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Original article

On-farm demonstration of post-emergence herbicide for the control of grass weeds in malt barley in the highlands of Bale, Southeastern Ethiopia

Mengistu Bogale^{a,*}, Amare Biftu^b, Ayalew Sida^b

^a*Oromia Agricultural Research Institute (OARI), Cereal Crops Agronomist, Sinana Agricultural Research Center P.O. Box-208, Bale-Robe, Ethiopia.*

^b*Oromia Agricultural Research Institute (OARI), Agricultural Research-Extensionist, Sinana Agricultural Research Center P.O. Box-208, Bale-Robe, Ethiopia.*

*Corresponding author: mbalemu@gmail.com

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ABSTRACT

On-farm demonstration of post-emergence herbicide (Axial 045 EC) was conducted at two districts (Goba and Dinsho) of Bale zone for the control of grass weeds in malt barley in the highlands of Bale during 2017/18 main cropping season. Test crop used was improved malt barley variety IBON 174/03 at the rate of 125 kg/ha. Fertilizer used was NPS at the recommended rate for the area (100 kg ha⁻¹). The treatments consisted of 2 4-D, 2 4-D + Axial 045 EC and weedy check. The result obtained from the two districts indicated that the herbicides (2 4-D + Axial 045 EC) are remained the most effective against the broad leaves and grass weeds in malt barley. Maximum barley grain yield was recorded at both districts (2720 kg ha⁻¹) at Dinsho and (3680 kg ha⁻¹) at Goba in plots treated with 2 4-D + Axial 045 EC with grain yield advantage over check (58.82%) and (67.39%) at Dinsho and Goba respectively. The second maximum grain yield was recorded at both districts in plots treated with 2 4-D. The lowest grain yield was recorded in weedy check at both districts (1120 kg ha⁻¹) at Dinsho and (1200 kg ha⁻¹) at Goba. The Cost- benefit analysis also revealed that plots treated with 2 4-D + Axial 045EC gave the maximum net benefit at both districts. The lowest was recorded from weedy check plots. Hence, it is recommended that farmers should have to use both herbicides (2 4-D + Axial 045 EC) for the control of weeds (broad leaves and grass weeds) in malt barley. Farmers

participated on demonstration and evaluation also selected (2,4-D + Axial 045 EC) as promising herbicides in controlling weeds in malt barley.

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1. Introduction

Malt barley is a crop plant that is very sensitive to weeds competition and suffers great yield and quality reduction through competition (Stroud, 1989). Weeds impose serious problem to cereal production in Bale highlands, southeastern Ethiopia. Cereal production is hampered due to the aggressiveness of both grass and broad leaf weeds (Taye et al., 1999). This might be due to multiple factors, such as; herbicides currently in use are ineffective; unavailability or inaccessibility of herbicides in amount, type and at required time; weed flora shift due to continuous mono-cropping of cereals and frequent use of one type of herbicide and morphological similarity of weed species with the cereal crops (Tanner and Giref, 1991). To alleviate the above mentioned problems due to weeds, pre-verification, verification and demonstration of newly introduced selective herbicides are very important. Axial 045 EC is a selective herbicide used to control most of the important annual grass species in small grain cereals, wheat and barley. This herbicide is not demonstrated to the farmers for its efficacy in controlling grass weeds in Malt barley. To demonstrate post-emergence herbicide (Axial 045 EC) for its efficacy in controlling most annual grass weeds in malt barley.

2. Materials and methods

2.1. Description of the study area

The demonstration was conducted in two districts (Goba and Dinsho) of Bale highlands. The altitude of the demonstration site is 1517 - 4378 masl for Goba and 2444 - 4250 for Dinsho. Average annual rainfall (mm) is 937.3 - 1342.44 and 965.03 - 1314 for Goba and Dinsho respectively. Maximum temperature (°C) is 19.58 for Goba while 15.33 for Dinsho. Minimum temperature (°C) is 6.53 for Goba and 7.07 for Dinsho. Soil types are Pellic Vertisol and Chromic Luvisols for Goba district and Vertisols and Cambisol for Dinsho. Soil P^H is 6.01- 6.82 for Dinsho district.

2.2. Treatments and design

The treatments consisted of 2,4-D, 2,4-D + Axial 045 EC and weedy check. The demonstration was laid out as a single block consisting of three plots. The first plot was treated with 2,4-D, the second plot with 2,4-D + Axial 045EC and the third plot was weedy check. The size of each plot was 5 m x 5 m = 25 m² and the distance between plots was 1.0 m. Test crop used was improved malt barley variety IBON 174/03 at the rate of 125 kg/ha. A fertilizer used was NPS at the recommended rate for the area (100 kg ha⁻¹).

