Effect Of Herbicides On Weed Dynamics And Yield And Yeild Attribute Of Bread Wheat (Triticum Aestivum L.) In South Eastern Part Of Ethiopia

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ABSTRACT: Wheat (Triticum aestivum L.) is the most important crop among food cereals. The experiment was conducted at south eastern part of Ethiopia to investigate the efficacy of three herbicides on weeds and growth and yield of wheat. The experiment was laid out in Randomized Complete Block design (RCBD) with three replication. Treatments were combination of 2, 4-D with pallase, Topic with 2, 4-D, pallase only, weed free and weed check were also included for comparison. The following data collected weed density, tiller number, weed biomass, spike length, seed per spike,1000g weight and grain yield. Statistical analysis of experiment showed that application of pallase exhibited the best performance with minimum weeds density ($10.67m^2$) and higher weed controlling efficacy of 84.4% as compared to weedy check ($69\ m^2$) followed by combination of pallase with 2,4-D had 68.6% of weed controlling efficacy and hand weeding. Combination of Topic with 2, 4-D had moderate weed density and with weed controlling efficacy of 63.77%. Number of tillers (8.67/plants), grain per spike (63), spike length (8.67cm) , plant height (75.17cm), Maximum 1000g grain weight (66.67g) and (4161kg/ha) at maturity were recorded at Pallase treated plots. Therefore, application of pallase was recommended for controlling of weeds and increasing yield attribute of wheat.

Key word: herbicides Yield Weed check

INTRODUCTION

Wheat (Triticum aestivum L.) is one of the most important food crops of the world and a member of the family Poaceae that includes major cereal crops of the world such as maize, wheat and rice. Among the food crops, wheat is one of the most abundant sources of energy and proteins for the world population and its increased production is essential for food security Chhokar et al., [6) Also, the largest crop area is devoted to wheat and the quantity produced is more than that of any other crop. This occupies about 17% of the world's cropped land and contributes 35% of the staple food (Pingali et al., [12]. Ethiopia is one of wheat productive country. In Ethiopia, Bale, Dugda and Arsi are one of the most productive areas in the country for the importance of Enjera and Bread preparation. Bale is one of the most Productive area of wheat in Ethiopian. However the yield has been affected by a number of factors among; Disease, Insect, weeds and monocropping is the major factor affecting the production of wheat. The presence of weeds in a crop can adversely affect production in a number of ways. Weeds compete with crop plants for light, moisture, nutrients and space. Weeds also increase harvesting costs, reduce quality of product, and increase fire hazards [4]. In order to increase wheat yields it is important to manage weeds, which resulted higher yield in wheat crop Khan et al., [11]. Chemical and hand weeding have often been used as a weed control in wheat. Ahmed et al. [1] observed that herbicides application and hand weeding decreased dry weight of weeds significantly compared to dry weight in non treated plots. Chemical weed control in wheat was best in producing higher grain yield than hand weeding. Akhtar et al. [3] found that application of grassy and broad leaf herbicides increased grain yield and yield components. In view of the importance of the weeds problem in wheat crop. Therefore, experiment was investigated to know the efficacy of herbicides on weeds and yield of wheat

MATERIALS AND METHODS

This study was conducted at south eastern part of Ethiopia in Madawalabu university experimental site during the main cropping season of 2012. The experiment was conducted using Randomized Complete Block Design (RCBD) with three replications. A plot size was 3.6m x 3.6m. Each plots and blocks were spaced 0.5 and 1 m apart, respectively. Dendea variety of Bread wheat was used with intra row spacing of 20 cm. All herbicides were applied at 25 days of wheat emergence. All the package of practices as recommended rate was followed to raise the crop. To spray the herbicides successfully all the precautionary measures were adopted so as to avoid any danger by misuse of the herbicides.

