

Provided for non-commercial research and education use.

Not for reproduction, distribution or commercial use.



This article was published in an Sjournals journal. The attached copy is furnished to the author for non-commercial research and education use, including for instruction at the authors institution, sharing with colleagues and providing to institution administration.

Other uses, including reproduction and distribution, or selling or licensing copied, or posting to personal, institutional or third party websites are prohibited.

In most cases, authors are permitted to post their version of the article (e.g. in Word or Text form) to their personal website or institutional repository. Authors requiring further information regarding Sjournals's archiving and manuscript policies encouraged to visit:

<http://www.sjournals.com>

© 2020 Sjournals Publishing Company



Contents lists available at Sjournals

Scientific Journal of Crop Science

Journal homepage: www.sjournals.com

Original article

On-farm demonstration of Dimethoate/Ethiothoate 40% EC for the control of Aphids on Lentil crop in Bale zone

Amare Biftu*, Bayeta Gadissa, Ayalew Sida

Oromia Agricultural Research Institute (OARI), Sinana Agricultural Research Center (SARC), P.O.Box-208, Bale-Robe, Ethiopia.

*Corresponding author: amarebiftu@gmail.com

ARTICLE INFO

Article history,

Received 12 December 2019

Accepted 13 January 2020

Available online 20 January 2020

iThenticate screening 14 December 2019

English editing 12 January 2020

Quality control 19 January 2020

Keywords,

Dimethoate

Farmers' preference

Selection criteria

FRG approach

ABSTRACT

On-farm demonstration of Dimethoate/Ethiothoate 40% EC for the control of Aphids on Lentil Crop. The main objective of the study was to demonstrate and validate the effectiveness of insecticides (Dimethoate) against lentil aphid. The demonstration was under taken on single plot of 10mx10m area for each plot with row planting, recommended full package. Mini-field day involving different stakeholders was organized at each respective site. Yield data per plot was recorded and analysed using descriptive statistics, while farmers' preference to the chemical was identified and ranked using simple ranking methods. The demonstration result revealed that Dimethoate (12.225qt ha⁻¹) is higher than unsprayed (6.95 qt ha⁻¹). Furthermore, this plot was selected by farmers. Thus, Dimethoate is recommended for wider scaling up/out activity in the districts.

© 2020 Sjournals. All rights reserved.

1. Introduction

Lentil (*Lens culinaris* Medikus) is one of the major cool-season food legumes grown in many parts of the World (Cubero, 1981; Erskine et al., 2011). The top 10 World countries each of which produced more than 80,000 tons of lentils in 2009, in decreasing order of production volume, were Canada, India, Turkey, USA, Nepal,

Australia, Ethiopia, China, Syria and Iran (FAO, 2009). Lentil is one of the highland crops widely grown in Ethiopia. It is largely produced in the highland and semi-highland regions of the country mainly on clay soil. In Ethiopia, out of the total area under cultivation, 113,684.63 hectares of land is covered with Lentil and about 1,662,742.20 quintals are produced by 799083 smallholder farmers with the average yield of 14.63 quintals per hectare (CSA, 2016/17). In Bale, about 4,429.80 hectares of land is covered with Lentil and 48,416.54 quintals are produced by 26,946 smallholder farmers with the average yield of 10.93 quintals per hectare (CSA, 2016/17). This crop is widely used for food because of its protein content. Apart from this, due to its ability to fix nitrogen, it is used in crop rotation with the nationally important crops. Although the above-mentioned realities indicate the national importance of lentil, the national yield is only about 8.35 quintals per hectare due to its susceptibility to insect pests. Lentil is attacked by different insects but, only few of them are economically important.

