

Efficacy of some plant extracts against diamondback moth (*Plutella xylostella*) on cabbage

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Abstract: In order to determine the comparative efficacy of certain plant extracts modules against the diamondback moth, *Plutella xylostella* (L.). Each module consisted of 10 days interval application commencing from 30 days after transplanting of cabbage. The pooled data revealed that all the plant extract module and recommended check gave significantly superior control of the pest over the untreated check (45.16 larvae / 5plants). Standard check i.e, three sprays of methyl demeton 25 EC at 1250ml/ha was found to be significantly superior to all the other tested module of plant extracts.

Key Words: Diamondback moth, cabbage, Dhatura, Dharak, Lantana, Mehandi

Introduction

Cabbage (*Brassica oleracea* var. *capitata*) is one of the most important cruciferous vegetable grown all over the country with 0.72 million hectares areas and 5.70 million tonne production. Among the pest complex of cabbage, diamondback moth, *Plutella xylostella* (L.) is the most destructive and dreaded pest. Fletcher (1914) recorded this pest for the first time in India on cruciferous vegetables and perusal of literature revealed that the pest is distributed all over India. Kumar *et al.*, 1983 reported 52% loss in marketable yield of cabbage due to the attack of *Plutella xylostella*. Diamondback moth has developed resistance to almost all the group of chemical pesticides. To overcome the problem, identification of newer effective molecules is one of the options. The practice of integrated pest management has brought about a lot of new avenues for utilizing even the traditional method in the field of plant protection. In view of this it become imperative to develop alternative strategies for the control of these pests and attempts were made to screen some of the indigenous plant to explore insecticidal properties against diamondback moth, *Plutella xylostella*.

Materials and Methods

Leaves of the test plants *viz*, Dhatura (*Dhatura innoxia* Mill.), Neem (*Azadirachta indica* A. Juss.), Dhark (*Melia azadirach* L.), Lantana (*Lantana camera* L.), Mehandi (*Lawsonia inermis* L.) were collected from various parts of Uttar Pradesh, India. The leaves were shade dried than ground in mechanical

grinder and finally passed through a 30 mesh sieve to get then in powder form. 50 gm leaf powders of mentioned botanical were extracted in ethanol in a conical flask with the help of magnetic stirrer for 6 hrs by changing solvent ethanol at every 2 hrs. The solvent was completely evaporated from the extract in water bath till it became a semisolid material. This was considered as cent percent concentrate. One percent plant extract was prepared from stock solution using 0.5% triton (X-100) as emulsifier (Singh *et al.*, 1995). The field experiments were conducted during 2010 - 2011 and 2011-2012. Thirty day old seedlings of cabbage variety 'Sultana' was transplanted at 60 × 60 cm. spacing. The experiment was laid out in 'Randomized block design' and the plot size was 2.40m × 1.80m. All the recommended agronomical practices were followed. In all the modules, three sprays were done for the management of diamondback moth, first spray each year was done 30 days after transplanting of cabbage seedlings. Subsequent sprays were given at 10 days interval as per the module. The observations were recorded from five randomly selected plants of each treatment. Diamondback moth population was recorded one day before spray and 1, 3, 7, and 10 days after spray. Diamondback moth population was counted from five leaves of the plants. Larvae were taken into consideration for counting the population of diamondback moth; the post treatment population count presented in the table 1 is the mean of 3 sprays in each module.

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Table: Effect of plant extract on the population of Diamondback moth on cabbage (2010-12)

| Diamondback Moth Population *5/Plant Treatments | | PTC | 1 DAT | 3 DAT | 7 DAT | 10 DAT | Mean After Treatments |
|--|--|-----------------|--------------|-----------------|-----------------|-----------------|--------------------------|
| M ₁ | Methyl demeton 25EC @ 1250 ml ha ⁻¹ NSKE @ 7.5% NSKE@ 7.5% NSKE@ 7.5% | 42.83(6.58)** | 14.72 (3.90) | 12.45 (3.59) | 28.50 (5.38) | 31.61 (5.66) | 21.82(4.72) |
| M ₂ | Methyl demeton 25EC @ 1250 ml ha ⁻¹ NSKE @ 7.5% | 42.64(6.56) | 14.67(3.89) | 11.22 (3.42) | 22.45 (4.79) | 31.00 (5.61) | 19.84(4.50) |
| M ₃ | Dhatura leaf extract @1% Neam leaf extract@1% Dhatura leaf extract @1% Mehandi leaf extract @1% | 41.39(6.47) | 15.28(3.97) | 13.00 (3.67) | 24.67 (5.01) | 31.12 (5.62) | 21.02(4.63) |
| M ₄ | Dhatura leaf extract @1% Dharak leaf extract @1% Lantana lea extract @1% | 42.72(6.57) | 9.00(3.02) | 16.06 (4.06) | 29.66 (5.49) | 37.72 (6.18) | 23.11(5.10) |
| M ₅ | Dhatura leaf extract @1% Lantana leaf extract @1% | 43.95 (6.66) | 18.85(4.39) | 15.89 (4.04) | 29.61 (5.48) | 33.10 (5.79) | 24.36(4.98) |
| M ₆ | Methyl demeton 25 EC @1250 ml ha ⁻¹ Methyl demeton 25 EC @1250 ml ha ⁻¹ Methyl demeton 25 EC @1250 ml ha ⁻¹ | 43.67 (6.64) | 8.10(2.93) | 5.06 (2.35) | 14.00 (3.80) | 18.89 (4.40) | 11.51(4.98) |
| M ₇ | Control | 45.37(6.70) | 45.21(6.76) | 45.28 (6.78) | 45.28 (4.77) | 44.89 (6.73) | 45.17(6.75) |
| Overall Mean | | 43.22 | 15.73 | 14.87 | 24.27 | 28.54 | 20.85 |
| F- test | | NS | S | S | S | S | S |
| | S. Ed. (±) | 5.993 | 0.831 | 1.218 | 0.904 | 0.957 | 5.582 |
| C. D. (P = 0.05) | | 12.705 | 1.762 | 2.583 | 1.917 | 2.030 | 11.835 |

* Means of three replication; PTC-Pre treatment count; DAT- Day after treatment

** Figure within parentheses are square root (X+0.5) transformed values

Results and Discussion

Toxic properties of aqueous extract of six modules each consisted of three spray of plant extract at 10 days interval along with a standard check of methyl demeton 25 EC at 1250 ml / ha, starting from 30 days after transplanting were evaluated against diamondback moth in cabbage. The pooled data revealed that all the modules were significantly superior over the untreated check. The standard check i.e. three sprays of methyl demeton 25 EC at 1250ml / ha was found to significantly superior than all the other tested modules of plant extract, at every observation (1, 3, 7 and 10 days after spray) in reducing the diamondback moth population with a minimum mean population of 11.51 larvae / 5 plants.

The maximum mean population of 45.16 larvae / 5 plants was observed untreated check. Nathuram *et al.*, (2001) have also reported superiority of insecticide in effectively checking the population of diamondback moth on cabbage. Next in order of effectiveness were modules having neem preparation *viz.*, module-2, module-1, module-3, in which the mean diamondback moth population ranged between 19.83 to 25.61 population/5 plants. The results are conformity with the findings of Liang *et al.*, (2000) and Moorthy and Kumar (2000) who have also documented the effectiveness of

neem seed kernel extract against diamondback moth on cabbage. Module 5 and 6, incorporating the leaf extract of Mehandi, Dhatura, Dhark and Lantana were found least effective in which the mean population was 24.36 and 11.51/ 5 plants.

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