Treatments	Rate of herbicide
Combination of 2,4-D with Topic	1Kg/ha for both hebicides
Pallase only	0.5 Kg/ha
Combination of 2,4-D with pallse	1 Kg/ha of 2,4-D x 0.25 Kg/ha of Pallase
Hand weeding	
Weedy Check	

Data Collection

The data were recorded on the following parameters. Weed density m^{-2} 25 days after herbicides application, fresh weed bio-mass before harvesting (kg.ha), number of tiller per plant, spike length(cm), plant height at maturity (cm), 1000grain weight (g) and grain yield kg ha^{-1}. Data were collected in sample 10 tagged plants of each plot within a week interval of the inner six rows. The weed control efficiency (WCE) was calculated by using formula Suggested by Auskalnis and Kadzys, [2].

$$WCE = \frac{NWC - NWT}{NWC} * 100\%$$

Where:

NWC = Number of Weeds m^{-2} from Control plots (weedy check

NW T = Number Weeds m^{-2} in plots Treated with herbicides

WCE = Weed Control Efficiency

Statistical Analysis

Collected dates were subjected to the analysis of variance with SAS computer software version 9.1.1 [14].

Mean were compared with Least Significance Difference (LSD) at 5% probability level.

Results and Discussion

Weeds Type

The following Weed types were recorded at the experimental area :- Galinsoga parviflora, Guizotia scabra, Plantago lanceolata, Amaranthus spp. Datura stramonium L., Cyperus spp., Avena fatua, Snowdenia polystachya, Phalaris paradoxa, Cynodon dactylon.

Weed density in m^2

The statistical analysis showed that combination of herbicides had a significant ($P<0.001$) effect on weed density per m^2. Maximum weed density was recorded at control plot ($69m^2$) followed by combination of Topic with 2, 4-D while minimum weed density was recorded at pallase treated plot (10.67 m^2) with weed controlling efficacy of 84.4%. Non significant result was recorded at application of pallase and hand weeding (Table 1). The result was in line with Khanet et al. [11] and Khaliq et al, [10] Numerous herbicide molecules at lower than recommended rates are effective enough to provide satisfactory weed control without sacrificing yields and increasing weed infestation. Also the result was supported by Shahida et al. [15] reported minimum weeds density was recorded in Topic treated plots where as maximum weeds density was recorded in weedy check followed by Agritop and 2, 4-D. These findings have a sufficient support from the previous work of Punia et al. [12] who concluded in their studies that different herbicides lowered weed density.

Fresh weed biomass (kg ha-1) before harvesting

Application of different herbicides were significant ($p<0.001$) variation on fresh weed biomass. Maximum fresh weed biomass (5017 kg ha^{-1}) was recorded in the weedy check plots followed by combination of 2,4-D with Topic while minimum fresh weed biomass (1100 and 1890 kg ha^{-1}) was recorded at pallase treated plots (Table 1). The result was inline to the work of Shahida, et al. [15] they are reported application of herbicide was an effect on fresh weed biomass of weed in relative to the control.

Number of tiller

The result showed that application of herbicides had a significant ($p<0.01$) effect on number of tiller. Maximum number of tiller was recorded at pallase treated plots followed by combination of pallase with 2, 4-D and hand weeding respectively. Medium number of tiller was counted at the combination of topic with 2, 4-D while minimum number of tiller was counted at the control plots (Table 1). Application of pallase was non significant effect as compare to combination of 2, 4-D with pallase and hand weeding plots. The result was supported by Shahida et al.[5] he reported that maximum tillers m^{-2} were counted in Topic treated plots which is followed by application of Affinity while minimum tillers m^{-2} was recorded in weedy check plots. Baldha et al. [5] and Sohail et al. [16] also reported similar results. They communicated that application of herbicides significantly influenced the number of tillers m^{-2}.

Plant height

The result showed that combination of herbicide has a significant ($p<0.01$) effect on plant height. Maximum plant height was recorded at pallase treated plots with the mean of 75.2cm while minimum plant height was recorded at the control plots. Non significant result was recorded at pallase treated plots, hand weeding and combination of 2, 4-D with pallase plots and also combination of 2, 4-D with Topic and control (Table 1).

