Bulletin of Environment, Pharmacology and Life Sciences
Bull. Env. Pharmacol. Life Sci., Vol 6 Special issue [1] 2017: 333-336

Online ISSN 2277-1808
Journal's URL:http://www.bepls.com
CODEN: BEPLAD
Global Impact Factor 0.533
Universal Impact Factor 0.9804
NAAS Rating 4.95

FULL LENGTH ARTICLE **OPEN ACCESS**

Relative efficacy of botanicals against pulse beetle (*Callosobruchus chinensis* L.)infestation in Chickpea during storage

R. B. Singh , R. N. Nishad and R. P. Singh*
Department of Entomology
NDUA&T, Kumarganj, Faizabad-224229(UP)

ABSTRACT

Pulses are the cheap and best source of protein. Pulses are third important group of crop in Indian agriculture after cereals and oilseed. Various constraints are responsible for deterioration of chickpea seed quality during storage, among them bruchid (Callosobruchus chinensis) infestation play an important role, which is managed by using botanicals seed protectants. Use of protectants as seed treatment is rapid and effective method for destroying life of insects during seed storage. In view of this facts bio-efficacy (infestation, and weight loss) of eight se ed protectants (Neem leaf powder @ (5g kg $^{-1}$), Nimbecidine @ (5 ml kg^{-1}), Karanj oil @ (5 ml kg^{-1}), Custard apple leaf powder @ (5g kg $^{-1}$), Castor oil @ (5ml kg $^{-1}$), Eucalyptus oil @ (5ml kg $^{-1}$), Gorakhmundi @ (5g kg $^{-1}$) and Deltamethrin 2.8 EC @ (0.04 ml kg $^{-1}$) was studied . Among tested seed protectants besides chemicals, Nimbecidine @ 5 ml kg^{-1} seed followed by karanj oil@ 5 ml kg^{-1} seed botanicals were most effective in respect to less insect infestation per cent and percent weight loss upto 6 month of storage periods.

Key Words: *Chickpea (Cicer arietnum L.), Pulse beetle (Callosobruchus chinensis), botanicals, Bio-efficacy.*

Received 10.07.2017 Revised 29.07.2017 Accepted 23.08. 2017

INTRODUCTION

Chickpea (*Cicer arietnum* L.), is not only a rich source of proteins, carbohydrate and other essential constituents of human diet but also improve soil health by fixing nitrogen in soil through symbiotic nitrogen fixation process. According to an estimate, 60 per cent of whole production that produced is destroyed by insect pests in which storage insect-pest play an important role. The insect causing damage in storage are pulse beetle (*Callosobruchus chinensis*), Khapra beetle (*Trogoderma granarium*) and lesser grain borer (*Rhizopertha dominica*). Among these, the pulse beetle is most important damaging insect which cause infestation to pulse both in field as well as in ambient storage. This pest was first of all described in china in the year 1758 where the beetle gets its species name (Thembhare, 2007). Pulse beetle is primary pest of stored pulses. Adult is harmless, having short life span. Only grub causes damage to stored pulses. The grubs cause damage by eating out the entire internal content of the grain, leaving only the shell behind. The losses caused by this pest to the pulses have been estimated to the tune of 40 to 50 per cent in storage (Mathur and Upadhyay, 2014). The bruchids are most degraded stored grain pest, causing nearly 10-90 per cent loss of in pulses (Rathore and Sharma, 2002).

MATERIALS AND METHODS

Effect of botanicals on chickpea seed infestation (damage) by *C. chanensis:*

From each sample of each replication hundred seed will be randomly selected carefully to short out healthy and unhealthy seed with the help of magnifying lens (10x). The observation will be recorded at 90 and 180 days after treatment. The data thus obtained will be used for computing per cent damage seed by using above formula.

$$\text{Per cent seed damage (bored seed)} = \frac{\text{No. of bored seed in sample}}{\text{Total number of seed in sample}} \text{ x } 100$$

Determination of percentage weight loss of seed:

To calculate the per cent weight loss of seed, 100 seed will be taken. From each replication of different treatment and carefully examined with the help of magnifying lens (10x) to separated out the bored seed. The observations were recorded at the end of experiment (180 days). The data thus obtained will be used for computing weight loss per cent by using above formula (Dawae, 2008)

$$\text{Per cent weight loss in seed} = \frac{\text{Weight of damage seed of sample}}{\text{Total weight of seed in sample}} \text{ x } 100$$

RESULT AND DISCUSSION

The results (Table-1, Fig.1&Table-2, Fig.2) showed variation in seed infestation and seed weight loss in chickpea up to experimental storage periods. All the Seed protectants at 3 and 6 month were given significantly superior results over control in respect to both seed infestation and seed weight loss.