Pea aphid (PA), *Acyrtosiphumpisum* (Harris) (Homoptera: Aphididae) is a widespread insect pest of leguminous crops such as lentils (*Lens culnaria*). In Ethiopia, the pea aphid (*A. pisum*) has a holocyclic life cycle (i.e., it reproduces parthenogenetically without producing sexual forms) which is typical of tropical and subtropical species (Cardona et al., 1984; Kemal Ali and Tadesse Gebremedhin, 1990). Apart from an irreversible damage due to direct plant sap sucking, pea aphid can transmit viral diseases that 95% cause complete crop loss. Viviparity (producing young aphid) permits rapid exploitation of the host plant as its parthenogenetic multiplication rate, without fertilization is potentially enormous. In the event of severe infestations before or at flowering stage of the crop, aphids require control using agro-chemical (insecticide) sprays. It is recommended that a single spray should be enough for three weeks effective control, but if the infestation occurs before pod maturity a second spray may be needed.

In addition to personal field observation of the researcher on the infestation of aphid, farmers in lentil producing areas reported that lentil yield is being threatened by heavy infestation and damage of lentil aphid. Hence, it is recognized as the major lentil yield reducing factor and currently becoming the major threat for lentil production in the study Zone and districts. Besides, our smallholder farmers have no any information regarding the effectiveness of verified insecticides by NARS (Dimethoate) for the management of lentil aphid. Thus, the aim of this proposal is to introduce, demonstrate (method and result) and validate the verified insecticides for the management of lentil aphid with joint participation of farmers, development agents, agricultural experts, researchers and other stakeholders in the study zone and districts. Therefore On-farm demonstration of the effectiveness of insecticides (Dimethoate) against lentil aphid was undertaken in mid-altitude areas of Bale zone.

1.1. Objectives

- ✓ To demonstrate and validate the effectiveness of insecticides (Dimethoate) against lentil aphid.
- ✓ To create awareness for end users on the effectiveness of verified insecticides for the management of lentil aphid.
- ✓ To evaluate the cost-benefit ratio (income gained) of the demonstrated varieties.

2. Materials and methods

2.1. Description of the study area

The research was carried out in Goro and Ginnir districts of Bale zone, Oromia National Regional State (ONRS), Ethiopia. Bale zone is among the 20 Administrative zones located in south eastern parts of Oromia, Ethiopia. The districts were selected purposively based on their potential to lentil crop production.

2.2. Site and farmers' selection

Goro and Ginnir districts of Bale zone were selected purposively based on the existing potential for lentil crop production. Two PAs from Goro and three PAs from Ginnir district were selected based on accessibility or vicinity to the road. Similarly, one trial farmer from each PAs was used to carry out the demonstration process considering each farmer's field as replication of the trial.

2.3. Materials used and Field design

Pre extension demonstration of insecticide called Dimethiote was carried out to control Pod Borer (African Ball Worm) on lentil crop in order to decrease the yield loss which recurrently occurs by the attack of aphids. From

each district, two potential PAs were selected to carry out the demonstration trial. One to two representative hosting farmers were selected to implement the activity. The trial was conducted on farmers' field in which farmers were considered as replications. The insecticide called Dimethoite was sprayed on lentil crop using Asano variety. The effect of the insecticide was demonstrated, evaluated and compared by using one sprayed plot and unsprayed plot.

2.4. Data type and method of data collection

Both qualitative and quantitative data were collected using appropriate data collection methods such as direct field observation/measurements, key informant interview and focused group discussion (FGD). Yield data per plot in all locations were recorded. Farmers' preference to the demonstrated technology was identified.

2.5. Data analysis

SPSS was used as statistical package (descriptive statistics was used to analyze the data), while farmers' preference to the chemical was identified and ranked using simple ranking methods.

3. Results and discussion

3.1. Yield performance of demonstrated treatment

The yield of demonstrated plots were analyzed using simple descriptive statistics like mean. Accordingly, the mean yield obtained from Goro and Ginnir were summarized in the graph below.

As the result of farmers' evaluation, the effect of dimethiote insecticide on the sprayed plot was clearly indicated by participant farmers. They compared the two plots by counting number of tillers, number of pods per plant and by assessing the whole plant pod status (Whether it is affected by aphids or healthy).

