

A Phytochemical Study on Biopesticide against Fruit Borer Pests: A Study on Dashaparni Ark

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Abstract:

Biopesticides are the biological substances that have the power to kill or repel the pests. Dashaparni Ark is a biopesticide. This organic liquid biopesticide is useful to control the pests of vegetables and fruit crops. Dashaparni Ark has the different types of active constituents like Alkaloids, Flavonoid, Triterpenoids and Tannins. We used this ark on eggplant to study its effect on fruit borer pests. The results indicated reduction in pest infestation after treatment of the egg plants with Dashaparni ark.

Keywords: Dashaparni Ark, Alkaloids, Flavonoids, Triterpenoids, Tannins Biopesticides, Fruit and shoot Borer

Introduction:

The insects are critical for various ecological functions including pollination; however some of the insects are beneficial while few are harmful to the development of crops. Some of the insects are categorized as pests and adversely impact the agrarian economy (Morgan and Wilson, 2001).

Biopesticides are the naturally occurring chemical or biological agents that kill or restrict the pests. Biopesticides are obtained from organisms, plants, microorganisms like bacteria. It contains active ingredients of biological origin that includes plants extracts. Inorganic pesticides used in fields to protect crops from various pests. These inorganic pesticides have adverse effects on nature as well as on human beings. These chemicals containing pesticides may cause respiratory disorders while spraying. It also affects the digestive track, reproductive disorders and some of these are carcinogenic in nature. To overcome these problems the biopesticides can be used which do not have any adverse effect on the nature as well as human beings as these are mostly of plant origin (Kuman N et al., 2015).

The use of biopesticides has been found in ancient practice farming by the farmers. The medicinal plants like, Neem (*Azardicta indica*), Nirgudi (*Vitex negundo*), Karanj(*Pongamia pinnata*), Mango (*Magnifera indica*),Turmeric (*Curcuma longa*) are used for centuries to limit the impact of pests on crops (Kuman N et al., 2015; Kumar JA et al, 2010; Thakur SH et al., 2021). The leaves of Neem (*Azardica indica*) has been used to store with *Ipomoea fistulosa* which could protected from the infestation of specific pest during long storage durations (Thakore and Srivastava, 2017).

Dashaparni ark is one of the best biopesticide; it is the admixture of 10 herbs available commonly around the fields. Hence, the Dashaparni ark contains the extract of at least 10 plants and the leaves of the identified plant. This extract of leaves from plants varies a bit at times however it is a traditional recipe widely used to control pests affecting fruit and vegetable crop (Gundreddy et al., 2024; Hosttetmann, and Marston, 2008). The current study was designed to evaluate the composition of the

Dashaparni ark on phytochemical parameters as well as to study its impact on growth and development of eggplant infested with pest affecting shoot and fruit (Brinjal Fruit and Shoot Borer). We developed a composition with leave of 10 plants and sprayed the ark mixed with water (1:10) ratio to observe effectiveness against on all stages of the plants.

Materials and Methods:

- 1. Collection of plants and identification:** The 10 plants used in Dashaparni Ark were collected from Bhopal and surrounding region. These plants were picked up hand picking method. These 10plants leaves were shed dried properly. The crushed powered form is used for cold maceration of these leaves for about 10days with occasional stirring method.
- 2. Extraction of plants materials:** After identification of these above 10 plants. These are shed dried properly and crushed. The powdered form of leaves were used in the preparation of cold maceration method with distilled water is used in the preparation of cold maceration method with stirring method. Out of 100 grams of powder form 10 g were used in 100 ml distil water.

Phytochemical analysis

All the 10 individual extracts are evaluated for the phytochemical test the following active constituents.

Alkaloid test -

Dragondroff's test- For the alkaloid content -

- 5 ml quantity of concentrated extract was taken to the 5 ml extract 2 drops of Dragondroffs reagent were added. The creamy precipitation formation was the indication of presence of alkaloids.
- Hager's Test - Alkali test 5 ml of concentrated extract was used with 2 to 3 drops of Hager's Reagent (saturated picric acid solution) Pale yellow precipitate is the indication of Alkaloids in the Dashaparni ark.

