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Assessment of Different Plant Extracts for Their Repellency Against Red Pumpkin Beetle (*Aulacophora foveicollis*(lucas) Attacking Muskmelon (*Cucummis melo* L.) Crop

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Abstract: Results reveal that neem extract in benzene was most effective repellent of red pumpkin beetle, followed by Bakain extract in benzene. These two extracts were found non-significantly different from each other. Hermal extract in ethanol was found significantly least effective, followed by Hermal extract in benzene, Bakain and Neem extracts in ethanol. All of these plants extracts were found significantly effective in the repellency of red pumpkin beetles compared to control.

Key words: Repellency, Neem, bakain, hermal, plant extracts, *Aulacophora foveicollis*, muskmelon

Introduction

Muskmelon (*Cucumis melo* L) is an important and cheap summer fruit, commonly grown through out Pakistan, particularly in D.I.Khan, Tank and Bannu as cash crop. It is a rich source of Vitamins A, B, C and minerals. It is attacked by a number of insect pests, among them red pumpkin beetle, huda beetle, fruitflies, jassids and aphids are the most destructive. These insects adversely affect its production, quality and its market value. The use of plants derived pesticides, which are usually much safer and effective have drawn the attention of scientists through out the world. More than 2300 plants have been identified with pest control properties and another 100 plants are being studies (Grainge and Ahmad, 1988).

Neem (*Azadirachta indica* (A.Juss): Patel *et al.* (1968) tested Neem seed extract as deterrents against *Amrasca mori* (But). Babu and Beri (1969) used Neem seed extract as deterrent against *Euproctus lunata*. Chakaravorty *et al.* (1969) reported Neem seed extract as repellent against *Aulacophora foveicollis* (Lucas). Goyal *et al.* (1971) reported that the leaves and seeds of Neem tree were found repellent to some insects.

Joshi and Sitaranaiah (1980) stated that treated Spodoptera litura (F) female with Neem kernel extract laid decreased number of eggs. The *Spodoptera lituralis* (Boised) larvae were affected by the residues of Neem kernel extract after 24 hours of treatment. The extract showed good phagodeterrency and residual activity when applied at 0.6% (Miesner and Ascher, 1981).

Islam (1983) tested seed and leaves extract of Neem with hexane, diethyl ether, 95% ethanol, acetone and distilled water. He found that ether and ethanolic extracts repelled the adults and larvae of rice hispa. According to him the aqueous and ethanolic extracts of leaves, seed of *Azadirachta indica*, *Melia azedarach* also deterred feeding in adults of pulse beetles and early instar larvae of jute hairy caterpillars.

Karel and Honga (1984) studied the effect of crude extracts from Neem (kernels and leaves), tomatoes leaves and hot pepper against foliar beetles, flower thrips, pod borer (larvae) and reported that Neem kernels and hot pepper caused repellency effect on foliar beetles and flower thrips. Schmutterer (1985) reported that seed kernels of Neem can effectively be used against lepidopterous, coleopterous, chrysomelids and other phytophagous larvae. He also obtained satisfactory results of this product on Tenthrenids, Agromizeds and Coccinelids larvae. Ahmad and Micheal (1988) observed that Neem tree contains promising pest control substance and found effective and economical. Moreover, these materials are easy to process at village level and can be utilized by limited farmer resources.

Khan and Siddiqui (1994, 1994a) obtained effective control of cabbage butterfly *Pieris brassicae* larvae and mustard aphid Brevcoryne brassicae with extracts of Neem in various solvents. Khan and Siddiqui (1994b) recorded good repellency of *Tribolium casteneum* with Neem extracts in various solvents.

Bakain (*Melia azedarach*): Leaves and fruits of Bakain, *Melia azedarach* were found effective in the repellency of adults and nymphs of grasshopper, *Schistocerica concellata* when sprayed on coffee and cabbage plants under laboratory conditions (Leppage, 1946). Leaves and fruits of Bakain were used as insecticides in Philippines (Quisumbing, 1964).

Panji (1964) reported that 10% ethanolic extract of dried fruits of bakain caused 60.0 to 78.3% mortality of larvae of *Pieris brassicae* and 48.3% of *Aulacophora foveicollis* with in 96 hours. He further stated that 5% ethanolic extract of Bakain repelled larvae of *Pieris brassicae*, nymphs and adults of *Chrotogonous trachypterous* (Blanch) and adults of *Aulacophora foveicollis*. Khan and Siddiqui (1994b) recorded good repellency of *Tribolium casteneum* with Bakain's seeds and leaves extracts in various solvents.

