



Growth and productivity of wheat as influenced by weed management

M. Saquib, R.L. Bhilare* and D.W. Thawal

Department of Agronomy, College of Agriculture, Pune, Maharashtra 411 005

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Wheat (*Triticum aestivum* L.) is the most important staple food crop of India. Wheat is the predominant *Rabi* season crop of north central and upper peninsular region of country. About 20-25% of the area under wheat is infested with narrow and broad leaf weeds, resulting in yield loss of 30-50% (Singh and Ghosh 1992). Shortage of labourers at right time to control weed by hand weeding has become difficult and uneconomical. Some herbicides like 2,4-D, isoproturon and new broad spectrum herbicides like metribuzin and sulfosulfuron have great importance in controlling weeds very effectively. To test the efficacy of these herbicides alone and in combination, an experiment was planned.

Field experiment was conducted at Agronomy Farm, College of Agriculture, Pune during *Rabi* 2009-10. The experiment was laid out in randomized block design with three replications. The nine treatment consisted of weedy check (T_1), weed free check (T_2), hand weeding at 30 DAS (T_3), post-emergence application of isoproturon 1000 g/ha (T_4), sulfosulfuron 25 g/ha (T_5), 2,4-D 750 g/ha (T_6), metribuzin 175 g/ha (T_7), isoproturon 500 g + 2,4-D 375 g/ha (T_8) and sulfosulfuron 12.5 g/ha + 2,4-D 375 g/ha (T_9) at 30 DAS. Wheat variety 'Trambak' was sown 125 kg seed/ha at a row spacing of 22.5 cm. The soil of the experimental field was clayey loam in texture with low (163.42 kg/ha), medium (30.46 kg/ha) and high (468.00 kg/ha) in available NPK, respectively. The recommended dose NPK fertilizers *i.e.* 120 kg N, 60 kg P_2O_5 and 40 kg K_2O were applied. Post-emergence herbicides were applied at 30 DAS through Knapsack sprayer with flat fan type of nozzle using 500 litres of water/ha.

Differences in growth and yield attributes differed significantly due to weed control treatments (Table 1). The significantly higher plant height (79.6 cm) and leaf area index (4.03) were recorded in weed free check (T_2) than rest of the treatments; however, it was at par with application of sulfosulfuron 25 g/ha (T_5). The same treatment (T_2) also registered maximum and significantly higher number of tillers per plant (4.20) than all other treatments except

application of sulfosulfuron 25 g/ha (T_5) and hand weeding at 30 DAS (T_3), where, it was found at par with each other. The weed free check also significantly out yielded for dry matter 20.36 g/plant. Amongst the herbicide treatments, application of sulfosulfuron 25 g/ha (T_5) being at par with metribuzin 175 g/ha (T_7), recorded statistically more dry matter per plant (18.16 g). However, significantly lower values of all growth attributes were registered with weed check. The more growth attributes in weed free check followed by sulfosulfuron 25 g/ha was might be due to lower weed competition for water, sunlight and greater availability of nutrients, which resulted profuse growth of plants and also effective control of both grassy and broadleaved weeds by sulfosulfuron. Wani *et al.* (2005) have also reported that spraying of sulfosulfuron 30 g/ha gave higher plant height and dry matter production which was at par with weed free treatments. These results are in agreement with those reported by Dawson *et al.* (2008) and Singh *et al.* (2009).

The yield attributes *viz.*, panicle length (8.16 cm), number of spikelet/panicle (17.36), grain weight (8.33 g) were maximum and significantly more under weed free check treatment (T_2) than rest of the treatments (Table 2). The same treatment (T_2) also noticed significantly higher number of grains per panicle and thousand grain weight, however, it was found at par with application of sulfosulfuron 25 g/ha (T_5) for number of grains per panicle and with hand weeding at 30 DAS (T_3) for thousand grain weight. Amongst the herbicides treatments, application of sulfosulfuron 25 g/ha showed its superiority over rest of the weed control treatments. However, minimum values of all yield attributes were registered with weedy check. These results are in conformity with the findings of Dawson *et al.* (2008) and Singh *et al.* (2009).

