



Evaluation of the most suitable insecticidal treatments for maintaining duration of storability and quality of seed of field pea seeds (*Pisum sativum L*)

Priyanka Singh*, Surendr Yadav, V.K. Chourasiya and Poonam Singh

Department of seed science & technology, C.S. Azad university of Agriculture & Technology Kanpur-208002, India

*e-mail: priyanka.agkanpur@gmail.com

(Received: June 05, 2015; Revised received: November 08, 2015; Accepted: November 10, 2015)

Abstract: An experiment was conducted to study the effect of insecticidal seed treatment on seed storability of field pea variety sapna during storage in year 2012-13 at the Department of Seed Science and Technology C.S.A. University of Agriculture and Technology Kanpur. Freshly harvested seeds were subjected to the testing against seed quality parameters and treated with Emamectin benzoate @ 40mg/kg, Spinosad @ 4.4mg/kg, Indoxacarb @ 13.8mg/kg, Rynaxypr @ 9.9mg/kg, Chlorfenapyr @ 0.2mg/kg, Deltamethrin 2.8EC @ 0.04 ml/kg and stored in jute canvas bags under ambient storage conditions. The observations were recorded at trimonthly interval on germination, seedling length, seedling dry weight, seed vigour index, field emergence and insect infestation. Results indicated that the highest germination, vigor parameters, field emergence with minimum insect infestation can be maintained through the treatment of deltamethrin 2.8 EC @ 0.04ml/kg or spinosad @ 4.4 mg/kg stored in jute canvas bags under ambient conditions.

Key words: Insecticide, Storage, Environmental factor and Field pea

Introduction

Field pea is one of the important *Rabi* pulse crop belong to family fabaceae and botanically known as *Pisum sativum*. Initially it was native of south west asia. It is an important frosty, hardy, annual, cool season pulse crop that is widely cultivated throughout the world. It is rich in protein and contains 20-25 % amino acid, sugar 12 %, carbohydrate, vitamin A and C, calcium and phosphate and a small quantity of iron. Maintenance of seed quality during storage upto the next sowing season is difficult which depends upon several factors. Beside other abiotic and biotic factors responsible for qualitative and quantitative losses, the bruchids (*Callosobruchus maculatus*) cause severe damage resulting quantitative losses varying from 10-15% including the reduction in germinability from 50-90% (Sinha and Watters, 1985). To overcome the problem of insect infestation the present research work was planned to know the best insecticide and its dose to maintain high germination, seedling length, seed vigour index, seedling dry weighed, insect infestation and field emergence in field pea seed under ambient storage. Therefore, efforts were made to compare the efficacy of insecticides for the maintenance of seed quality during storage. The objective of present investigation was to control the losses of quality parameters of field pea against bruchids through insecticidal treatments.

Materials and Methods

Freshly harvested seeds of field pea *var. sapna* obtain from seed producing site and analysed for initial seed quality traits. Seeds were treated with different insecticides *i.e* Emamectin benzoate @ 40mg/kg, Spinosad @ 4.4mg/kg, Indoxacarb @ 13.8mg/kg, Rynaxypr @ 9.9mg/kg, Chlorfenapyr @ 0.2mg/kg, Deltamethrin 2.8EC @ 0.04 ml/kg and stored in jute canvas bags. Uniform covering of different insecticides on individual seed surface was ensured through proper mixing and packaged in canvas bags kept in separately to avoid any type of residual and fabric effects and stored under ambient condition. Samples were drawn from each treatment at 3 months interval and analysed for germination %

(ISTA 1999), seedling length, dry wt., vigour index, (Abdul and Anderson 1973), insect infestation and field emergence. Insect infestation was recorded visually and doubt full seeds were also observed under dissecting/ stereo microscope to identify the hidden damage. For field emergence counted number of seeds was sown in pots filled with soil, moisture and kept under glass house.

