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# Weed management in wheat grown at Doon valley of Uttarakhand

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**ABSTRACT**

Sulfosulfuron + metsufuron-methyl 30 + 2 g/ha application as post-emergence recorded significantly less weed biomass and higher weed control efficiency followed by clodinafop 60 g/ha compared to the rest of the herbicidal treatments. The highest (65.8 g/m$^2$) weed biomass was recorded with weedy check conditions. Post-emergence application of sulfosulfuron + metsulfuron-methyl 30 + 2 g/ha recorded significantly less weed biomass and higher weed control efficiency, number of effective tillers, grain yield which were at par with weed free check and clodinafop 60 g/ha.

Wheat (*Triticum aestivum* L.) is an important cereal crop for a large number of countries in the world. In India, wheat stands second next to rice in area and production, but first in productivity among all the cereals. In Uttarakhand, area under wheat is about 3.4 lakh ha with total production of 6.6 lakh tonne with 1.92 t/ha productivity (Anonymous 2016). Weeds are the prominent constraint in achieving the potential yield of wheat. Wheat suffers with mixed weeds flora. The losses caused by weeds vary depending on the weed species, their abundance, crop management practices and other environmental factors. Herbicides are one of the major groups of pesticides, which contribute to the increased and economical production of crop and reduction in the drudgery in agricultural production. In this context, the continuous use of a particular herbicide for many years resulted in development of resistance against some weeds, which happened in case of isoproturon (Malik and Singh 1995). Keeping these in view, present study was conducted to assess the efficacy of different herbicides in managing weeds in wheat qrown under Doon valley of Uttarakhand.

A field experiment was conducted during winter season 2015-16 at research farm of Doon P.G. College of Agriculture Science & Technology, Selaqui, Dehradun, Uttarakhand. The experimental soil was sandy loam in texture, medium in available P (21.6 kg/ha) and K (167.2 kg/ha) and low in OC (0.4%) with pH 6.4. The treatments consisted eight weed control practices, *viz.* isoproturon 750 g/ha, sulfosulfuron + metsulfuron-methyl 30 + 2 g/ha, clodinafop 60 g/ha, metribuzin 200 g/ha, 2,4-D 1000 g/ha, metsulfuron-methyl 4 g/ha, weedy check and weed free check were laid out in randomized complete block design with three replications. In experimental field, wheat variety *'WH-1105'* was sown manually by drilling at 4-5 cm deep in 1$^{st}$ fortnight of December using seed rate of 125 kg/ha with rows 20 cm apart. Herbicides were applied as post-emergence at 35 days after seeding (DAS) with the help of manually operated knapsack sprayer using 600 L water/ha. The crop were fertilized with N:$P_2O_5$:$K_2O$ of 120:60:40 kg/ha through urea, single super phosphate and murate of potash, respectively. The recommended packages of practices were adopted to raise the healthy crop. Observations of weeds and crop were taken as per standard procedures followed and being statistically analyzed data on weeds was subjected to square root transformation to normalize the distribution.

## Weed flora

The most dominant weed species at experimental field were *Phalaris minor, Avena fatua, Cynodon dactylon* in grassy, *Melilotus alba, Chenopodium album, Anagallis arvensis, Convolvulus arvensis* and *Fumaria indica* under broad-leaved whereas *Cyperus rotundus* in sedges group.

**Table 1. Effect of weed control treatments on weed biomass, weed control efficiency, yield and yield attributes of wheat**

| Treatment | Dose (g/ha) | Weed biomass ($g/m^2$) | Weed control efficiency (%) | Effective tillers/$m^2$ | Grain yield (t/ha) | Straw yield (t/ha) | Weed index (%) | Test weight (g) |
|---|---|---|---|---|---|---|---|---|
| Isoproturon | 750 | 4.54 (21.7) | 67.0 | 218.3 | 2.82 | 4.48 | 16.1 | 37.2 |
| Sulfosulfuron + metsulfuron- methyl | 30 + 2 | 2.14 (10.3) | 84.3 | 234.8 | 3.29 | 4.44 | 2.1 | 35.8 |
| Clodinafop | 60 | 2.56 (14.6) | 77.8 | 229.3 | 3.20 | 4.39 | 4.8 | 38.6 |
| Metribuzin | 200 | 3.85 (18.4) | 72.0 | 221.2 | 2.82 | 3.88 | 16.1 | 37.7 |
| 2,4-D | 1000 | 4.35 (20.7) | 68.5 | 226.9 | 2.76 | 4.53 | 17.9 | 36.2 |
| Metsulfuron-methyl | 05 | 3.12 (16.6) | 73.3 | 229.4 | 2.81 | 4.73 | 16.4 | 38.8 |
| Weedy check | - | 8.68 (65.8) | - | 183.8 | 2.43 | 3.65 | 27.7 | 38.2 |
| Weed free | - | 0.71 (0.0) | 100 | 240.5 | 3.36 | 4.53 | - | 41.2 |
| LSD (p=0.05) | - | 0.87 | 8.6 | 9.8 | 0.22 | 0.27 | - | NS |

*Data in parentheses are original values

### Effect on weeds

The weed biomass and weed control efficiency were affected significantly due to weed management treatments (**Table 1**). Sulfosulfuron + metsufuron-methyl 30 + 2 g/ha application as post-emergence recorded significantly less weed biomass and higher weed control efficiency followed by clodinafop 60 g/ ha compared to the rest of the herbicidal treatments. The highest (65.8 $g/m^2$) weed biomass was recorded with weedy check conditions. The effectiveness under combined application of sulfosulfuron + metsufuron-methyl and clodinafop might be due to its killing selectivity to both of the grassy and broad-leaved weeds in the field. The results are in conformity with the findings of Chhokar *et al.* 2007. Other herbicidal treatments efficacy managing either grassy or broad-leaved weeds was lesser than that of sulfosulfuron + metsufuron-methyl.

### Effect on crop

All the herbicide treatments registered significantly higher crop yield over weedy check **(Table 1)**. Presence of weeds throughout the crop season reduced wheat grain yield by 27.8% as compared to crop under weed free situation. The higher wheat yield of 3.29 t/ha recorded with the application of sulfosulfuron + metsufuron-methyl 30 + 2 g/ha which was at par with clodinafop (3.20 t/ha) and weed free check (3.36 t/ha) and significantly superior to rest of the treatments **(Table 1)**. The higher yield might be attributed to more effective tillers produced with sulfosulfuron + metsufuron-methyl 30 + 2 g/ha and clodinafop 60 g/ha as post-emergence due to their knockdown effect on grassy and broad-leaved weeds which resulted in increased yield attributes and wheat yield. Similar results were also obtained by Brar and Walia 2007 and Jain *et al.* 2007.

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