2.3. Farmers participation on herbicides demonstration

The herbicide demonstration was conducted in two districts of bale highlands on farmers' field. 50 farmers at Goba and 42 farmers at Dinsho were participated on evaluation and selection of the promising herbicide.

2.4. Data collection and analysis

Grain yield and socio-economic data were collected to analyse yield advantage and cost benefit of herbicide demonstration. Cost-benefit analysis was done as described by CIMMYT, 1988.

3. Results and discussion

The result obtained from the two districts indicated that the herbicides (2,4-D + Axial 045 EC) were remained the most effective against the broad leaves and grass weeds in malt barley. Maximum barley grain yield was recorded at both districts (2720 kg ha⁻¹) at Dinsho and (3680 kg ha⁻¹) at Goba in plots treated with 2, 4-D + Axial 045 EC with grain yield advantage over check (58.82%) and (67.39%) at Dinsho and Goba respectively. The second

maximum grain yield was recorded at both districts in plots treated with 2,4-D. The lowest grain yield was recorded in weedy check at both districts (1120 kg ha⁻¹) at Dinsho and (1200 kg ha⁻¹) at Goba (Table 1).

The Cost- benefit analysis also revealed that plots treated with 2,4-D + Axial O45EC gave the maximum net benefit at both districts (2.56) and 3.58 at Dinsho and Goba respectively. The lowest was recorded from weedy check plots (Table 2 and 3). Farmers participated on demonstration and evaluation (42 at Dinsho and 50 at Goba) were selected 2,4-D + Axial O45EC as promising herbicides and increase malt barley production and quality by controlling weeds.

Table 1

Grain yield and yield advantage of herbicide (Axial O45EC) demonstration on malt barley.

Districts	Treatments	Grain yield (kg ha ⁻¹)	% Yield increased over check
Dinsho	2,4-D	2160	+48.15
	2,4-D + Axial 045 EC	2720	+58.82
	Weedy check	1120	
Goba	2,4-D	2480	+51.61
	2,4-D + Axial 045 EC	3680	+67.39
	Weedy check	1200	

$$\% \text{ Yield increased over check} = \frac{\text{Yield of treated plot} - \text{Yield of untreated plot} \times 100}{\text{Yield of untreated plot}}$$

Table 2

Cost-benefit analysis of herbicides demonstration at Dinsho district.

Plot #	Treatment	Yield obtained (qt/ha)	Sale price (Bir/qt)	TVC (Bir/ha)	TR (Price x Qt)	NB (TR -TVC)	% of benefit (NB/TVC)
1	2,4-D	21.6	1200	7980	25920	17940	2.25
2	2,4-D + Axial 045 EC	27.2	1200	9160	32640	23480	2.56
3	Weedy check	11.2	1200	6,828	13,440	6,612	0.97

Table 3

Cost-benefit analysis of herbicides demonstration at Goba district.

Plot #	Treatment	Yield obtained (qt/ha)	Sale price (Bir/qt)	TVC (Bir/ha)	Total revenue (Price x Qt)	NB (TR -TVC)	% of benefit (NB/TVC)
1	2,4-D	24.8	1200	8140	29760	21620	2.66
2	2,4-D & Axial 045 EC	36.8	1200	9640	44160	34520	3.58
3	Weedy check	12	1200	6,980	14,400	7,420	1.06

TVC = Total variable cost TR = Total revenue NB = Net benefit

4. Conclusion

It is recommended that farmers should have to use both herbicides (2,4-D + Axial O45EC) for the control of weeds (broad leaves and grass weeds) in malt barley to increase production and quality. It is also better to demonstrate recently registered herbicide Axial 1 (herbicide which can control both grass and broad leave weeds in malt barley at the same time) to reduce the cost of farmers due to application of two different herbicides at different time.

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References

- CIMMYT, 1988. From agronomic data to farmer recommendations: An economics training manual. Completely revised edition. Mexico, DF. 79p.
- Stroud, A., 1989. Weeds management in Ethiopia: An extension and training manual. FAO, Rome, Italy.
- Tanner, D.G., Giref, S., 1991. Weed control research conducted on wheat in Ethiopia. 235-275. In: Hailu Gebere-Mariam, D.G., Tanner and Mengistu Hulluka (eds.). Wheat research in Ethiopia: Historical perspective. Addis Ababa, Ethiopia: IAR/CIMMYT.
- Taye, T., Tanner, D.G., Assefa, T., Amsal, T., 1999. Screening advanced bread wheat lines for grain yield potential under grass weed infestation. 325-334. In: Tenth Regional Wheat Workshop for Eastern, Central and Southern Africa. Addis Ababa, Ethiopia: CIMMYT.

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