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Efficacy of *Azadirachta indica* and *Eucalyptus globulus* against *Corcyra cephalonica*

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Abstract

The four different concentrations (0.5, 1.0, 1.5 and 2.0 g) of *Azadirachta indica* and *Eucalyptus globules* powdered leaves were tested against all stages of rice-moth larvae. The result revealed that maximum mortality were observed at higher concentration (2.0 g) with both botanicals in first and second instar of *Corcyra cephalonica*. When compared both botanicals, *E. globulus* shows more effectiveness as compared to *Azadirachta indica* on larvae of rice moth. Therefore on small scale these plant powders having the insecticidal effect could be used as good alternatives for synthetic pesticides against this pest.

Keywords: *Corcyra cephalonica*, *Eucalyptus globulus*, *Azadirachta indica*, Mortality

Introduction

Corcyra cephalonica (Stainton) (Lepidoptera: Pyralidae) is one of the most widely distributed critical insect pests of the stored grains (Osmen, 1984). It is commonly known as Rice moth. It is major store grain pest of India and it causes 5-10% of the stored grains lost (Champ and Dyte, 1977; Frenemore and Prakash, 1992; Tooba et al., 2005). The annual loss of food grains in the Indian go down due to insect infestation is around five million tons (Neelakanthan, 1972).

It attacks on rice, wheat, corn, sorghum, groundnut, cotton seeds, coffee, spices, cocoa beans, maize, millet etc. in tropical, Asia, Africa, North America and Europe of the world (Allotey and Kumar, 1985; Allotey, 1991; Cox et al., 1981; Kumar and Kumar, 2001; Lucas and Riudavets, 2002; Allotey and Azalekor, 2000; Huang and Subramanyam, 2004; Atwal and Dhaliwal, 2008). In this the larval stage of *C. cephalonica* causes serious damage to stored grain by feeding, leaving dense and tough silken threads (Ayyar, 1934; Prevett, 1964). The damage also form frass which make grains useless for human consumption (Frenemore and Prakash, 1992). To control this pest insecticides were used but it is unsafe and indiscriminate use of chemicals leads to resistance to these insecticides, causes environmental and health hazards (White and Leesch, 1995; Tillman and Mulrooney, 2000). Methyl bromide, as one of the most effective fumigants to control this stored pests, is banned today (Fields and White, 2002; Philips and Throne, 2010). Due to this plant origin is most promising for the control of stored grain insects. These botanicals are biodegradable, less toxic to human beings and ecofriendly (Guzzo et al., 2006). So, present investigation was conducted to study the toxic effect of *Azadirachta indica* and *Eucalyptus globulus* against rice-moth, *Corcyra cephalonica.*

Materials and Methods

Efficacy of the botanical leaf powder on *Corcyra Cephalonia*:

Preparation of leaf powder

Fresh leaves of *Azadirachta indica* (L.) (Meliaceae) and *Eucalyptus globulus* (Labill.) (Myrtaceae) were collected from university garden and nearby locality. They were washed with distilled water, shade- dried and ground to fine powder using mixer. These mixer kept in air tight containers. Different concentrations ranging from 0.5 g to 2.0g (0.5, 1.0, 1.5 and 2.0 g) per 20 g Maize grains (broken) were selected for assessing the insecticidal effects of two botanicals against *C. cephalonica* (Singh et al., 2012).

Experimental design for Mortality Percentage (Insecticidal property)

Five sets were set up simultaneously with four concentrations of each plant leaf powder (0.5, 1.0, 1.5 and 2.0 g) and a control in small 250 ml plastic vials. Each vials were also containing 20 g fresh broken maize with few yeast granules. All six stages of 10 larvae were separated from stock cultures and transferred to pre-treated vials. Control cultures without any leaf powder treatment were also maintained along same experimental conditions.

All the vials were covered with muslin cloths. These vials were checked at regular intervals of 24 hours to see the toxic effect of these plant powders. The number of dead larvae were removed after noting. This was continued till all the 10 larvae were dead in each experimental set. Mortality percentage were calculated using below formula:

$$\text{Mortality \%} = \frac{\text{Number of larva dead}}{\text{Total Numbers of larva}} \times 100$$

The data of all experiment was recorded in excel sheets. Further the mean ± SE was calculated and graph was prepared accordingly using the Microsoft Excel 2013.

