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Studies on Relative Orientation of *C. cephalonica* on Wheat Grain

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ABSTRACT

The laboratory experiments were conducted to study on feeding orientation of *C. cephalonica* on treated wheat grains using choice method carried out during 2015-16 in the Department of Entomology, G. B. Pant University of Agriculture and Technology, Pantnagar, Uttarakhand. Relative attractancy of 30 days old larvae of *C. cephalonica* towards treated wheat grains after 24, 48 and 72 h of release. After 24 h of release of larvae of *C. cephalonica*, ash powder and Rynaxypyr (Coragen) treated wheat grains were found highly effective as no any larvae were found oriented towards the treated grains with negligible number of larvae attracted towards sand (0.67), chopped neem leaves and talcum powder (3.00 each) followed by ajwain seed powder (3.67), saw dust (4.33) followed by garlic capsules (5.00), salt (6.00), cow urine (7.33), cow dung cake powder (8.00) with highest attractancy of larvae was found towards untreated control (9.00). Similarly, after 72 h of release of *C. cephalonica* larvae on treated wheat grains, again ash powder and coragen showed no larval orientation towards them followed by sand (2.00), chopped neem leaves (2.33), ajwain seed powder (3.00), talcum powder (3.67), salt (5.67) and saw dust (4.33). Among the treatments, the maximum number of rice moth larvae oriented towards garlic capsules (5.33), cow dung cake powder (6.00), cow urine (7.33) and untreated control (10.33). After 48 h of release of *C. cephalonica* larvae for orientation among the treated wheat grains, movement of no larvae was observed again towards ash powder and Rynaxypyr (Coragen) treated wheat grains with the least number of rice moth larvae was attracted again towards sand (1.67) treated wheat grains followed by saw dust (2.67) and chopped neem leaves (2.67 each), talcum powder (3.67), cow dung cake powder (4.00), cow urine and salt (6.00 each), garlic capsules (6.67) with maximum number of larvae oriented towards untreated wheat grains (12.33).

Key words: Wheat grain, Natural product, Relative orientation, *C. cephalonica*

Wheat (*Triticum aestivum* L.) is a major cereal grain (Belderok *et al*. 2000). It is the world's most important cereal crop in relation to production and consumption (Ileke 2011). India is the second largest producer of wheat with a total production of about 96.0 million tonnes and 29.8 million hectare area under cultivation (Anonymous 2014). The highest wheat producing states in India are Uttar Pradesh, Punjab, Haryana and Uttarakhand having a production of 30.01, 16.47 11.63 and 0.8 Metric tonnes, respectively. India's share in global wheat production was recorded 13.2 per cent during 2015-16. The rice moth, *Corcyra cephalonica* (Stainton), (Lepidoptera: Pyralidae) has a wing expanse of about half an inch and is pale greyish brown or tawny. When fully grown, the larva is about half an inch long and varies in color from white to a dirty, slightly bluish grey with occasional tints of green. Damage caused by the larvae, which are rather general feeders. They attack wheat, rice, cocoa, chocolate, dried fruit, biscuits and seeds. The larvae produce a dense webbing as they become fully grown. When feeding upon grains, they spin dense silken tubes and web the grain kernels into the walls of the tubes. It is an economically important stored grain pest in Asia, Africa, North America and Europe (Atwal and Dhaliwal 2008). For the control of stored product insects, it is less hazardous to use plant materials with antifeedant, repellant or insecticidal action than to use synthetic insecticides (Jadav 2009). Many products of botanical origin have been proved to show insecticidal activity against stored grain insects (Akhtar *et al*. 2013, Rajendran and Sriranjini 2008). Plant extracts have shown ovicidal, repellent, antifeedent and toxic effects in insects (Isman *et al.* 1990, Devi and Devi 2011). Many

products of botanical origin such as leaves and seeds of neem and jatropha, garlic capsules have been proved to show insecticidal activity against stored grain insects (Onu *et al.* 2015) as plant extracts have shown ovicidal, repellent, antifeedent and toxic effects in insects (Devi and Devi 2011). Considering the hazardous effects of chemicals used for control of stored insect pest, it is necessitated to use the indigenous eco-friendly approaches such as use of botanicals, inert material and animal origin products for their management under storage conditions.

