Research Paper Agricultural Science

Effect of Insecticidal Seed Treatment on Seed Quality Parameters of Field Pea (*Pisum Sativum* L.) During Ambient Storage

Priyanka Singh	Department of seed science & technology, C.S.Azad university of Agriculture &Technology Kanpur (U.P) India
Ruchi Bajpai	Department of seed science & technology, C.S.Azad university of Agriculture &Technology Kanpur (U.P) India
Poonam Singh	Department of seed science & technology, C.S.Azad university of Agriculture &Technology Kanpur (U.P) India
M. K. Singh	Department of seed science & technology, C.S.Azad university of Agriculture &Technology Kanpur (U.P) India

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. Freashly 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.

KEYWORDS Insecticide, storage, environmental factor, 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 quantative losses , the bruchids (Callosobruchus maculatus) cause severe damage resulting quantative 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 newer molecules of insecticides for the maintenance of seed quality during storage.

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 Baki & 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 were sown in pots filled with soil, moisture and kept under glass house.

Result

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 freashly 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, 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 spinosad showed germination (80%), 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 Raheem et al (2011); Sanon(2010); Khashaveh et al (2011) ; Babu (1991).

Next insecticide was deltamethrin for maintaining higher germination (76%), 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 respectively. These result were supported by Bajpai et al (2002); Singh et al (2004); Babu et al (2008); Raheem et al (2011); Mandeep and Thakur (2011). Treated seed with insecticide emamectin benzoate ranked was third after spinosad and deltamethrin for maintaing 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. **Discussion**

The maintenance of seed quality parameter which are 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 newer molecules highest improvement in seed quality parameters during storage is showed treated by spinosad followed by deltamethrin and next is emamectin benzoate. Spinosad (80%) 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 deltamethrin treatment and (76%) 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 93% and 88% which was at par to emamectin benzoate (74%) and followed by indoxcarb (70%).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) .

TABLE : EFFECT OF NEWER MOLECULES INSECTICIDAL SEED TREATMENTS AND STORAGE ON SEED QUALITY PARAMETERS

TREATMENTS	GERMINATION	OVER INCREASING %	SEEDLING LENGTH (CM)	OVER INCREASING %	SEEDLING DRY WT	OVER INCREASING %	SEED VIGOUR INDEX	OVER INCREASING %	FIELD EMERGENCE	OVER INCREASING %	INSECT INFESTATION %	OVER DECREASING %	OVER INCREASING %
T_1 - INDOXACRAB @ 13.8mg/kg	70 (56.66)	13.9	11.1	26.4	0.213	7.00	671	40.2	84 (67.0)	11.9	9.5	74.3	
T_2 – DELTAMETHRIN 2.8EC @ 0.04ml/kg 4.4mg/kg	76 (61.0)	21.2	12.0	30.3	0.222	13.6	732	41.3	88 (70.0)	16.9	4.50	277.0	
T_3 –RYNAXYPYR @9.9 mg/kg	68 (55.660)	12.3	11.0	26.0	0.198	5.51	567	28.4	79 (63.3)	6.7	12.2	40.65	
T_4 – EMAMECTIN BENZOATE @ 40 mg/kg	74 (58.6)	16.9	11.3	26.8	0.200	17.0	658	38.3	80 (63.6)	7.2	7.43	130.9	
T_5 - CHLORFENAPYR @0.2 mg/kg	64 (53.3)	8.7	10.9	24.0	0.170	21.2	600	37.8	60 (75)	16.6	10.17	224.3	
T_6 – SPINOSAD@ 4.4mg/kg	80 (63.0)	24.7	12.5	33.1	0.225	10.3	808	49.8	93 (75.6)	21.8	1.76	875	
T_7 - UNTREATED CONTROL	56 (48.6)	00	8.3	00	0.193	00	402	00	74 (59.0)	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		

REFERENCES

Adhikary, P. and Barik, A.(2012). Effect of temperature on biology of Callosobruchus maculatus (F). Indian J.of Entomology.74(3):261-266. | Babu, H.M.M. and Ravi, H.(2008). Effect of seed treatment with botanical on storability of soyabean. J. of Agri. Sci. 21 (3):357-360. | Bajpai, V.P. Khan, A.A.Vyas, R.P.Tiwari, L.P. and Tripathi, R.A. (2002).Effect of bio-insecticide on viability of urd bean seed stored in different container. Seed Res.30 (2):331-333. | Babu, C.J. (1991). Deltamethrin as an alternative prophylactic insecticide in grain storage. Entomology for defence Services.226-230. | Khashaveh, A. Ziaee, M. And Safarlizadeh, M.B. (2011). Control of pulse beetle in different cereals using spinosad dust in storage condition. J.of Plant Protection Res.51(1):77-81. | Mandeep, P. and Thakur, A.K. (2012). Efficiency of insecticide against pulses beetle on black gram. Indian J. of Entomology.74(4): 402-403. | Raheem, A. and Sridevi, D. (2011). Evaluation of selected insecticide as seed protectant against the pulse beetel. J. of Res. ANGRAU.39(4): 94-100. | Sanon, A.Ba.N.M. Binso-Dabire, C.L. and Pittendrigh, B.R. (2010). Effectiveness of spinosad in controling the cowpea storage pest Callosobruchs maculatus. J.of Economic of Entmology.103(1):203-210. | Singh, P. Tewari, N. Maurya, C.L. Bajpai, V.P. and Tripathi, R.A. (2004).Comparative losses in germination and vigour of treated lentil seeds