Trends in Biosciences 4 (1): 75-76, 2011

Influence of Various Natural Indigenous Plant Products against *Trogoderma granarium* Everts on Wheat

RAJNI DUBEY, S.P. SRIVASTAVA, B.S. AZAD, S.K. SINGH* ALOK PANDEY AND RAJNISH KUMAR

Department of Zoology, D.A.V. College, Kanpur

**Division of Crop Protection, Indian Institute of Pulses Research Kalyanpur, Kanpur*

ABSTRACT

Natural indigenous plant products *viz., Melia azadarch, Linum usitatissimum, Cyperus rotundus, Ocimum americanum, Sussia occidentalis, Datura stramonium, Azadirachta indica* and *Carthamus tincotorius* were tested against *Trogoderma granarium* to see its growth and development behaviour *i.e.*, fecundity (22.67 to 5.13 eggs), incubation period (9.33 to 6.67) day, larval period (18.67 to 25.33 days), pupation (%) (19.33 to 36.67%), pupal duration (12.00 to 13.30 days), grain damage (4.67 to 30.67%) and eventually grain weight loss (1.86% to 23.33%). All the grain protectants protected the grain from *T. granarium* significantly in comparison to untreated check.

Key words *Plant products, fecundity, larval period, grain damage*

Post harvest losses of food grain due to insect pests are of vital significance in view of nutritional and economic burden to subsistence farmers in developing countries. Insect pest in storage cause qualitative and quantitative losses (Kudachi and Bahkai 2010). Growing awareness of environmental hazards due to synthetic chemicals has attracted attention towards pesticides of plant origin. The plants having insectisidal and other activities gained attention in the last few decades. Earlier attempts have been made to exploit plant materials against stored grain pests by various workers (Mishra, *et al.*, 1992, Paneru, *et al.*, 1997 and Kudachi and Bahkai, 2010); however, it needs further investigation. Efforts are being continued and prioritized to safe measures for stored pest control, and to identify bio-products as alternatives and feasible measures against hazardous chemicals. Considering this, investigations were made to find out the efficacy of different botanicals for the management of *khapra* beetle, *Trogoderma granarium* during storage.

MATERIALS AND METHODS

Seeds of (*Bankain*) *Dharek* (*M. azadarch*), linseed (*L. usitatissimum*), *Nagarmotha* (*C. rotundus*), *Kali tulsi* leaves (*O. americanum*), *Kasundi* seed (*S. occidentalis*), *Datura* seed (*D. stramonium*), *neem* oil and seed (*A. indica*), safflower oil (*C. tincotorius*) were collected and dried in shade. The fully dried plant materials of each plant were powdered with the help of common domestic grinder and filtered with 60-mesh sieve. The grounded powders were kept in to labled airtight bottles for use in the experiments.

Various plant products were thoroughly mixed separately with seed of susceptible wheat GW 1139 @ 10 and 5 ml/kg grain of powder and oil, respectively, in cylindrical jars by manual shaking. Sub samples infested with 10 pairs of 24-hours old *T. granarium* resulted pupal period of 12.76 and 12.67 days in *C. rotundus* and *O. americanum*, respectively, as against 12.16 days in control.

RESULTS AND DISCUSSION

The female laid minimum numbers of eggs (22.67) on grain treated with *A. indica.*, Maximum fecundity of the pest was observed on grains treated with *Linum usitatissimum* (51.33 eggs). Highest incubation period (9.33 days) was noticed in grains treated with *A. indica*, Minimum incubation period registered on grains smeared with *L. usitatissimum* (6.67 days). The data depicted in Table 1 indicated that the hatchability per cent of the pest was minimum (27.50) in treated with *A. indica* seed, while the maximum hatchability per cent (52.33%) in treated with *L. usitatissimum*. These findings are in conformity with the results of Verma, *et. al.* 1983. Chander and Ahmed, 1987 also recorded different essential oil as reproduction retardant against rice weevil. Present finding is also in agreement with the result of Helson, *et al.*, 1996, who have also reported neem seed extract for the management of insect pest.