Result and Discussion

The maintenance of seed quality parameters which are deteriorated by infestation of insects during storage is managed by using insecticides because it is rapid and effective method for destroying insect life in storage. Accordingly the initial seed quality attributes of freshly harvested seed lot supplied for experimentation were worked out before the treatments and packaging. Effect of treatment on seed germination, seedling length, seed dry weighed, seed vigour index and field emergence with minimum insect infestation. The initial seed germination (98%), seedling length (16cm), seedling dry weight (0.228), seed vigour index (835), field emergence (95%), and insect infestation (00%). When seed of field pea *var sapna* was treated before storage through different treatment deltamethrin showed germination (93%), seedling length (12.5cm), seedling dry weight (0.225g), seed vigour index (808), field emergence (93%), and insect infestation (10.1%) as well as per-cent increase over control was also higher with 24.7% for germination, 33.1% for seedling length, 10.3 % dry weight, 49.8% for seed vigour index, 21.8% for field emergence with 880% in insect infestation respectively. While initial seed germination (88%). These result were also support by Babu (1991); Bajpai *et al* (2002); Singh *et al* (2004); Babu *et al* (2008); Raheem *et al* (2011); Mandeep and Thakur (2011). Next insecticide spinosad was for maintaining higher germination (84%), seedling length (11.1cm), seedling dry weight (0.213), seed vigour index (732), field emergence (88%) and with minimum insect infestation (4.5%) with per-cent over control were (21.2) for germination, (22.3) for seedling length, (12.6) for seedling dry weight, (41.3) for seed vigour index, (16.9) for field emergence and (278) for insect infestation

Table-1: Effect of Insecticidal Seed Treatments and Storage on Seed Quality Parameters

Treat-ments	Germi-nation	Over increasing %	Seedling Length (Cm)	Over Increasing %	Seedling Dry Wt	Over Increasing %	Seed Vigour Index	Over Increasing %	Field Emer-gence	Over Increasing %	Insect Infestation %	Over Decreasing %
T ₁	84(67.0)	13.9	11.1	26.4	0.213	7.00	671	40.2	70(67.0)	11.9	9.5	74.3
T ₂	76(70)	21.2	12.0	30.3	0.222	13.6	732	41.3	76(61.0)	16.9	4.50	277.0
T ₃	79(63.3)	12.3	11.0	26.0	0.198	5.51	567	28.4	68(55.66)	6.7	12.2	40.65
T ₄	80(63.6)	16.9	11.3	26.8	0.200	17.0	658	38.3	74(58.6)	7.2	7.43	130.9
T ₅	64(53.3)	8.7	10.9	24.0	0.170	21.2	600	37.8	60(51.0)	16.6	10.17	224.3
T ₆	93(75.6)	24.7	12.5	33.1	0.225	10.3	808	49.8	80(63)	21.8	1.76	875
T ₇	74(59)	00	8.3	00	0.193	00	402	00	56(48.6)	00	17.16	00
S.E	1.266	-	0.600	-	0.0183	-	45.27	-	0.958	-	0.2904	-
C.D	3.840	-	1.820	-	N.S	-	127.32	-	2.952	-	0.8808	-

Where: T₁- Spinosad@ 4.4mg/Kg; T₂-Rynaxypyr @9.9 Mg/Kg; T₃-Indoxacrab@ 13.8 mg /kg; T₄- Emamectin Benzoate @ 40 Mg/Kg; T₅- Chlorfenapyr @0.2 Mg/Kg; T₆- Deltamethrin 2.8ec @ 0.04ml/Kg; T₇- Untreated Control

respectively. These result were supported by Raheem *et al* (2011); Sanon (2010); Khashaveh *et al* (2011). Treated seed with insecticide emamectin benzoate ranked was third after deltamethrin and spinosad for maintain germination (74%) ,seedling length(11.3cm), seedling dry weight(0.200), seed vigour index (658), field emergence (80%)and with minimum insect infestation (7.4%) with per-cent over control were (16.9) for germination,(26.8) for seedling length,(17.0) for seedling dry weight,(38.3) for seed vigour index,(7.2) for field emergence and (131.7) for insect infestation respectively. Emamectin benzoate followed by indoxacrab germination (64%) ,seedling length(10.9cm), seedling dry weight (0.170), seed vigour index (600), field emergence (60%) and with minimum insect infestation (10.1) with per-cent over control were (8.7) for germination,(24) for seedling length,(21.2) for seedling dry weight,(37.8) for seed vigour index,(1.66) for field emergence and (224.3) for insect infestation respectively. Indoxcarb followed by chorfenapyr and Rynaxypyr treated seed by chorfenapyr maintain the germination percent (64), seedling length(10.9), seed vigour index(600), seedling dry weight(0.170), seed infestation percent(10.17), field emergence (60) and Rynaxypyr maintain the germination percent (68), seedling length (11cm), seed vigour index (567), seedling dry weight (0.198g), seed infestation percent (12.2), field emergence (79) both are showed significant inferior performance than other treatment but better than control for all parameters.