Hermal (*Peganum harmala* L.): The smoke of Hermal *Peganum harmala* is used as disinfectant in the houses since long times. Secoy and Smith (1983) reported that the roots of this plant contain toxic alkaloids for lice and mosquitoes.

The present investigations were undertaken to determine the repellency effect of Neem (*Azadirachta indica*), Bakain (*Melia azedarach*) and Hermal (*Peganum harmala*) extracts in ethanol and benzene against red pumpkin beetles (*Aulacophora foveicollis*).

Materials and Methods

Plant extracts: The extracts from plants were obtained at Entomological laboratory, Faculty of Agriculture, Gomal University, D.I.Khan. The leaves and seeds of Bakain, Neem and leaves of Hermal were collected, cleaned and shade dried for two weeks. The leaves of Neem, Bakain and Hermal were ground to fine powder with the help of electric grinder, while the seeds of Bakain and Neem were ground with the help of paste and mortar. 10g of each powder was taken in the

soxhlet apparatus and 50 ml distilled ethanol (alcohol) was added for digestion under boiling point at 45 °C for 24 hours. The ethanolic mixture was filtered and then evaporated under reduced pressure at 50 °C in a rotatory evaporator to remove the solvent. The resulted crude material was diluted in benzene, ethanol and used for their efficacy against red pumpkin beetle.

Repellency Test of Plant Extracts Against Red Pumpkin Beetle: The repellency tests of Neem, Bakain and Hermal extracts in benzene and ethanol against red pumpkin beetles were conducted at the farm of Agricultural Faculty, Gomal University, D.I.Khan in a randomized complete block design with three replications. There were seven treatments including control in each replication. Bukhara variety of muskmelon was sown in sub-plots having 3 x 2 meter size. Row to row and plant to plant distances were kept 180 and 60 cm respectively. Two seeds per hill were sown and after germination thinning was done to leave one seedling per hill. All agronomic practices were done at par in all of the treatments. Recommended dose of urea fertilizer was applied to crop with first irrigation. The plants were sprayed with the following plant extracts with help of knapsack sprayer:

T1 = Neem Extract in Ethanol
T2 = Neem Extract in Benzene
T3 = Bakain Extract in Ethanol
T4 = Bakain Extract in Benzene
T5 = Hermal Extract in Ethanol
T6 = Hermal Extract in Benzene
T7 = Control (Un-sprayed plants)

Data on the basis of adult beetles/plant were recorded daily upto 7 days and then on 10th day of treatments. The data were subjected to statistical analysis and means of treatments were separated by LSD test.

Percent repellency of red pumpkin beetles was calculated by using the following Abbot's formula

$$\text{Percent repellency} = \frac{A - B}{A} \times 100$$

A = Average No. of red pumpkin beetles present on untreated plants.

B = Average No. of red pumpkin beetles present on treated plants.

Results and Discussion

The results of repellency effect of different plants extracts on red pumpkin beetles after different durations are presented in Table 1.

Percent replellency of red pumpkin beetles after one day of treatment: Data recorded after one day of spray of differnt plant extracts of muskmelon plants show that neem extract in benzene repelled maximum red pumpkin beetles followed by neem extract in ethanol, Bakain extract in benzene, Bakain extract in ethanol, extracts were found non-significantly differnt from each others in their repellency effect on red pumpkin beetles at 5% level of probability.

Percent repellency of red pumpkin beetles after two days of treatment: Results obtained after two days of treatment reveal that both Neem and Bakain extracts in benzene repelled maximum red pumpkin beetles followed by Neem and bakain extracts in ethanol, Hermal extracts in benzene and ethanol. All of these tested plant extracts were found non-significantly different from each others in their repellency effect against red pumpkin beetles and were found significantly effective against the pest compared to control at 5% level of probability.

Percent repellency of red pumpkin beetles after three days of treatment: Results pertaining to the effect of different plant extracts as red pumpkin beetles repellents after three days of treatment reveal that Neem extract in benzene repelled maximum number of beetles followed by Bakain extract in benzene, Neem and Bakain extracts in ethanol, Hermal extract in benzene and ethanol. Neem extract in benzene was found significantly more effective, followed by Bakain extract in benzene and Neem extract in ethanol. Hermal extract in ethanol and benzene significantly least effective, followed by Bakain extract in ethanol. All of these products were found significantly effective in their repellency against the pest compared to control at 5% level of significance.