Results and Discussion

Effect of *Azadirachta indica* and *Eucalyptus globulus*leafpowders on different larval stages of *C. cephalonica*

The effect of pulverized leaves of *Azadirachta indica* (L.) (Meliaceae) and *Eucalyptus globulus* (Labill.) (Myrtaceae) was recorded against *C. cephalonica*.

The effect of *Azadirachta indica* leaf powder were evaluated on *C. cephalonica* larval mortality. In first instar of rice moth 67% and 82% mortality were recorded at 0.5 g and 1.0 g, whereas 100% mortality were recorded at 1.5 and 2g respectively. In second instar mortality was 67% and 73% at 0.5 g and 1.0 g, whereas 100% mortality was recorded at 2 g (Table 1). In third instar mortality was 44% and 56% at 0.5 g and 1.0 g, whereas 87% and 90% mortality were recorded at 1.5 g and 2 g respectively. In forth instar mortality was 39% and 58% at 1.5 g and 2 g respectively. In fifth and sixth instar no mortality was recorded at 0.5 g and 1 g. But at 1.5 g leaf powder mortality was recorded as 18% and 16 % respectively. Whereas at 2 g leaf powder mortality was recorded as 21 % and 17 % respectively (Table 1).

Table 1: Toxic effect of *Azadirachta indica* leaf powder against larvae of *Corcyra cephalonica*

Percentage corrected mortality over control in larval stage					
Instar	**0.5 g**	**1.0 g**	**1.5 g**	**2.0 g**	**Control**
1th	67	82	100	100	0
2nd	67	73	91	100	0
3rd	44	56	87	90	0
4th	36	42	39	58	0
5th	0	0	18	21	0
6th	0	0	16	17	0

The effect of *Eucalyptus globules* leaf powder were evaluated on *C. cephalonica* larval mortality. In first instar of rice moth 76% and 87% mortality were recorded at 0.5 g and 1.0 g, whereas 100% mortality were recorded at 1.5 g and 2g respectively. In second instar mortality was 73% and 78% at 0.5 g and 1.0 g, whereas 100% mortality was recorded at 2 g. In third instar mortality was 54% and 61% at 0.5 g and 1.0 g, whereas 92% and 94% mortality were recorded at 1.5g and 2 g respectively (Table 2).

In forth instar mortality was 62% and 66% at 1.5 g and 2 g respectively. In fifth and sixth instar no mortality was recorded at 0.5 g and 1 g. But at 1.5 g leaf powder mortality was recorded as 17% and 15 % respectively. Whereas at 2 g leaf powder mortality was recorded as 20 % and 16 % respectively (Table 2). When compared both plant leaf powder against rice moth larva, *Eucalyptus globulus* was showing slightly more mortality percentage then *Azadirecta indica*.

Table 2: Toxic effect of *Eucalyptus globulus* leaf powder against larvae of *Corcyra cephalonica*

Percentage corrected mortality over control in larval stage					
Instar	**0.5 g**	**1.0 g**	**1.5 g**	**2.0 g**	**Control**
1th	76	87	100	100	0
2nd	73	78	93	100	0
3rd	54	61	92	94	0
4th	46	49	62	66	0
5th	0	0	17	20	0
6th	0	0	15	16	0

Senguttuvan et al., (1995) reported that neem leaf powder and edible oil was effective in protecting stored groundnuts against the rice moth. Dwivedi and Garg, (2003), reported the ovicidal, larvicidal, and moult inhibiting properties of *L. camara* extract on *C. cephalonica* were reported. Morya et al., (2010) reported that leaves powders of *Lantana camara*, *Clerodendrum inerme* and *Citrus limon* was having larvicidal properties against *Corcyra cephalonica*. Khani et al., (2012) recorded that *Piper nigrum* and *Jatropha curcas* extract reduced the population of rice moth. Khan and Qamar (2015) reported that *Argemone mexicana*, *Nerium oleander* and *Parthenium hysterophorus* reduced feeding or act as antifeedant when compared to that of control.

Therefore to control this store grain pests alternate method such as use of botanicals as antifeedants and larvicidal (Khan and Qamar, 2015). These insecticidal properties of plants are due to presence of many alkaloid, flavonoids and play important role in in post-harvest protection of food grains (Omar et al., 2007; Boeke et al., 2004). These traditional methods are useful in protecting the store grains for 5-12 months (Kiruba et al., 2008).

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