The insect damaged was ranged from 0.33to 3.33 per cent at 3 month and 1.67 to 6.00 per cent at 6 month of ambient storage.

At 3 months of storage period the minimum seed infestation 0.33% was observed in Deltamethrin 2.8 EC @ 0.04 ml kg $^{-1}$ followed by Nimbecidine @ 5 ml kg^{-1} with 0.67 per cent and Karanj oil @ 5 ml kg^{-1} with 1.0 per cent damage.

At 6 months of storage period the minimum seed infestation 1.67 per cent was observed in Deltamethrin 2.8 EC @ 0.04 ml kg $^{-1}$, followed by Nimbecidine @ 5 ml kg^{-1}with2.33 per cent and Karanj oil @ 5 ml kg^{-1} with 3.33 per cent damage. All treatment was significantly superior then the untreated control that have maximum insect damage (9.0%) at 6 month of storage period. Insect infestation percent was increased in all the treatments with period increased in storage and nature of protectants.

These results were also supported by Singal and Bhanot (2007) in greengram, Mishra *et al.* (2008), Lal and Raj (2012) in pigeonpea, and Mendali and Raddy(2014) in pigeonpea.

The result showed that all the seed protectants showed better performance in respect to per cent weight loss with significant level over control at different storage periods.

At 3 month of storage, the weight loss due to feeding of seed was ranged 9.33-2.67 per cent.The minimum weight loss observed in Deltamethrin 2.8 EC @ 0.04 ml kg $^{-1}$ 2.67 per cent followed by Nimbecidine @ 5 ml kg^{-1} with 4.333 per cent, Neem leaf powder @ 5g kg $^{-1}$ with 4.76 per cent, Karanj oil @ 5 ml kg^{-1} with 6.33 per cent and Custard apple leaf powder @ 5g kg $^{-1}$ with 7.76 per cent. The weight in control was higher in compare to treatment and was 10.75 per cent .

At 6 month of storage, the weight loss was ranged 14.8-6.33 per cent.The minimum weight loss was in Deltamethrin 2.8 EC @ 0.04 ml kg $^{-1}$ 6.33 per cent followed by Nimbecidine @ 5 ml kg^{-1} with 9.51 per cent, Neem leaf powder @ 5g kg $^{-1}$ with 9.76 per cent, and Karanj oil @ 5 ml kg^{-1} with 10.15 per cent. The weight in control was 18.8 per cent significantly higher than all control.

Similar findings have been reportd by several workers, Tripathi *et al.* (2006), pandey *et al.* (2013) in pigeonpea, Gawade *et al.* (2009) in cowpea, Tabu *et al*. in chickpea.

Table 1: Effect of treatment (Seed protectants) on insect infestation by pulse beetle in chickpea at different storage period

Treatment	Seed protectant (Insecticide/Botanical)	Dose (kg $^{-1}$ Seed)	Mean Percent Infestation	
			Storage Month After Treatment	
			3	6
T_1	Neem leaf powder	5 g	1.33(6.53)	3.33(10.49)
T_2	Nimbecidine	5 ml	0.67 (3.82)	2.33(8.74)
T_3	Karanj oil	5 ml	1(5.73)	3.33(10.49)
T_4	Custard apple leaves powder	5g	1.67(7.33)	3.66(11.01)
T_5	Castor oil	5ml	2.67(9.35)	5.33(13.33)
T_6	Eucalyptus oil	5ml	3.33(10.94)	6.00(14.14)
T_7	Gorakhmundi	5g	3(9.97)	5.00(12.87)
T_8	Deltamethrin (2.8EC)	0.04ml	0.33(1.92)	1.67(7.33)
T_9	Control	Untreated	5(12.87)	9.00(17.43)
S.E±			1.044	0.615
C.D. (5%)			3.17	1.84