The maintenance of seed quality parameter which is deteriorated by infestation of insect during storage is managed by using insecticides. It is rapid and effective method for destroying insect life in storage. The various insecticide have been used by various scientist Ramzan *et al.* 1989, Ramaiah *et al.* 1999, Patil *et al.* 2006 under storage such as Emamectin benzoate, Spinosad, Deltamethrin, Thiram, Malathion etc for maintenance of seed quality parameter. The main objective of seed storage to protective adequate plant stand of high quality for economic production Delauche and Mathews 1973. To overcome the problem of insect infestation the present research work was planned to know the best insecticide and its dose to maintain the quality parameters of field pea seed under ambient storage condition. Effect of seed treatment was found significant for most of the parameters like seed germination, seedling length, seedling dry weight, seed vigour index, insect infestation, and field emergence except two insecticides. After treated the seeds through different insecticides highest improvement in seed quality

parameters during storage is showed treated by deltamethrin followed by spinosad and next is emamectin benzoate. Deltamethrin (93%) showed significantly best performance regarding germination ,seedling length, seedling dry weight, seed vigour index, minimum insect infestation and field emergence when seed of field pea variety sapna was treated before storage as well as per cent increase over control was also higher with, respectively. Next treatment spinosad (84%) were able to maintain the quality parameter under ambient storage condition in packaging of jute bag for 9th month and showed fairly good field emergence in season i.e in month of October 2012 with 80% and 70% which was at par to emamectin benzoate (74%) and followed by indoxcarb (68%). Treatment of insecticide rynaxypyr and chlorfenapyr showed significant inferior performance than other treatment for maintaining all quality parameters of seeds but superior than control. All the parameters like germination, seedling length, seedling dry weight, seed vigour index, insect infestation, and field emergence reduced significantly as the storage period proceed from July (2012) to April (2013) .

References

- Adhikary, P. and Barik, A.:Effect of temperature on biology of *Callosobruchus maculatus* (F). *Indian J. of Entomology*, **74**: 261-266 (2012).
- Babu, H.M.M. and Ravi, H.: Effect of seed treatment with botanical on storability of soyabean. *J. of Agri. Sci.*, **21**: 357-360 (2008).
- Bajpai, V.P. Khan, A.A., Vyas, R.P., Tiwari, L.P. and Tripathi, R.A.: Effect of bio-insecticide on viability of urd bean seed stored in different container. *Seed Res.*, **30**: 331-333 (2002).
- Babu, C.J.: Deltamethrin as an alternative prophylactic insecticide in grain storage. *Entomology for defence Services*, **21**: 226-230 (1991).
- Dikshit, A.K.: Stability of deltamethrin on pulses during storage and the effect of processing. *Pesticide Rse. J.*, **14**: 1 (2002).
- Das, Pulin, P. and Sarmah, B.K.: *Callosobruchuschinensis*(L).cause damage to number of important pulses, grain during storage. *Indian Legume Res.*, **28**: 253-256 (2005).
- Khashaveh, A., Ziaee, M. and Safarizadeh, M.B.: Control of pulse beetle in different cereals using spinosad dust in storage condition. *J. of Plant Protection Res.*, **51** : 77-81 (2011).
- Mandeep, P. and Thakur, A.K.: Efficiency of insecticide against pulses beetle on black gram. *Indian J. of Entomology*, **74**: 402-403 (2012).
- Raheem, A. and Sridevi, D.: Evaluation of selected insecticide as seed protectant against the pulse beetel. *J. of Res. ANGRAU*. **39**: 94-100 (2011).
- Sanon, A., Ba. N.M. Bins-Dabire, C.L. and Pittendrigh, B.R.: Effectiveness of spinosad in controlling the cowpea storage pest *Callosobruchus maculatus*. *J. of Economic of Entomology*, **103**: 203-210 (2010).
- Singh, P., Tewari, N., Maurya, C.L., Bajpai, V.P. and Tripathi, R.A.: Comparative losses in germination and vigour of treated lentil seeds in ambient storage. *From Sci. J.*, **13**: 111-113 (2004).
- Sharma, Ritu, Verma, R.A., Bhol, B.P.: Effect of different storage structure on the infestation of pulse beetle in chickpea. *India J. of Entomology*, **69**: 3 (2007).