The maximum larval period (25.33 days) of the pest was observed in *A. indica* treated seeds, while it was minimum (18.67 days) in *L. usitatissimum* treated seeds. Pupation was highest (36.67%) in *A. indica*, which is at par with *A. indica* oil treatment, while it was minimum (19.33%) in *L. usitatissimum* treatment. The grain treated with different plant products affected the pupal period of the pest. Highest pupal period (13.30 days) was in *S. occidentalis*. The minimum pupal period (12.00 days) was recorded in *L. usitatissimum*.

The minimum emergence (7.00%) of adults was observed in the grain treated *A. indica* while the maximum emergence (27.33) was recorded in *L. usitatissimum*. The present finding also corroborates the result of Jood, *et al.*, 1996 who reported that neem seed kernel powder (1%) and (2%) (w/w) completely prevented the damage caused in sorghum grain by larvae of *Khapra* beetles. The data recorded for F_1 progeny presented in Table 1 further revealed that all the botanical protectants protected the grains from *T. granarium* significantly in

Table 1. Efficacy of some plant products against *Trogoderma granarium* everts

S. No.	Treatment	Common name	Parts used	Dosages Kg/grain	Fecundity (%)	Incubation period (days)	Hatchability (%)	Larval period (days)	Pupation (%)	Pupal period (days)	Adults' emergence (%)	F_1 Progeny	Adult longevity male	Adult longevity female	Grain damage (%)	Weight loss (%)	Germination (%)
1.	*Melia azadarch.*	Bankain Dharek	Seed Power	10 gm.	38.33	8.00	46.67 (43.11)	21.76	29.67 (33.02)	12.73	24.33 (29.93)	6.67	12.30	13.33	28.00 (31.95)	18.67	66.67
2.	*Linum usitatissimum*	Linseed (Alsi)	Seed and Oil	10 gm.	51.33	6.67	52.33 (46.32)	18.67	19.33 (26.06)	12.00	27.33 (31.50)	9.43	13.67	16.00	30.67 (33.65)	23.33	60.67
3.	*Cyperus rotundus*	Nagarmotha	Powder	10 gm.	38.00	8.17	39.00 (88.65)	22.33	34.33 (35.85)	12.76	10.67 (19.09)	30.00	7.00	12.67	25.00 (30.02)	14.67	71.87
4.	*Ocimum americanum*	Kali Tulsi	Leaves	10 gm.	39.33	7.60	49.33 (44.60)	21.33	26.33 (31.50)	12.67	24.67 (29.80)	22.67	12.33	13.67	28.67 (32.39)	18.33	66.33
5.	*Sussia occidentalis*	Kasundi	Seed	10 gm.	31.67	8.20	31.00 (33.83)	22.43	36.00 (36.87)	13.26	10.00 (19.43)	5.67	6.67	7.33	18.00 (25.10)	5.67	75.00
6.	*Datura stramonium*	Datura (Dhatura)	Seed	10 gm.	44.00	7.46	50.66 (45.34)	21.00	25.33 (30.20)	12.67	26.33 (30.85)	31.67	13.00	14.00	29.00 (32.58)	22.00	66.00
7.	*Azadirchta indica*	Neem Oil	Leaves Powder	1.5 ml.	23.33	8.73	27.76 (31.76)	24.00	36.33 (37.05)	13.30	9.67 (10.15)	3.96	6.33	5.50	16.00 (23.58)	4.67	82.33
8.	*Azadirchta indica*	Neem (Seed)	Leaves Powder	1.5 ml.	22.67	9.33	27.50 (31.63)	25.33	36.67 (37.29)	13.13	7.00 (15.34)	8.67	3.67	4.67	24.67 (12.52)	1.86	84.33
9.	*Carthamus tincotorius*	Safflower	Oil	1.5 ml.	48.67	7.33	51.10 (45.63)	20.67	33.67 (29.13)	12.33	27.00 (31.34)	20.63	13.67	14.96	29.67 (33.02)	22.67	61.00
10.	Control				82.00	9.64	84.33	18.10	74.66 (59.74)	12.16	78.00 (62.03)	74.23	18.16	19.33	58.00 (49.60)	48.33	84.33
	S.E. ±				1.28	0.23	1.17	0.93	1.01	0.275	0.869		0.587	0.506	0.708	0.558	1.23
	C.D. at 5%				2.66	0.47	2.44	1.95	2.11	0.574	1.81		1.22	1.06	1.48	1.16	2.56

Figures in parentheses are transformed value.

comparison to control. In different treatments, number of adults' beetles varied from 3.96 to 31.67. The minimum longevity of male being 3.67 days observed against *A. indica*, whereas it remained maximum (13.67 days) in *L. usitatissimum*. Mishra, *et al.*, 1992 and Srivastava, *et al.*, 2007, reported similar finding.