Initial infestation 0.33

The figures given in parenthesis are Angular Transformed values

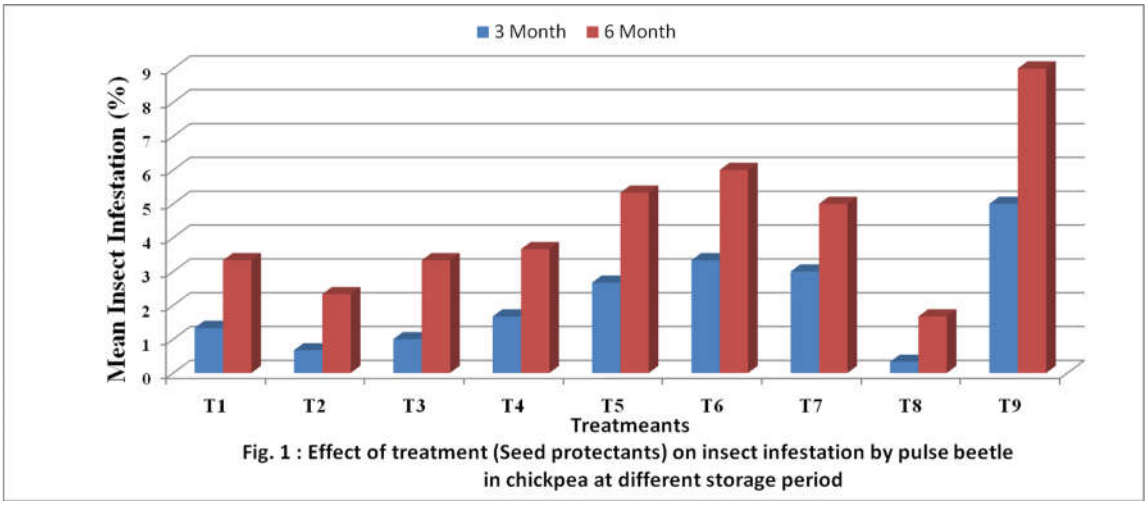

Fig. 1 : Effect of treatment (Seed protectants) on insect infestation by pulse beetle in chickpea at different storage period

Table 2: Effect of treatment (Seed Protectants) on seed weight loss (%) in chickpea at different storage period.

Treatment	Seed protectant (Insecticide/Botanical)	Dose (kg^{-1} Seed)	Mean Seed weight loss (%) at different storage period	
			3 Month	6 Month
T_1	Neem leaf powder	5 g	4.76(12.59)	9.76(18.17)
T_2	Nimbecidine	5 ml	4.33(11.99)	9.51(1796)
T_3	Karanj oil	5 ml	6.33(14.57)	10.15(18.57)
T_4	Custard apple leaves powder	5g	7.76(16.17)	13.0(21.10)
T_5	Castor oil	5ml	8.33(16.75)	13.8 (21.80)
T_6	Eucalyptus oil	5ml	9.33(17.78)	14.8(22.64)
T_7	Gorakhmundi	5g	8.67(17.10)	13.5(21.56)
T_8	Deltamethrin (2.8EC)	0.04ml	2.67((9.37)	6.33(14.57)
T_9	Control	Untreated	10.75(18.93)	18.8(25.71)
S.E±			0.341	0.314
C.D. (5%)			1.021	0.94

The figures given in parenthesis are Angular transformed value.