MATERIALS AND METHODS

The laboratory experiments on the efficacy of eco-friendly indigenous products on insect pests of stored wheat were conducted during 2015-16 in the Department of Entomology, G. B. Pant University of Agriculture and Technology at Pantnagar, Uttarakhand. The culture of *C. cephalonica* was maintained on wheat in the laboratory at 28 ± 2°C temperature and 75 ± 5 per cent relative humidity. Freshly emerged adults were collected from stock culture and caged together in an inverted glass funnel covered with mosquito net. They were allowed to mate and lay eggs. Then the eggs were kept in glass beaker to obtained newly hatched 1st instar, 15 days old (3rd instar) and 30 days old (5th instar) larvae for conducting the experiments. The experiments were conducted on susceptible wheat variety UP-2338 under laboratory conditions. The treatments were consists of chopped neem leaves, ajwain seed powder, garlic capsules, cow dung powder, ash powder, sand, common salt and cow urine @ 2 g/100g wheat grains along with chemical, Coragen (10 mg/100 g wheat grains) and control (untreated) seeds. The tested plant product i.e. neem leaves (*Azadirachta indica* (Juss.) and the inert materials i.e. sand, ash powder and saw dust were collected from the University Campus whereas, ajwain powder, talcum powder, salt, garlic capsules were collected from our houses and chemical, coragen were purchased from the local market. The animal waste i.e. cow urine and cow dung and ash were collected from the nearby houses domesticating cows. The neem leaves were washed with water and shade dried to mix with wheat grains in chopped form. The cow dung cake was powdered in pestle and mortar. To prepare the required quantity @ 2 per cent concentration of the treatments 20 gram of each powder and 20 ml of cow urine was added separately to 1kg of wheat seeds. The dose for chemical, Rynaxypyr (Coragen) was 100 mg/kg of wheat seeds.

RESULTS AND DISCUSSION

Preferential studies for rice moth, C. cephalonica in treated wheat grains

The feeding preference test using choice method was conducted using treated wheat grains in circular plastic containers trays in triplicate along with untreated grains to find out the relative attractancy and orientation of larvae of *C. cephalonica*, separately, for treated and untreated grains after 24, 48 and 72 h of their release. The data obtained under the choice bioassay method on the efficacy of some eco-friendly indigenous products on the orientation/attarctacncy of all the tested insects is given in (Table 1).

Table 1 Effect of indigenous products on per cent larval colonization* of 30 days old larvae of *C. cephalonica* orientation towards the treated wheat grain in choice test

Treatments	Dose per 100g of grains	Mean number of larvae oriented after		
		24 h	48 h	72 h
Chopped neem leaves	2g	3.00	2.67	2.33
Ajwain seed powder	2g	3.67	4.33	3.00
Garlic capsules	2g	5.00	6.67	5.33
Cow urine	2ml	7.33	6.00	7.33
Cow dung cake powder	2g	8.00	4.00	6.00
Ash powder	2g	0.00	0.00	0.00
Talcum powder	2g	3.00	3.67	3.67
Saw dust	2g	4.33	2.67	4.33
Sand	2g	0.67	1.67	2.00
Salt	2g	6.00	6.00	5.67
Rynaxypyr (Coragen)	10mg	0.00	0.00	0.00
Untreated control	-	9.00	12.33	10.33
SEm±	-	0.016	0.015	0.013
CD (P=0.05)	-	0.047	0.044	0.040
CV (%)	-	0.670	0.632	0.575

The relative attractancy of 30 days old larvae of *C. cephalonica* towards treated wheat grains after 24, 48 and 72 h of release. After 24 h of release of larvae of *C. cephalonica*, ash powder and Rynaxypyr (Coragen) treated wheat grains were found highly effective as no any larvae were found oriented towards the treated grains with negligible number of larvae attracted towards sand (0.67), chopped neem leaves and talcum powder (3.00 each) followed by ajwain seed powder (3.67), saw dust (4.33) followed by garlic capsules (5.00), salt (6.00), cow urine (7.33), cow dung cake powder (8.00) with highest attractancy of larvae was found towards untreated control (9.00). After 48 h of release of *C. cephalonica* larvae for orientation among the treated wheat grains, movement of no larvae was observed again towards

ash powder and Rynaxypyr (Coragen) treated wheat grains with the least number of rice moth larvae was attracted again towards sand (1.67) treated wheat grains followed by saw dust (2.67) and chopped neem leaves (2.67 each), talcum powder (3.67), cow dung cake powder (4.00), cow urine and salt (6.00 each), garlic capsules (6.67) with maximum number of larvae oriented towards untreated wheat grains (12.33). Similarly, after 72 h of release of *Corcyra cephalonica* larvae on treated wheat grains, again ash powder and coragen showed no larval orientation towards them followed by sand (2.00), chopped neem leaves (2.33), ajwain seed powder (3.00), talcum powder (3.67), salt (5.67) and saw dust (4.33). Among the treatments, the maximum number of rice moth larvae oriented towards garlic capsules (5.33), cow dung cake powder (6.00), cow urine (7.33) and untreated control (10.33). These present studies supported the findings of Hakbij (2002) tested cow dung ash as an insecticide against *S. granaries* and *Triticuma aestivum* larvae. Ash kills insects by dessication or by filling the intergranular spaces, restricting insect movement and emergence. Achiano *et al.* (1999) showed the effectiveness of neem leaf powder and ash from various sources against different stored grain pests. The use of animal origin products such as cow urine, cow dung powder, cow dung ash powder and cow dung smoke are the emerging traditional approaches in the field of pest management under field as well as storage conditions. The biogas was found very effective to control three insect pests such as *Corcyra cephalonica* infesting stored paddy over a period of 8 months. These observations are in accordance to Yadav and Mahla (2005).

The present study clearly revealed that these naturally occurring indigenous products could be used to manage the storage insect pests in wheat as a grain protectant.

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