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Evaluation of pre-harvest spray of insecticides for the control of pulse beetle *Callasobruchus chinensis* L. in Redgram

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Abstract

Field-cum-laboratory experiment was conducted to study the effect of pre-harvest spray of insecticides for control of pulse beetle in Redgram at Seed Research and Technology Centre, Prof. Jayashankar Telangana State Agricultural University, Rajendranagar, during *Kharif* 2016 and 2017. The design used was split plot design consist of five treatments and three spraying schedules with three replications. Adult emergence of pulse beetle and seed damage differed significantly due to pre-harvest spray of insecticides and different spraying schedules. The lowest number of adult emergence were recorded in treatment profenophos 50 EC followed by emamectin benzoate 5 SG and neemazal 10000 ppm. In case of spraying scheduled lower number of adult emergence and seed damage were recorded in spraying at 50% pod maturity and maturity as compared to others. In interaction effect significantly lowest adult emergence as well as seed damage were recorded in pre-harvest spraying of profenophos 50 EC 0.012 (1 ml/ litre of water) at 50% pod maturity and maturity stage to check the infestation of pulse beetle during storage up to two months.

Keywords: Pre-harvest spray, insecticides, redgram and pulse beetle

Introduction

Red gram is an important pulse crop in India. In India, Red gram is one of the most widely cultivated pulse crop. Improper storage conditions affect the pulses, both in quantity and quality. Many insect pests including red flour beetle, grainary weevil, lesser grain borer, damage red gram in storages, however, pulse beetle *Callosobruchus chinensis* L., belonging to the family chrysomelidae, is the most damaging crop pests by to the stored legume industry due to their generalized legume diets and wide distribution, (Ahmed *et al.* 2003 and Yanagi *et al.* 2013) ^[1, 2]. It is a cosmopolitan pest, attacking grain legumes during both pre and post-harvest stages all over the world, (Dias and Yadav.1988) ^[3]. Normally infestation starts in the field because adult beetles can easily fly and lay eggs on the redgram pods. In India Gujar and Yadav (1978) ^[4] recorded 32.2 to 55.7 per cent loss in seed weight and 17.0 to 53.5 per cent loss in protein content. In case of severe infestation cent per cent damage is caused by the pest, (Pruthi and Singh 1950) ^[5]. It is very difficult to manage the pulse beetle which causes heavy losses during storage. Under such situation, it is necessary to find out such strategy which will be helpful to manage the pest. Accordingly to damaging pattern of this pest (Infestation starts right from the field) pre-harvest sanitation spray is a novel method to arrest these insects in the field itself thereby delimiting the damage during storage. It involves the spraying of insecticides during the formation and development of pod and seed at needy concentrations at suitable intervals

Materials and Methods

In field The field trials were conducted from 2016 to 2018 at at Seed Research and Technology Centre, Prof. Jayashankar Telangana State Agricultural University, Rajendranagar with redgram (variety: Asha) adopting Split Plot Design with two factors *i.e.* first factor was insecticides and second factor was spraying schedules with three replications. A crop was raised after following recommended agronomical practices in a plot size 8 x 10 m² under irrigated condition. Insecticidal spray was applied as per the three spraying schedules *i.e.* spraying at 50% pod maturity (S1), spraying at maturity (S2) and spraying at 50% pod maturity and maturity (S3). The crop was imposed with pre-harvest spray using emamectin benzoate 5 SG@ 0.3g per litre, Malathion 50 EC @ 1 ml/litre (I2), profenofos 50 EC 1

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1 ml/litre (I3) and Neemazal 10000 ppm 14.5 SC with knapsack sprayer as prophylactic measures against pulse beetle. The unsprayed plots served as control (I5).

In storage

After threshing, 1000 g seed was collected from each treatment, replication-wise. Such quantity of seed was kept in cloth bag ensuring protection from cross infestation during the storage period. The observations on adult emergence were recorded at weekly interval up to two month. Number of seeds having exit hole (damaged seed) were counted at the end of the two months. For the purpose, 100 seeds were randomly selected from each treatment replication-wise and seeds having exit hole were counted. The data recorded on adult emergence and seed damage based on exit hole was subjected to ANOVA.