Percent repellency of red pumpkin beetles after four days of treatment: Data of red pumpkin beetles recorded after four days of treatment show that Neem extract in benzene repelled maximum number of beetles followed by Bakain extract in benzene, Neem extract in ethanol, hermal extract in benzene, Neem extract in ethanol, Hermal extract in benzene. Neem extract in benzene was found significantly more effective, followed by Bakain extract in benzene and neem extract in ethanol. Hermal extract in benzene was found significantly least effective, followed by bakain extract in ethanol and Hermal extract in ethanol. All of these extracts were found significantly effective against th tested pest compared to control at 5% level of probability.

Percent repellency of red pumpkin beetles after five days of treatment: After five days of treatment the results reveal that

Table 1: Repellency effect of different plants extracts on red pumpkin beetles attacking muskmelon after different durations.

	Percent repellency of red pumpkin beetles after different durations of treatments (days)								
Treatment	1	2	3	4	5	6	7	10	Mean
T1	70.00a	61.67a	47.78abc	41.11ab	48.52a	52.38ab	48.81b	32.14b	51.69b
T2	80.00a	68.33a	64.45a	58.89a	55.19a	62.70a	57.94a	54.76a	60.70a
T3	66.67ab	55.00a	46.67bc	34.44b	40.19a	51.59ab	46.82b	31.55b	47.73bc
T4	71.11a	68.33a	58.89ab	47.78ab	50.56a	57.94a	50.40a	50.00a	56.74a
T5	54.55ab	46.67a	35.55c	35.55b	38.15a	42.06b	46.23b	31.55b	41.83d
T6	53.33ab	53.33a	41.11c	28.89b	41.85a	41.27b	43.45b	26.79b	43.47cd
T7	0.00b	0.00b	0.00d	0.00c	0.00b	0.00c	0.00c	0.00c	0.00e

Means followed by same letters are not significantly differ from each other at 5% level of probability.

Neem extract in benzene rep elled maximum number of beetles followed by Bakain extract in benzene, Neem and Bakain extrcts in ethanol, Hermal extracts in benzene and ethanol. All of the plant products were found non-significantly different from each others in thir rep ellency effect on the tested beetles at 5% level of probability and were found significantly effective compared to control.

Per cent repellency of red pumpkin beetles after six days of treatment: Data of repellency of red pumpkin beetles recorded after six days of treatment show that Neem extract in benzene was found superior to Bakain extract in benzene, Neem and Bakain extracts in ethanol, Hermal extracts in ethanol and benzene. Neem and bakain extracts in benzene were found non-significantly different from each otehrs and differed significantly from Hermal extracts. All of the plants extracts were found significantly effective compared to control in their repellency against red pumpkin beetles on muskmelon plants at 5% level of probability.

Percent repellency of red pumpkin beetles after seven days of treatment: Results of treatments obtained after seven days reveal that neem extract in benzene was found effective against the pest followed by Bakain extract in benzene, Neem and Bakain extracts in ethanol, Hermal extracts in benzene and ethanol. All of these plants products were found non-significantly different from each others and differed significantly compared to control at 5% level of significance in their repellency against the tested beetles.

Percent repellency of red pumpkin beetles after ten days of treatment: Data recorded after ten days of treatment show that neem extract in benzene repelled significantly more beetles followed by Bakain extract in benzene, Neem and Bakain extracts in ethanol, Hermal extracts in ethanol and benzene. All of the tested plant extracts were found significantly effective against the pest in their repellency compared to control.

Overall effectiveness of plant extracts on red pumpkin beetles: It is evident from the Table 1, that Neem extract in benzene was found most effective in the repellency of red pumpkin beetles followed by Bakain extract in benzene. These two extracts were found non significantly different from each other. Hermal extract in ethanol was found significantly least effective, followed by Hermal extract in benzene, bakain extract in ethanol, Neem extract in ethanol. All of these plants extracts were found significantly effective in their repellency against red pumpkin beetles compared to control.

Neem extracts were found most effective repellent against red pumpkin beetle. Chakaravorty *et al.* (1969) also found Neem seed extract as repelleut against *Aulacophora faveicollis* (Lucas). Panji (1964) stated that 10% ethanolic extract of dried fruits of Bakain caused 48.3% mortality of *Aulacophora foveicollis* with in 96 hours of treatment. Secoy and Smit h (1983) reported that the roots of Hermal plant contain toxic alkaloids for lice and mosquitoes.

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