Minimum damage (4.67%) of grain was recorded in *A. indica* seed along with minimum loss in weight (1.86%) of grain was observed therein, while the maximum loss (23.33%) in weight was recorded in *L. usitatissimum*. These findings are in agreement with the present finding. There was no adverse effect of grain protectants on the germination of wheat seed. However, maximum germination was observed in the grain treated with *A. indica* seed (84.33%) and it was recorded minimum in *L. usitatissimum* (60.67%). Saramma and Verma, 1971, Bowry, *et al.*, 1986 and Zudir and Imti, 1997 also reported adverse effect of neem seed kernel powder on the germination of paddy, but of course they recorded observation on germination after six moths.

ACKNOWLEDGEMENT

The authors are thankful to Professor L.P. Tiwari (Wheat Breeder), currently Director Research, C.S.A. University, Kanpur for providing facilities to carry out the present research.

LITERATURE CITED

Bowry, S.K., Pandey, N.D. and Tripathi, R.A. 1986. Evaluation of certain oil seed cake powders as grain protectants against *Sitophilus oryzae L. Indian J. Ent.*, **44**(2): 196-200.

Chander, H. and Ahmed, S.M. 1987. Laboratory evaluation of natural embelin as a grain protectant against some insect pests of wheat in storage. *J. Stored Prod. Res.*, **23** (1): 41-46.

Helson, B. Lyons B. and Groot, P.D. 1996. Development of neem seed extract for forest insect pest management in Canada. Neem News Letter, **13**(3): 35-36.

Jood, S., Kapoor, A.C. and Singh, R. 1996. Evaluation of some plant products against *Trogoderma granarium* Everts in sorghum and their effects on nutritional composition and organoleptic characteristic. *J. Stored Prod. Res.*, **32**: 345-352.

Kudachi, D.C. and Bahkai, R.A. 2010. Evaluation of botanical powders for the management of *Sitophilus oryzae* in sorghum during storage. *Journal of Eco-friendly Agriculture*, **5**(1): 43-47.

Mishra, B.K., Mishra, P.R., and Mohapatra H.K. 1992. Studies on some plant product mixtures against *Sitophilus oryzae* L. infesting wheat seed. *Indian J. Plant Prot.*, **20**(2): 178-182.

Paneru, R.B., Patourel, G.N.J and Kennedy, S.H. 1997. Toxicity of *Acorus calamus* rhizome powder from Eastern Nepal to *Sitophilus granarium* (L.) and *Sitophilus oryzae* (L.). *Crop Protection*, **16**:759-763.

Saramma, P.V. and Verma, A.N. 1971. Efficacy of some plant products and Magnesium Carbonate as protectants of wheat seed against attack of *Trogoderma granarium* Everts. *Bull. Grain Tech.*, **82**: 127-137.

Srivastava, S.P., Pandey, A.K. and Azad, B.S. 2007. Bio-efficacy of grain protectants against Khapra Beetle *Trogoderma granarium* Everts for its strategic management *Life Science Bulletin*, **4**(1&2) 7-12.

Verma, S.P. Singh, B and Singh Y.P 1983. Studies on the comparative efficacy of certain grain Protectants against *Sitotroga cerelella* (Oliv.). *Bull. Grain Tech.*, **23**(1):

Zudir, T. and Imti, B. 1997. Effect of neem *Melia azadarach* Linn. and *Azadirachta indica* (A.Juss) on the incidence of *Sitophilus oryzae* Linn on stored Paddy. *Pl. Prot. Bull.*, **49** :1-4

Recieved on 31.3.2011 *Accepted on 20.4.2011*