Results and Discussion

Three years pooled data on adult emergence in pre-harvest spraying of different insecticides, spraying schedules and interaction effect of pre-harvest spraying and spraying scheduled was showed no adult emergence up to two week of storage, Lowest number of adult emergence (16.87) was recorded in treatment profenophos 50EC (I3) followed by emamectin benzoate 5 SG (I1) and neemazal 10000 ppm (T4). In case of spraying scheduled lower number of adult emergence (25.30) was recorded in spraying at 50% maturity and maturity (S3) as compared to others. The results of interaction effect were found significant and lowest adult emergence was recorded in treatment combination profenophos 50 EC spraying at 50% maturity stage and maturity (I3S3) in redgram.

Minimum seed damage (0.01%) was recorded in pre-harvest spraying of profenophos 50EC followed by malathion 50EC. The significant effect of spraying schedule and combination with pre-harvest spraying on seed damage was found in redgram. The results of interaction effect were found significant and lowest adult emergence was recorded in

treatment combination profenophos 50 EC spraying at 50% maturity stage and maturity (I3S3) in redgram.

The pre-harvest sprays, which were conducted at 105 days after sowing, in this experiment had significantly reduced the number of *C. chinensis* recorded during storage. This was, probably, as a result of significant reduction in the number of eggs of the bruchids. Kabeh and Lale (2004) [6] found similar trend, when they combined the extra spray of synthetic insecticides and the botanicals, on one hand, and early harvesting of the cowpea, on the other. Lower number of the bruchids found in the plots where the extra sprays were applied, was as a result of less number of eggs already laid in the field. Dick and Credland (1986) [7] reported that the number of *C. maculatus*, which can emerge from cowpea seeds, depends among other things on the number of eggs initially present. However, there was no significant increase of *C. maculatus* between the two conditions of non spray (control) of the insecticides and early sprays (46 and 58 days after sowing) of the insecticides, without the extra sprays as shown by this study. The result, therefore, indicated that field infestation of cowpea grains by the *C. maculatus* usually occurs towards the pod ripening stage. Ezueh (1995) [8] had reported that the attack by the bruchid beetles *C. maculatus* on cowpea begins at about pod drying time and damage of 2-11 percent may begin at this stage.

Most of the seeds that were protected in the field just before harvesting germinated. This is expected since these seeds were least damaged by the bruchids in the store. This indicates that the embryos of the seeds were not damaged significantly. Reduced seed infestation by bruchids during storage due to pre-harvest spray of insecticides and botanicals in pulses was established by earlier scientists Malarkodi and srimathi (2007) [9] and Sanon et al., (2010) [10]

Okonkwo and Okoye (2002) [11] had reported that reduction in germination of damaged seeds was attributed to damage to the embryo. Bruchid-damaged redgram seed suffered a decline in germination related to each emergence hole on the seeds.

Table 1: Evaluation of pre-harvest spraying of insecticides for the management of pulse beetle (*Callosobruchus sp*) pooled analysis

	Adult emergence/kg seed					Mean
	T ₁ (Emamectin benzoate) @ 0.3 ml/litre	T ₂ (Malathion) 50 EC @ 1ml/litre	T ₃ (Profenophos) 50 EC @ 1ml/litre	T ₄ (Neemazal 10000 ppm @ 1ml/litre)	T ₅ (Control)	
S ₁ (Spraying at 50% pod maturity)	28.07	29.07	15.55	19.03	70.89	32.59
S ₂ (Spraying at Maturity)	37.91	51.26	25.05	42.30	75.44	46.55
S ₃ (Spraying at 50% pod maturity and maturity)	9.47	17.26	9.22	17.49	73.07	25.30
Mean	25.14	32.65	16.87	26.27	73.14	
	T	S	T at S	S at T		
S.Ed	0.615	0.42	0.99	0.95		
CD (0.05)	1.42	0.88	2.14	2.05		

