12.2
Two hand weeding at 30 and 60 DAT	78.9	24.8	7500	2.8	3.5	65.0	19.3
Mulch (straw) at 0 up to 60 DAT	75.8	22.7	4984	1.8	2.9	44.3	15.9
Alachlor (2.0 kg/ha) pre-transplanting	76.2	24.2	5640	2.1	3.2	56.7	18.1
Alachlor (2.0 kg/ha) pre-transplanting +one hand weeding at 45 DAT	82.1	29.8	8797	3.2	5.1	71.7	23.3
Pendimethalin (1.0 kg/ha) pre-transplanting	78.3	24.5	6534	2.4	3.4	60.7	18.6
Pendimethalin (1.0 kg/ha) pre-transplanting + one hand weeding at 45 DAT	84.9	31.2	9034	3.3	5.2	74.3	24.3
Glyphosate (1.5 kg/ha) post-transplanting at 30 and 60 DAT	80.3	25.1	7851	2.9	3.5	71.0	21.1
Glyphosate (1.5 kg/ha) post-transplanting at 30 and 60 DAT + one hand weeding at 15 DAT	81.9	29.2	8600	3.2	4.2	74.3	23.1
Pendimethalin (extra) (0.64 kg/ha) pre-transplanting + one hand weeding at 40 DAT	80.9	28.5	8407	3.1	4.2	76.7	22.3
Pendimethalin (extra) (0.64 kg/ha) pre-transplanting + one hand weeding at 40 DAT + pendimethalin (extra) (0.64 kg/ha) at 45 DAT	85.4	31.5	9352	3.5	5.3	85.0	25.2
LSD (P=0.05)	7.5	3.7	1360	0.5	1.67	11.9	3.2

Table 2. Effect of different weed management practices on weeds and economics of weed management in brinjal

Treatment	Weed density (no/m^2)	Dry matter of weeds (g/m^2)	Weed control efficiency (%)	Gross returns (x10^3 ₹/ha)	Net returns (x10^3 ₹/ha)	Benefit : cost ratio
Unweeded check	21.05	14.76	_	97.60	56.64	1.38
Two hand weeding at 30 and 60 DAT	8.06	6.13	58.46	154.24	106.98	2.26
Mulch (straw) at 0 up to 60 DAT	12.74	9.43	36.11	127.36	85.77	2.06
Alachlor (2.0 kg/ha) pre-transplanting	10.67	7.43	49.66	144.72	103.01	2.47
Alachlor (2.0 kg/ha) pre-transplanting + one hand weeding at 45 DAT	4.90	3.50	76.28	186.56	14275	3.25
Pendimethalin (1.0 kg/ha) pre-transplanting	10.57	6.33	57.11	149.12	107.57	2.58
Pendimethalin (1.0 kg/ha) pre-transplanting + one hand weeding at 45 DAT	4.75	3.40	76.96	194.48	150.83	3.45
Glyphosate (1.5 kg/ha) post-transplanting at 30 and 60 DAT	6.89	6.00	59.34	169.20	127.19	3.02
Glyphosate (1.5 kg/ha) post-transplanting at 30 and 60 DAT + one hand weeding at 15 DAT	5.93	4.00	72.89	184.64	140.53	3.18
Pendimethalin (Extra) (0.64 kg/ha) pre-transplanting + one hand weeding at 40 DAT	6.29	4.86	67.07	178.24	134.68	3.09
Pendimethalin (Extra) (0.64 kg/ha) pre-transplanting + one hand weeding at 40 DAT + pendimethalin (Extra) (0.64 kg/ha) at 45 DAT	4.10	3.00	79.67	201.44	157.38	3.57
LSD (P=0.05)	-	2.87	-	-	-	-

ments. Similar findings were also reported by Singh *et al*. (1997) and Mekki *et al.* (2010). The maximum gross return (Rs. 2,01,440/ha), net return (Rs. 1,57,386/ha) as well as benefit: cost ratio (3.57) was obtained under pendimethalin (extra) (0.64 kg/ha) pre-transplanting + one hand weeding at 40 DAT + pendimethalin (extra) (0.64 kg/ha) at 45 DAT.

REFERENCES

Anonymous. 2008. *National Horticulture Board*. Ministry of Agriculture, Government of India, Gurgaon. pp. 155-158.

Biradar SA, Agasimani CA and Yenagi BS. 1999. Integrated weed management in chilli (*Capsicumannum* L.) under northern transition tract of Karnataka. *World Weeds* **6**(1): 53 – 59.

Khan IA, Hassan G, Daur I and Khattak B. 2008. Chemical weed control in Canola. *Arab Journal of Plant Protection* **26**: 72-74.

Meena R. 2004. *Weed management in brinjal (Solanum melongena* L.*)* variety Mukta Keshi. M.Sc. (Ag) thesis. IGKV, Raipur (C.G.). pp. 89- 90.

Mekki BB, Faida AA and Kowthar G. 2010. Effect of weed control treatments on yield and seed quality of some Canola cultivars and associated weeds in newly reclaimed sandy soils. *American-Eurasian Journal of Agricultural & Environmental Science* **7**(2): 202-209.

Patel BD, Patel VJ, Patel JB and Patel RB. 2006. Effect of fertilizers and weed management practices on weed control in chickpea under middle Gujarat conditions. *Indian Journal of Crop Science* **1**(1&2): 180-183.

Reddy CN, Reddy MD and Devi MP. 2000. Efficiency of various herbicides on weed control and yield of brinjal. *Indian Journal of Weed Science* **32**(3&4): 150-152.

Singh V, Bisen RK and Agrawal HP 1997. A note on weed control studies in brinjal. *Vegetable Science* **24**(2): 162-163.