Table 1
Yield Performance of demonstrated technologies.

No	Treatment	Yield obtained (Qt/ha)			Percent yield increased over check	Net return
		Goro	Ginnir	Mean		
1	Dimethoate	9	15.45	12.225	75.90%	1.64
2	Unsprayed	5.4	8.5	6.95	-	0.63

The result showed that the higher yield was obtained from the sprayed (Dimethoate plot from both Goro (9qt/ha) and Ginnir (15.45qt/ha) districts while lower yield were obtained from unsprayed plot at both locations (5.4qt/ha and 8.5qt/ha at Goro and Ginnir respectively). This shows that the Dimethoate has a great difference on the yield of lentil. It increased yield over the control (unsprayed) by 66.67% and 81.76% at Goro and Ginnir respectively. The result of Cost benefit ratio analysis also indicates that Dimethoate (1.64) has higher net return than the check [unsprayed plot (0.63)].

Table 2
Farmers' comparison of the insecticide with unsprayed plot based on their selection criteria.

No	Varieties	Rank	Reasons
1	Dimethoate	1 st	High yielder, high number of tillers, high number of branch/plant, high seed/pod, not affected by aphids, plump seed.
2	Unsprayed	2 nd	Very low yielder, few numbers of tillers, limited numbers of pods/plant, affected by aphids.

4. Conclusion

Pre extension demonstration of insecticide called Dimethiote was carried out to control Pod Borer (African Ball Worm) on lentil crop was carried out on farmers' field. The effect of the insecticide was demonstrated, evaluated and compared by using one sprayed plot and unsprayed plot.

Similarly, farmers were enhanced to select the plot (sprayed and unsprayed) of their interest by setting their own selection criteria. Better plot (sprayed and unsprayed) was identified and ranked based on farmers' preferences. According to simple ranking result, grain yield, number of tillers and high number of branch/plant, were the top three priority concern of the farmers for sustainable production of lentil crop in the study districts.

To summarize, Dimethoate plot was selected by participant farmers in all districts due to high yielder, high number of tillers, high number of branch/plant, high seed/pod, not affected by aphids, plump seed. Therefore, insecticide called Dimethoate to control Pod Borer (African Ball Worm) on lentil crop should be carried out in the areas where it was selected.

References

- Cardona, C., Fam, E.Z., Bishara, S.I., Bushara, A.G., 1984. Field guide to major insect pests of Faba bean in the Nile valley. Information bulletin No.2. International Center for Agricultural Research in the Dry Areas (ICARDA). ICARDA: Aleppo, Syria.
- Central Statistical Agency (CSA), 2017. The Federal Democratic Republic of Ethiopia. Central Statistical Agency Agricultural Sample Survey 2016/2017 (2009 E.C.): Report on Area and Production of Major Crops (Private Peasant Holdings, Meher Season), Vol. I. Addis Ababa, Ethiopia.
- Cubero, J.I., 1981. Origin, taxonomy and domestication. In: Webb, C., Hawtin, G. (Eds.), Lentils. Common wealth Agricultural Bureaux, Slough, UK, 15-38.
- Erskine, W., Sarker, A., Kumar, S., 2011. Crops that feed the world 3. Investing in lentil improvement toward a food secure world. Food Sec., 3, 127-139.
- FAO (Food and Agriculture Organization of the United Nations), 2009. FAOSTAT Statistical.

How to cite this article: Biftu, A., Gadissa, B., Sida, A., 2020. On-farm demonstration of Dimethoate/Ethiothoate 40% EC for the control of Aphids on Lentil crop in Bale zone. Scientific Journal of Crop Science, 9(1), 389-392.

Submit your next manuscript to Sjournals Central and take full advantage of:

- Convenient online submission
- Thorough peer review
- No space constraints or color figure charges
- Immediate publication on acceptance
- Inclusion in DOAJ, and Google Scholar
- Research which is freely available for redistribution

Submit your manuscript at
www.sjournals.com

Sjournals
where the scientific revolution begins