EFFICACY OF BOTANICAL PESTICIDES AGAINST *PLECOPTERA REFLEXA* GUEN. (NOCTUIDAE, LEPIDOPTERA), SHISHAM DEFOLIATOR

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ABSTRACT

Botanical pesticides are becoming more important for pest control due to hazardous effect of toxic chemicals. In the present study water extracts of different parts of four drug plants *Azadirachta indica, Dhatoora alba, Melia azedarach* and *Calotropis procera* were used to determine their efficacy against *Plecoptera reflexa* larvae, an important defoliator of shisham plantations. In case of *A. indica* and *M. azedarach* seed powder was used for making 10% water extract and for *D. alba* and *C. procera* leaves, branches and stem were boiled in water for making 15% and 21% decoctions, respectively. The experiment was laid out in randomized complete block design. All test materials gave significant control over control with maximum by Dhatoora (90%) followed by neem (73.3%), Calotropis (66.7%), bakain (60%) and control (13.3%).

INTRODUCTION

Use of toxic chemicals for pest control is presently discouraged, due to their adverse effects, such as, environmental degradation, human hazard, pest resistance, pest resurgence, out-breaks of secondary pests and all that at very high cost of pesticides and their application. These demerits have renewed interest in safe pesticides as ecological sustainability has become a key consideration in pest control.

Neem (*Azadirachta indica*) extracts in water or oil of the leaves, fruit bark and seeds are reported to control at least 125 species of pest insects, mites, and nematodes, including 25 species of Coleoptera 10 species of Diptera, 25 species of Lepidoptera and one of Orthoptera (Hepburn, 1989). Neem extracts were successfully used against beetle, *Pityogenes chalcographus* L. (Wulf, 1991). Neem seed extract controlled more than 80% population of major stored grain insect pests and grain damage upto 6 months which remained quite effective upto 13 months in a farm level trial in Sindh (Anon.,1991). Similarly, Tahir, *et al* (1992) used neem extract factor B (NFB) against adults of rice weevil, *Sitophilus oryzae*, and found effective upto 7-10 days after treatment.

Simple crude water extracts of seeds of the

neem tree were used with excellent efficacy against *Plutella xylostella* on white cabbage, *Diaphania hyalinata* on cucumber, *Stegasta besguella* and *Anticassia gemmatalis* on peanut, *Spodoptera frugiperda* and *Helicoverpa zea* on maize, *Bemisia tabaci*, leaf miners, and fruit borers on tomato and *Corythacia syathicollis* on egg plant. But it was not effective against spider mites and thrips (Michael and Carsten, 1992).

Melia azedarach fruits contains an oil which is similar to that of *Azadirachta indica.* Its fruit is used in the manufacture of an insecticide and a flea powder. The leaves of bakain are used as insect repellent (Dastur, 1961). *Melia azedarach* and *Calotropis procera* at 50 or 100 gm/pot significantly suppressed build-up of nematodes, *Hoplolaimus indicus, Helicotylenchus indicus, Tylenchorhynchus brassicae, Rotylenchulus reniformis* and *Tylenchus filiformis* on *Capsicum annuum* CV. NP-46A. (Akhtar and Alam 1989).

Use of *Calotropis procera, Azadirachta indica* and *Melia azedarach* against *Meloidogyne incognita* (Root-knot nematode), enhanced plant gowth and suppressed the nematodes and reduced root gall formation (Akhtar and Alam, 1990). *Calotropis procera* has inhibiting property against tobacco mosaic *Virus* (Khurana and Singh, 1975).

Similarly *Datura metel* has larval-hatch-inhibitory-action against *Meloidogyne incognita* (Goswami and Vijayalakshmi 1990).

Keeping in view, the importance of environmental safety, studies were conducted against *Plecoptera reflexa* Guen. (Noctuidae, Lepidoptera) which is a very important defoliator in irrigated plantations in Pakistan to workout the effectiveness of 4 drug plants, i.e., Neem (*Azadirachta indica),* AK (*Calotropis procera),* Dhatoora (*Datura alba*, and Bakain (*Melia azedarach)* for pest control.

MATERIALS AND METHODS

Neem, Bakain, Ak and Dhatoora plant parts were collected from field and dried under shade. In case of Neem and Bakain dry seeds were ground and 100 gms of powder of each was soaked in 1 litre of tap water for 20 hours. Available quantities of AK and Dhatoora leaves, branches, and stem were dried in laboratory and their decoctions were made by boiling 157 gms of Dhatoora and 211 gms of AK parts in one litre of tap water for 15-20 minutes and left for 20 hours. Soaked materials and decoctions were filtered and following dilutions were prepared in water:

Neem 10%, Bakain 10%, Dhatoora 15.7%, AK 21%.

Ten 4th instar larvae of *P. reflexa* and shisham leaves on shoots were sprayed with each treatment and kept in glass chimneys. Larvae were allowed to feed on treated food for 48 hours after which fresh unsprayed leaves were provided every day. There was control in which water was sprayed only. All the treatments were replicated thrice in randomized complete block design.

RESULTS AND DISCUSSION

Observations on the mortality of larvae were recorded after every 24 hours at the time of food change. The results are presented in the table 1.

Mortality of larvae started 48 hours after treatment but the difference among treatments was not significant. Percent mortality in *P. reflexa* larvae was highly significant 72 hours after treatments. *Dhatoora alba* caused higher mortality (33.3%) followed by neem which gave 26.7% mortality. The least mortality among pesticide treatments was recorded in *Calotropis procera* (13.3%). Similarly, larval mortality was highly

significant after 96 hours of treatment. *Dhatoora alba* was on top with 36.7%, neem with 30%, *Calotropis procera*, 26.7%, *Melia azedarach* 23.3% and the least in check, 6.7%. Mortality difference in Dhatoora and neem, and neem, Ak and Bakain was non-significant. Mortality of larvae 120 hours after application of test material was not significant. To workout the mortality potential of 4 botanical pesticides under discussion an overall percent mortality in larvae of *P. reflexa* was calculated.

A perusal of the overall mortality shows that *Dhatoora alba* has given maximum larval mortality (90%), followed by neem with (73.3%), Calotropis (66.7%), Bakain (60%) and the least in control (13.3%). An individual comparison of treatments, reveals that mortality difference between Dhatoora and neem was non-significant. Similarly, mortality difference among neem. Ak and Bakain was not significant. However, all test botanical pesticides gave highly significant mortality over control.

Table 1. Mean percent mortality of *Plecoptera reflexa* larvae treated with botanical pesticides

Treatments	Dose %	Percent Mortality (After Treatments)				
		48 hours	72 hours	96 hours	120 hours	Overall
Dhatoora alba	15.7	13.3$^{n.s}$	33.3 a**	36.7a**	6.7$^{n.s}$	90 a**
Azadirachta indica	10	13.3	26.7ab	30.0ab	3.3	73.3ab
Melia azedarach	10	13.6	16.7b	23.3b	13.3	60.0b
Calotropis procera	21	13.3	13.3b	26.7b	10.0	66.7b
Control	-	0.0	0.00c	6.7c	6.7	13.3c

n.s = Non-significant
** = Significant at 1% level
- = Figures sharing same superscription are non-significant.

CONCLUSION

It can be concluded from the above study that *Dhatoora alba, Azadirachta indica, Calotropis procera* and *Melia azedarach* have potential for insect control against *Plecoptera reflexa* larvae. Further work on preparation of spray materials, application methods and extractive of these plant parts is required.

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