Effect of application of herbicides on weeds in the wheat (*Triticum aestivum* L.) crop and yield attribute

Tavinder Singh, Karampal Singh Brar and Navdeep Gandhi

Abstract

The experiment was carried out at the farm of S. Dalip Singh at Abohar, Teh-Abohar, Dist-Fazilka, Punjab. The crop was grown in Rabi season of 2017-18 to study the effect of application of herbicides on weeds in the wheat crop and yield attribute. The crop was sown on November 28, 2017. The following treatments are T₁- (Pendimethlin 30 EC @ 1L/ acre), T₂- (Isoproturon 75% WP @ 500g/ acre), T₃- (Metsulfuron methyl 20% WP @ 8g/ acre), T₄- (Hand weeding), T₅- (Control) treatments. The experimental conducted that among the treatments T₁ has performed better in parameter like plant height (103.08 cm), effective tillers (267), yield per acre (25.44q) and harvest index(44.66%). It is concluded from the experiment that higher yield can be obtained by pre-emergence application of Pendimethlin 30 EC (Stomp).

Keywords: herbicides on weeds, crop and yield attribute, wheat

Introduction

Wheat (*Triticum species*) is a crop of global significance. It is grown in diversified environment. It is a staple food of millions of people. Approximately one-sixth of the total arable land in the world is cultivated with wheat. Among food grains wheat is the richest source of protein and its stands at second place after pulses. Approximately one-sixth of the total arable land in the world is cultivated with wheat. Among food grains wheat is the richest source of protein and its stands at second place after pulses. In general wheat contains carbohydrates (70%), protein (12%), lipid (2% cent), vitamins & minerals (2%) and crude fibre (2%). (www.agropedia.iitk.ac.in.com) [1] The herbicide 2,4-D had been used in crop fields quite for long time. Depending on the type of cereal crop, the weed spectrum, cultural practices and climatic factors, 2,4-D might be applied as salt, esters, amines or free acid formulation at rates ranging from 250 g to 2 Kg/ha (rarely up to 4 Kg/ha). The herbicide application is usually made when weeds and cereal plants are small. (Kumar and Singh) [2] Pendimethlin [N-(1-ethylpropyl)-2, 6-dinitro-3,4-xylidine] is a herbicide of the dinitro-aniline group used as pre-emergence application to control annual grasses and certain small seeded broadleaf weeds. It inhibits cell division and cell elongation. Dinitroaniline herbicides kill susceptible plants by inhibiting cell division in roots cells which arrests normal root growth. (Kaur et al.) [3]

Materials and Methods

The experiment was carried out at the farm of S. Dalip Singh at Abohar, Teh-Abohar, Dist-Fazilka, Punjab. The crop was grown in Rabi season of 2017-18. The experiment was conducted in five plots with each plot having dimensions of 10 m x 2.5m, length and breadth respectively. The crop was sown on November 28, 2017. Wheat variety HD 3086 was sown at the seed rate of 40KG for one acre. Sowing was done using seed drill on November 28, 2017. Plant heights was measured with the help of measuring tape from the soil surface to the highest leaf of the plant. One plant was selected from each plot randomly and then plants were kept in oven for oven drying for 72 hours at temperature of 60⁰C at an interval of 15 days. As for the calculation of 1000 grain weight, 1000 grains were counted from each treatment after harvesting and were weighed with the help of weighing machine. After harvesting, grains were separated from spikes by threshing. The weight of grains was recorded. The grains yield was computed and expressed as quintals per acre. Harvesting index was calculated by using...
formula: Economic yield (seeds) / Biological yield (seeds + plant straw) x 100.

Treatments
T1- Pendimethlin 30 EC @ 1L/acre
T2- Isoproturon 75% WP @ 500g/acre
T3- Metsulfuron methyl 20% WP @ 8g/acre
T4- Hand weeding
T5- Control

Result and Discussions

Number of weeds
It is observed that density of weeds in wheat in treatments, T1, T2, T3, T4 and T5 were 5 m−2, 7 m−2, 8 m−2, 4 m−2 and 12 m−2, respectively. So, Bibi et al. 1 observed that the minimum weeds density (157.8 m−2) was recorded in Topik treated plots. While maximum (352.0) weeds density was recorded in weeds check followed by Agritop and 2,4-D at 25 days after herbidical application. Similarly, Hassan et al. 3 observed that the maximum weeds density m−2 (98.75) was recorded in weedy check followed by 45.00 in Puma Super 75 EW. The lowest weeds density (16.00) was recorded in Puma super + Sencor, followed by 21.25 in Pujing + Sencor, and 21.75 m−2 in Affinity 50 WP. The weeds density of Sencor, Pujing and WH-01 are statistically comparable to one another.