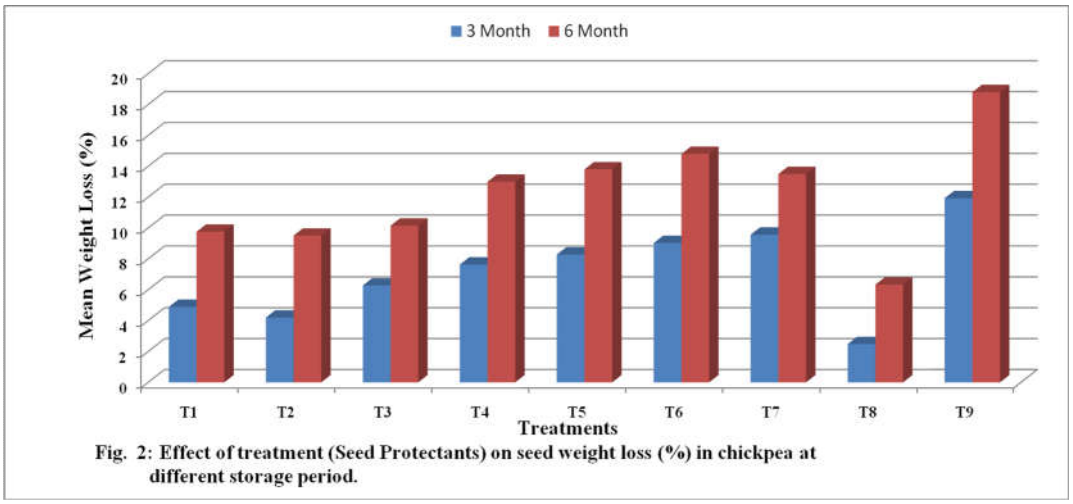

Fig. 2: Effect of treatment (Seed Protectants) on seed weight loss (%) in chickpea at different storage period.

REFERENCES

1. Dawae, P. V. (2008). Studies on biology and management of pulse beetle on stored pigeonpea M.Sc. (Ag.) thesis submitted to NDUAT, Kumarganj, Faizabad (U.P.) India.

2. Gawade, A. A.; Chavan, B. P. and Chandele, A. G. (2009). Relative efficiency of some botanicals and synthetic seed production against the pulse beetle *Callosobruchus maculates* F. on cowpea. *Pest Management and Economic Zoology.***17** (2): 159-162.
3. Lal, D. and Raj, D. V. (2012). Efficacy of application of four vegetable oils as grain protectant against the growth and development of *Callosobruchus maculatus* and on its damage. *Advances in Bioresearch*, **3** (2): 55-59
4. Mathure, Y. K. and Upadhyay, K. D. (1997).A text book of Entomology, pests of crops pp.272-73.
5. Mishra, B.; Srivastava, A. K. and Chauhan, A. K. S. (2008). Effects on growth and development of *Callosobruchus chinensis* (Linn.) due to some vegetable oils used as grain protectants. *J. of Living World.*,**15**(2): 11-16.
6. Pandey, A. K.; Singh, P.; Palni, U. T. and Tripathi, N. N. (2013).Bioefficacy of plant essential oils against pulse beetles *Callosobruchus* spp. (Coleoptera: Bruchidae) in pigeon pea seeds with particular reference to *Clause napentaphylla* (Roxb.) D. C. *J. of Phytopathology and Plant Protection,***46** (12):1408.
7. Rathore Y. S. and Sharma, V. (2002).Management of bruchid infestation in pulses. Indian Institute of pulse Research, Kanpur, U.P., India, 136.
8. Singal, S. K. S. C. and Bhanot, J. P (2007).Role of grain protectants in integrated pest management of pulse beetle, *Callosobruchus chinensis* (L.) infesting green gram, *Vignaradiata* (L.)Wilczek.*Res. on Crops*, 8(2):458-462.
9. Tabu, D. Selvaraj, T.; Singh, S.K. and Mulugeta, N. (2012).Management of Adzuki bean beetle (*Callosobruchus chinensis*L.) using some botanicals, inert materials and edible oils instored chickpea. *J.ofAgril. Tech.*, Vol. **8**(3): 881-902.
10. Thambhare, B. D. (2007). Modern Entomology Vol. II, pest of other crops and stored grains pp. 337.
11. Tripathi, S.; Awasthi, S. and Chandralekha.(2006). Efficacy of different seed protectants against (*Callosobruchuschinensis*L.*)* on pigeon pea.*Indian j. Pulses Res.,* **19** (2): 272.

CITATION OF THIS ARTICLE

R. B. Singh , R. N. Nishad and R. P. Singh. Relative efficacy of botanicals against pulse beetle (*Callosobruchus chinensis* L.)infestation in Chickpea during storage.Bull. Env. Pharmacol. Life Sci., Vol 6 Special issue 1, 2017: 333-336