Productivity measured in terms of grain and straw yield differed significantly due to different weed control treatments (Table 2). The maximum and statistically higher grain and straw yield of 4.03 and 5.35 t/ha, respectively, were recorded with weed free check than rest of the treatments. The second best treatment was application of sulfosulfuron 25 g/ha, which showed its significant supe-

*Corresponding author: bhilareraj@yahoo.co.in

Table 1. Growth parameters of wheat as influenced by different treatments

Treatment	Plant height (cm)	Number of tillers/plant	Leaf area index	Dry matter/plant (g)
T ₁ –Weedy check	68.6	2.33	3.04	12.50
T ₂ –Weed free check	79.6	4.20	4.03	20.36
T ₃ – Hand weeding at 30 DAS	75.6	3.90	3.84	16.56
T ₄ – Post-emergence isoproturon 1000 g/ha at 30 DAS	73.3	3.06	3.36	14.68
T ₅ – Post-emergence sulfosulfuron 25 g/ha at 30 DAS	77.6	4.03	3.92	18.16
T ₆ – Post-emergence 2, 4-D 750 g/ha at 30 DAS	74.3	3.66	3.73	16.50
T ₇ – Post-emergence metribuzin 175 g/ha at 30 DAS	75.3	3.80	3.81	16.90
T ₈ – Post-emergence isoproturon 500 g/ + 2, 4-D 375 g/ha at 30 DAS	74.6	3.36	3.79	15.70
T ₉ – Post-emergence sulfosulfuron 12.5 g/+ 2, 4-D 375 g/ha at 30 DAS	74.0	3.36	3.70	15.46
LSD (P=0.05)	2.13	0.35	0.18	1.45

Table 2. Yield attributes, grain and straw yield of wheat as influenced by different treatments

Treatment	Length of panicle (cm)	No. of spikelet/panicle	No. of grains/panicle	Grain weight /plant	1000 grain weight (g)	Grain yield (t/ha)	Straw yield (t/ha)
T ₁ – Weedy check	6.69	14.7	33.4	5.33	35.53	2.51	2.89
T ₂ – Weed free check	8.16	17.4	41.6	8.33	41.50	4.03	5.35
T ₃ – Hand weeding at 30 DAS	7.63	16.2	38.3	7.50	40.46	3.61	4.49
T ₄ – Post-emergence isoproturon 1000 g/ha at 30 DAS	7.16	15.3	35.5	6.16	37.33	3.16	3.71
T ₅ – Post-emergence sulfosulfuron 25 g/ha at 30 DAS	7.86	16.7	39.4	7.70	40.92	3.71	4.78
T ₆ – Post-emergence 2, 4-D 750 g/ha at 30 DAS	7.43	16.1	37.4	7.30	38.80	3.42	4.31
T ₇ – Post-emergence metribuzin 175 g/ha at 30 DAS	7.60	16.4	38.1	7.40	39.46	3.59	4.44
T ₈ – Post-emergence isoproturon 500 g/ + 2, 4-D 375 g/ha at 30 DAS	7.46	16.0	37.6	7.03	38.50	3.38	4.24
T ₉ – Post-emergence sulfosulfuron 12.5 g/+ 2, 4-D 375 g/ha at 30 DAS	7.30	15.5	36.8	6.80	38.13	3.32	3.88
LSD (P=0.05)	0.25	0.6	2.3	0.58	1.54	0.12	0.17

riority for grain (3.71 t/ha) and straw yield (4.78 t/ha) than rest of the treatments, whereas, grain yield was at par with treatment T₃ and T₇. The higher values of grain yield with these treatments may be ascribed to marked decrease weed population and weed dry weight and thereby better growth and increased the productive tillers and yield attributes. Singh *et al.* (2009) found that application of sulfosulfuron

25 g/ha have a significant impact on growth and yield attributes, which resulted higher grain yield of 3.53 t/ha and being at par with one hand weeding at 30 DAS.

The aforesaid results indicated that growing of wheat with application of sulfosulfuron 25 g/ha as post-emergence at 30 DAS showed better proposition for higher productivity.

SUMMARY

A field experiment was conducted during *Rabi* season of 2009-10 at College of Agriculture, Pune to study the efficacy of different herbicides on growth and productivity of wheat. The growth attributes of wheat crop in terms of plant height, number of tillers/plant, leaf area index, and dry matter accumulation/plant were maximum with weed free check. Among the herbicide treatments, post-emergence application of sulfosulfuron 25 g/ha recorded higher values of all these growth attributes characters and were on par with hand weeding at 30 DAS and application of metribuzin 175 g/ha. However, substantial reduction in growth characters was observed in weedy check. The values of yield attributes were higher in magnitude in weed free check treatment. The next best treatment was application of sulfosulfuron 25 g/ha. Amongst the weed control treatments, application of sulfosulfuron 25 g/ha, recorded maximum grain and straw yield of 3.71

and 4.78 t/ha, respectively, as compared to other treatments. However, substantial reduction in growth and yield attributes and yield were observed in weedy check.

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