Plant height (cm)
As from the experiment, at maturity plant height of wheat in T1, T2, T3, T4 and T5 were 103.08 cm, 95.8 cm, 100.1 cm, 102.8 cm and 97.2 cm respectively. So, Bibi et al. 1 observed that the maximum plant height was obtained in Topik treated plots. Maximum plant height (95.8 cm) was obtained from Sencor WP 70 treated plots, which was at par with 40 hills m−2. So, Arif et al. 10 concluded that the maximum 1000 grain weight (268.8 g) was produced by Equip @ 2.25 % OD @ 2000 ml/ha while minimum 1000 grain weight (186.7 g) was obtained in the weedy check. Similarly, Khan et al. 11 observed that the highest (3.68 g) 1000 seed weight was obtained from Treflan 4 EC and Fusilade 13 EC (3.40 g) plots. It was further observed that the lowest 1000 seed weight (2.72 g) was obtained from Sencor WP 70 treated plots, which was statistically equal (2.78 g) to the weedy check plots which in turn was statistically similar with the remaining herbidical treatments except the top scoring treatments and the Ronstar 12 L (3.20 g).

Yield per acre
As from the experiment, among the different herbicides T1 has maximum yield per acre (25.44q) and minimum yield per acre (21.24q) were observed in T5. So, Chaudhry et al. 11 concluded that maximum seed yield (2315 kg/ha) was obtained in case of Stomp application at SBP which was 69.10 percent higher than weedy check (1369 kg/ha). However, it was statistically at par with Dual Gold (2230 kg/ha) and partner (2183 kg/ha) at SBP which produced 62.89 and 59.46 percent higher than weedy plot, respectively. Minimum seed yield was obtained in case of Sencor at SBP (84 kg/ha) and JAS (123 kg/ha) due to severe mortality of crop plants. Similarly Chhokar et al. 13 found that the lowest wheat grain yield of 2.78 and 2.03 t/ha was recorded under weedy check, during first and second year, respectively, due to severe weed competition. All the herbicide treatments except Metsulfuron 4g/ha provided significantly higher grain yield compared to weed check. Wheat grain yield improvement of > 56.8% was recorded with the use of sulfosulfuron, sulfosulfuron + metolachlor and clodinafop.

Observations and Tables

Dry matter accumulation per plant (g)
Dry matter accumulation in wheat T1, T2, T3, T4 and T5 were 12.5 gm, 17.4 gm, 20.6 gm, 18.5 gm and 19.2 gm, respectively. So, Asad et al. 8 concluded that the highest dry wheat biomass (0.24 Kg m−2) was recorded in Buctril super 60% EC @ 825 ml/ha, followed by T5 (Starane—M @ 875ml/ha) with 90.10 cm height, as compared to T1 (control) where the least plant height (84.70 cm) was recorded. Similarly, Nadeem et al. 7 observed that the maximum plant height (216.70 cm) was recorded in plots of manual hoeing and it was statistically at par with foramsulfuron + isoxadifen-ethyl at 1125 g a.i./ha + 3% urea (213.70) and foramsulfuron + isoxadifen-ethyl at 1125 g a.i./ha alone (212.70). The minimum plant height (195.70) was recorded in weedy check plots.

1000-grain weight
Among the different herbicides T1 has maximum grain weight (40.7 gm) and minimum grain weight (37.7 gm) were found in T5. So, Arif et al. 10 concluded that the maximum 1000 grain weight (268.8 g) was produced by Equip @ 2.25 % OD @ 2000 ml/ha while minimum 1000 grain weight (186.7 g) was obtained in the weedy check. Similarly, Khan et al. 11 observed that the highest (3.68 g) 1000 seed weight was obtained from Treflan 4 EC and Fusilade 13 EC (3.40 g) plots. It was further observed that the lowest 1000 seed weight (2.72 g) was obtained from Sencor WP 70 treated plots, which was statistically equal (2.78 g) to the weedy check plots which in turn was statistically similar with the remaining herbidical treatments except the top scoring treatments and the Ronstar 12 L (3.20 g).
The present experiment was carried out to study the effect of different application of herbicides on weeds in the wheat (Triticum aestivum L.) crop and yield attribute. The following treatments are T1 – Pendimethlin 30 EC @ 1L/acre, T2 – Isoproturon 75% WP @ 500g/acre, T3 – Metsulfuron methyl 20% WP @ 8g/acre, T4 – Hand weeding, T5 – Control. The experiment concluded that among the treatments T1 has performed better in parameter like plant height (103.08 cm), effective tillers (267), yield per acre (25.44q) and harvest index (44.66%). T3 has performed better in parameter like dry matter accumulation (20.6gm), tillers per plant (5.8) and spikes per plant (5.6). T4 has performed better in parameter like number of weeds (4m²) and 1000-grain weight (40.7gm). T5 has performed better in parameter like grains per spike (60.4). It is concluded from the experiment that higher yield can be obtained by pre-emergence application of Pendimethlin 30 EC (Stomp).

References
1. https://www.agropedia.iitk.ac.in.com