Indian Journal of Weed Science **45**(4): 291–293, 2013

Short communication

Effect of new herbicides on growth and yield of wheat

V.B. Paighan, A.K. Gore and A.S. Chavan[1*]

Marathwada Krishi Vidyapeeth, Parbhani, Maharashtra 431 402

Received: 12 September 2013; Revised: 28 November 2013

Key words : Herbicides, Weed control, Yield, Wheat

Wheat (*Triticum aestivum*) is the world's most widely cultivated food crop and in India it is second important staple food, rice being the first. A formidable factor that limits its productivity is severe weed competition, which competes with crop plants for water, nutrients, space and solar radiation resulting in reduction of yield by 29% (Pandey *et al. 2006*). Wheat field is generally infested from both monocot and dicot weeds. The most common weeds in wheat which cause reduction in grain yield of wheat are *Chenopodium album*, *Convolvulus arvensis*, *Cynodon dactylon* etc. in crop-weed ecosystem (Singh and Singh, 2004), controlling these weeds at initial stage, results in greater benefit. There are many good pre-emergence herbicides used for weed control in India and they were found effective in controlling weeds in wheat. This trial was done to assess efficacy of post-emergence herbicides for weed control in wheat, its effect on growth and yield of wheat and economics of different herbicidal treatments.

A field investigation was conducted during *Rabi* season 2009-10 at the Experimental Farm, Department of Agronomy, Marathwada Krishi Vidyapeeth, Parbhani, Maharashtra. The experimental field was leveled and well drained, clayey in texture with pH 7.8, organic carbon 0.52%, medium in available N, P and high in available K. The maximum and minimum temperature recorded during the experimental period was 40.2^{0}C and 6.6^{0}C, respectively. The experiment was laid out in randomized block design with ten treatments. Each experiment unit of 5.4 x 6.0 m gross plot size and having 3.6 x 4.2 m of net plot size was repeated three times. In weed free treatment, the plot was kept weed free by weeding at 20 days interval for three times where as in two hand weeding, weeding were carried out at 20 and 35 days after sowing. Variety *'NIAW-301'(Trimbak*) was sown manually on 2nd December, 2009 at a row spacing of 22.5 cm using 125 kg seeds/ ha. The basal dose consisting of NPK 50 : 50 : 50 kg/ha in the form of Urea, SSP and MOP was applied before sowing. The remaining half dose of 50 kg N was applied on 23rd December, 2009, 22 days after sowing. Pre-emergence application of pendimethalin 750 g/ha was done on 4th December 2009. The remaining PoE herbicides were applied on 4th of January, 2010 (32 days after sowing) Various ancillary observations on crop growth were periodically recorded along with post harvest studies to evaluate treatment effects. Necessary observations on weeds were also recorded during the conduct of experiment.

The dominant dicot weeds were: *Acalypha indica*, *Parthenium hysterophorus*, *Phyllanthus medraspatensis*, *Convolvulus arvensis*, *Euphorbia geniculata*. In monocot weeds *Cynodon dactylon*, *Cyprus rotundus* and *Brachiaria eruciformis* were dominant.

Throughout the crop growth period, lower weed intensity was observed in weed free and it was followed by metsulfuron-methyl 4 g/ha. In weedy check, dicot weeds were higher than monocot at 60 DAS (Table 1). These results were in conformity with Pandey *et al.* 2001 and Singh and Ali 2004). The treatment of weed-free did not record any dominant weeds at 60 DAS except *Cynodon dactylon* and *Cyprus rotundus*, whereas metsulfuron-methyl 4 g/ha. controlled dicot weeds than monocot weeds. Similar reports were given by Pandey *et al.* (2001), Singh and Ali (2004). Lowest monocot weed weight was observed with weed free treatment followed by metsulfuron-methyl 4 g/ha whereas, highest monocot weeds dry weight was recorded with treatment weedy check. At 60 days after sowing, lowest dicot weed weight was recorded with treatment weed free followed by metribuzin 300 g/ha. The treatment weedy check showed highest dicot weed dry weight followed by 2,4-D Na salt 750 g/ha. The highest weed control efficiency was observed in weed free condition followed by metsulfuron-methyl 4 g/ha at 30 DAS and at 60 DAS. The results of the present quest are in line with the findings of Pandey *et al.* (2001) and Verma *et al.* (2007).

The highest dry matter accumulation was recorded with weed free treatment followed by metsulfuron-methyl 4 g/ha over weedy check (Table 2). This might be due to effective control of weeds, so it resulted in mini-

***Corresponding author:** anil.bunty212@gmail.com

[1]Department of Agronomy, NAU, Navsari

Table 1. Effect of herbicides on weed population, dry weed weight and weed control efficiency (60 days after sowing)

Treatment	Dose (g/ha)	Weed population (no./m^2)		Dry weed weight (g/m^2)	
		Monocot	Dicot	Monocot	Dicot
Pendimethalin	750	17.6	22.6	141.5	177.0
Carfentrazone	25	21.6	40.6	141.7	251.6
Fenoxaprop	120	23.3	30.6	194.9	262.7
2,4-D	750	17.6	48.0	123.8	352.4
Metsulfuron-methyl	4	14.3	53.6	42.6	161.4
Metribuzin	300	18.6	25.6	90.1	125.1
Fenoxaprop + metribuzin	90+140	21.3	30.6	158.5	237.0
Weed free	-	6.6	8.6	10.5	12.1
2 HWs	-	24.3	33.6	102.7	130.7
Weedy check	-	51.3	91.3	464.9	729.3
LSD (P=0.05)	-	21.7	38.5	47.0	71.2