Table 2: Evaluation of pre-harvest spraying of insecticides for the management of pulse beetle (*Callosobruchus sp*) pooled analysis

	Seed damage (%)					Mean
	T ₁ (Emamectin benzoate)	T ₂ (Malathion)	T ₃ (Profenofos)	T ₄ (Neemazal 10000 ppm)	T ₅ (Control)	
S ₁ (Spraying at 50% pod maturity)	0.45	0.39	0.16	0.46	1.81	0.654
S ₂ (Spraying at Maturity)	0.54	0.42	0.20	0.56	1.73	0.69
S ₃ (Spraying at 50% pod maturity and maturity)	0.12	0.20	0.01	0.23	1.76	0.464
Mean	0.37	0.34	0.12	0.42	1.77	
	T	S	T at S	Sat T		
S.Ed	0.009	0.005	0.012	0.013		
CD (0.05)	0.02	0.01	0.02	0.03		
CV (%)	2.63					

Conclusion

Among the different treatments, spraying of profenophos 50 EC at 50% maturity and maturity stage were found more effective in checking cross infestation of pulse beetle in redgram and also recorded with lowest adult emergence and lowest seed damage.

References

1. Ahmed KS, Itino T, Lchikawa T. Duration of developmental stages of *Callosobruchus chinensis* (Bruchidae: Coleoptera) on Azuki bean and the effect of neem and sesame oils at different stages of their development. *Pak J Biol. Sci* 2003;6(10):332-335.
2. Yanagi S, Saeki Y, Tuda M. Adaptive Egg Size Plasticity for Larval Competition and its Limits in the Seed Beetle *Callosobruchus chinensis*. *Bulletin of Grain Technology* 2013;6(10):332-335.
3. Dias CAR, Yadav TD. Incidence of pulse beetle in different legume seeds. *Indian Journal of Entomology* 1988;50(4):457-461.
4. Gujar GT, Yadav TD. Feeding on *Callosobruchus chinensis* L. in Green gram. *Indian Journal Entomology* 1978;40(2):108-112.
5. Pruthi HS, Singh M. Pests of stored grain and their control. Manager of publications, Delhi 1950, P68.
6. Kabeh JD, Lal NES. Effect of Pre-harvest Sprays of Neem (*Azadiracta indica* A. Juss seed products and primiphos-methyl and harvest time modification on infestation of cowpea by storage bruchids in the Field and Store in Maiduguri, Nigeria, *Nig J Entomol* 2004;21: 104-116.
7. Dick KM, Credland PF. Changes in the response of *Callosobruchus maculatus* (Coleoptera: Bruchidae) to a resistant variety of cowpea. *J Stored Products* 1986;22:227-233.
8. Ezueh MI. Control of stored product pests. In: Anthony Youdeowei and Mike Service (eds). *Pests and Vector Management in the Topics*. Longman Nigeria PLC Lagos 1995, P399.
9. Malarkodi K, Srimathi P. Seed physiological maturity. *Internat J Plant Sci* 2007;2(1):222-230.
10. Sanon, Abanm, Binco Dabiree CL, Pitteendrigh BR. Effectiveness of spinosad (Naturalyes) in controlling the cowpea storage pests. *Callasobruchus maculatus* coleoptrea bruchidae. *Journal of Economic Entomology* 2010;103(1):203-210.
11. Okonkwo OU, Okoye WI. Effect of Plant Materials on Damage and Germination of Cowpea Seeds Stored on small Farms. Nigeria. *Journal Entomology* 2002;19:90-98.
12. Michalaki MP, Athanassiou CG, Kavallieratos NG, Kavallieratos YA, Balotis GN. Effectiveness of *Metarhizium anisopliae* applied alone or in combination with diatomaceous earth against *Tribolium confusum* Du Val larvae: Influence of temperature, relative humidity and type of commodity. *Crop Prot* 2006;25:418-425.
13. Pruthi HS, Singh M. Pests of stored grain and their control. Manager of publications, Delhi 1950, pp68.