Spike length

Statistical analysis showed that combination of herbicide has a significant ($p<0.01$) difference on spike length. Maximum spike length was recorded at application of pallase followed by combination of 2, 4-D with pallase and hand weeding which is the mean of (8.67, 7.76 and 7.57) respectively. Minimum spike length was recorded at the combination of 2, 4-D with topic and control (Table 9). The result was supported by Gul et al. [8] they reported that application of different herbicide were an effect on spike length of wheat and also the same result was reported by Khalil et al.[9] they reported that application of post emergence herbicide in wheat crop produce the highest spike length.

grains per spike

Combination of herbicides were significantly ($p< 0.001$) affected on grain per spike of wheat. The result shows that maximum grain numbers were counted pallase treated plots which is the mean of 61.3 followed by combination of 2,4-D with pallase. Minimum numbers of grains were counted at the control plots while intermediate grain numbers were counted at combination of 2, 4-D with topic and hand weeding plots (Table 1). The result was in line to Gul et al.[8] they are reported that the higher grains per spike was recorded herbicide treated plots while the minimum grains per spike was recorded in the weed check plots.

1000g grain weight

Combination of herbicides were significant ($p<0.001$) effect on1000g grain weight. Maximum grain weight was recorded

at pallase treated plots (66.67g) followed by combination of 2, 4-D with pallase. Minimum grain weight was recorded at the control plots where as intermediate result was recorded at combination of 2, 4-D with topic and hand weeding plots (Table 1). The result was in agreement with Gul et al**.** [8] they reported that the heights 1000g grains weight was recorded herbicide treated plots while the minimum 1000g grains weight was recorded in the weed check

Grain yield kg/ha

Statistical analysis shows that significant ($p<0.01$) variation was observed on grain yield of wheat. Maximum Grain yield was harvested at pallase treated plots with the mean of 4161kg/ha followed by combination of pallase with 2, 4-D while minimum grain yield was recorded at the control plots. Non significant yield was harvested at combination of pallase with 2, 4-D and 2, 4-D with Topic (Table 1). The result was in line to Shahida, et al. [15] Different herbicidal treatments had a significant effect on grain yield of wheat.

Conclusion and recommendation

Combinations of herbicides were significant value to increase yield attribute of wheat in relative to the control. Among the alternative application of pallase at he rate of 0.5kg/ha is effective to increase yield and yield attribute of wheat followed by combination of 2, 4-D with pallase and hand weeding. Combination of 2, 4-D with Topic was also effective to increase yield attribute of wheat in relative to the control. Therefore application of pallase only is recommended to increase the productivity wheat.

Table 1. Effect of herbicides on weed and yield and yield components of wheat

Treatment	Number tiller	Weed Fresh Density biomass m^2 kg/ha	Plant height	Spike Length	grain/ spike	1000g/ grain weight	Grain Yield (kg/ha)
2-4-D x Pallas	8^{a}	21.67^{c} 1890^{d}	71.23^{a}	7.57^{a}	43.3^{b}	54^{b}	2929.3^{b}
2-4-D x Topic	6^{b}	29^{b} 4000^{b}	63.3^{b}	5.5^{b}	41.67^{b}	42.67^{c}	2817^{b}
Pallas only	8.67^{a}	10.67d 1100^{c}	75.17^{a}	8.67^{a}	61.3^{a}	66.67^{a}	4167^{a}
Hand weeding	8.33^{ab}	14.33d 0.0^{e}	72.1^{a}	7.76^{a}	63^{a}	61^{b}	3812.7^{a}
Weed check	4.67^{c}	69^{a} 5017^{a}	61.9^{b}	4.3^{b}	34^{c}	42^{C}	2317^{C}
LSD	1.37	6.43 508.89	6.1 1.17		3.78	5.4	594.1

Means with the same letters are not significant different

Acknowledgment

The Author wants to thanks to the research and community service Director of Madawalabu University for their funding during the experiment was conducted.

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