Table 2. Effect of herbicides on growth, yield attributes and yield of wheat

Treatment	Dose (g/ha)	Plant height at harvest (cm)	No. of tillers per plant at harvest	Ear length (cm)	Number of grains/ ear	1000-grain weight (g)	Grain yield (t/ha)	Gross monetary returns (x10^3 `/ ha)	Net monetary returns (x10^3`/ ha
Pendimethalin	750	88.4	4.40	8.10	50.3	39.0	2.93	40.34	26.91
Carfentrazone	25	88.7	4.26	7.90	47.8	37.5	2.67	36.69	24.24
Fenoxaprop	120	88.4	4.33	7.80	47.5	37.1	2.60	35.74	23.34
2,4-D	750	87.8	4.40	7.93	48.6	37.9	2.69	37.16	24.75
Metsulfuron-methyl	4	90.1	4.73	8.33	50.8	40.0	3.16	43.66	31.35
Metribuzin	300	89.4	4.46	8.30	50.7	39.4	3.15	43.43	30.90
Fenoxaprop + metribuzir	90+140	87.8	4.33	8.06	48.6	38.4	2.81	40.68	26.23
Weed free	-	90.2	5.00	8.36	51.9	41.2	3.36	46.26	30.84
2 H Ws	-	88.7	4.26	8.23	50.6	39.1	3.01	41.35	29.13
Weedy check	-	85.6	4.13	7.63	46.1	36.6	2.54	34.61	22.78
LSD (P=0.05)	-	2.05	0.28	N.S.	2.11	1.78	0.505	0.59	0.52

mum weed-crop competition. The dry matter accumulation is largely a function of photosynthetic surface which has also more under these treatments resulting in increased biological productivity and finally dry matter accumulation. Similar results were obtained by Hooda *et al.* (2007). Grain and straw yield of wheat were higher in weed free situation followed by metsulfuron-methyl 4 g/ha. Weedy check recorded the lowest grain and straw yield. Low yield in check may be due to poor root growth and higher weed population could have competed with wheat crop for space, water and nutrients, thereby adversely affecting grain and straw yields. Similar trends were given by Pandey *et al.* (2001) and Pandey *et al.* (2006).

Maximum gross monetary return was observed in weed free treatment due to effective weed control. While highest net monetary returns and B : C ratio was recorded with treatment metsulfuron-methyl 4 g/ha- may be due to higher yield and comparatively lower cost of cultivation as compared to weed free treatment. These results were in conformity with Jat *et al.* (2003) and Pandey *et al.* (2006).

SUMMARY

An average decrease in grain yield by 15.42 % was observed due to season-long weed-crop competition. Lowest monocot and dicot weeds were observed with weed free treatment. The best weed control efficiency in case

of monocot (90.8%) and dicot (82.8%) was achieved with metsulfuron-methyl and metribuzin, respectively compared to other herbicides namely pendimethalin, carfentrazone, fenoxaprop and 2,4-D. All the treatments except fenoxaprop, carfentrazone, 2,4-D and mixture of metribuzin and fenoxaprop application gave significantly higher grain yield compared to weedy check. However , higher additional net return (` 31,359) was obtained with metsulfuron-methyl followed by metribuzin (` 30,907).

REFERENCES

Hooda VS, Dhukia RS, Malik RK, Yadav A, Kumari R and Singh S. 2007. Influence of irrigation and metsulfuron- methyl on growth, yield attributes and yield of wheat (*Triticum aestivum* L.). *Indian Journal of Weed Science* **39**(1&2): 123-125.

Jat RS, Nepalia V and Jat RL. 2003. Effect of weed control and sowing methods on production potential of wheat (*Triticum aestivum*). *Indian Journal of Agronomy* **48**(3): 192-195.

Pandey, AK, Gopinath KA and Gupta HS. 2006. Evaluation of sulfosulfuron and metribuzin for weed control in irrigated wheat (*Triticum aestivum*). *Indian Journal of Agronomy* **51**(2): 135-138.

Pandey J, Mishra BN and Verma AK. 2001. Effect of metsulfuron-methyl, 2,4-D and their tank mixture on weeds and yield of wheat (*Triticum aestivum*). *Annals of Agricultural Research* **22**: 100-103.

Singh P and Ali M. 2004. Efficacy of metsulfuron-methyl on weeds in wheat and its residual effects on succeeding soybean crop growth on vertisols of Rajasthan. *Indian Journal of Weed Science* **36**(1&2): 34-37.

Singh R and Singh B. 2004. Effect of irrigation time and weed management practices on weeds and wheat yield. *Indian Journal Weed Science* **36**(1&2): 25-27.

Verma SK, Singh SB, Singh G, and Rai OP. 2007. Performance of varieties and herbicides on production potential of wheat (*Triticum aestivum*) and associated weeds. *Indian Journal of Weed Science* **39**(3&4): 230-233.