Flavonoids test -

- Sulphuric acid test -1 ml of concentrated H₂SO₄ was added to 5 ml of extract the yellow colour disappears is the indication of presence of flavonoids.
- Shinoda test - Same quantity 5 ml was taken with 3 to 4 drops of concentrated HCl was added. We got dark Cherry red colour indicated the presence of flavonoids.

Saponins Test:

For the Saponin foam test was carried out. For this test 1 ml of Dashaparni Ark was diluted with 20 ml distilled water and shaken. After few minutes stable form formed is the indication of presence saponins.

Test for Tannins:

For this test 5 ml of Dashaparni Ark was treated with 5% FeCl₃. The formation of green colour indicates the presence of Tannins.

Evaluation of development of plant: The prepared Dashaparni ark is sprayed on selected plantswhich were infested with fruit borer pest for 4 weeks.

Results and Discussion-

The phytochemical tests conducted on Dashaparni ark for qualitative estimation of alkaloids, flavonoids, saponins and tannins. The outcomes are reported for presence or absence above phytoconstituents in the Dashaparni Ark (Table No.01).

Table No. 01: Phytochemicals in the Dashaparni Ark

S.No.	Common Name/Botanical Name	Family	Reported Chemical Constituent	Alkaloids	Flavonoids	Saponins	Tannins
1	Neem (<i>Azadirachta Indica</i>)	Meliaceae	Azadirachtin	+++	-	-	-
2	Mango (<i>Mangifera Indica</i>)	Anacardiaceae	Mangiferin	-	+++	-	-
3	Karanj (<i>Millettia pinnata</i>)	Fabaceae	Karanjin	+++	+++	-	-
4	Dhatura (<i>Datura stramonium</i>)	Solanaceae	Atropin, Hyoscine	+++	-	-	-
5	Marigold (<i>Tagetes</i>)	Asteraceae	Ocimens, Limonene, Terpene	-	+++	-	-
6	Tulsi (<i>Occimum Sanctum</i>)	Lamiaceae	Eugenol	-	-	-	-
7	Congress grass (<i>Parthenium hysterophorous</i>)	Asteraceae	Perthenin	+++	++	-	-
8	Bael (<i>Aegle marmelos</i>)	Rutaceae	Aeglein	+++	-	-	+++
9	Sitafal (<i>Annona squamosa</i>)	Annonaceae	Anonaine	+++	+	-	-
10	Papaya (<i>Carica papaya</i>)	Caricaceae	Carpaine	+++	+	-	-
11	Gudwel (<i>Tinospora cardifolia</i>)	Menispermaceae	Cordifolin	+++	-	-	-

Table no. 02: Critical phytoconstituents of the medicinal plants earlier reported

S. No.	Plant	Critical Phyto-chemical	Chemicals estimated			Reference
			Alkaloids	Flavonoid	Tannins	
1	Neem	Azadirachtin	Nimbin	-	-	Thakore and Srivastava, 2017
2	Mango	Manjiferin				Loan et al, 2021
3	Karanj	Karanjin	Pongal Kanjore	Karanjn	-	Raghav et al., 2019
4	Dhatura	Atropine, Hyoscine	Atropin Hyoscine	-	-	Trancă et al., 2017

5	Marigold	Limonene Terpene	–	Rutin Quercetin	–	Gundreddy RR et al., 2024
6	Congress Grass	Perthenin	Perthenin	Aglycon	–	Gul et al., 2022
7	Bael. (Wood Apple)	Aeglein	Aeglein	–	Phloba-tannin	Monika s et al.,2023
8	Custard apple	Anonaine	Anonaine	Rutin	–	Safira, et al., 2022
9	Papaya	Carpain	carpaine	Rutin	–	Akanda et al.,2025
10	Gudwel	Cordifolin	Cordifolin Berberin	–	–	Saha,et al., 2012

Up on observation and evaluation on various parameters we report following outcomes in plants sprayed with Dashaparni Ark. The overall development of the eggplant and effect of Dashaparni ark was denoted with the representative photographs of the plants given below in figure 01.

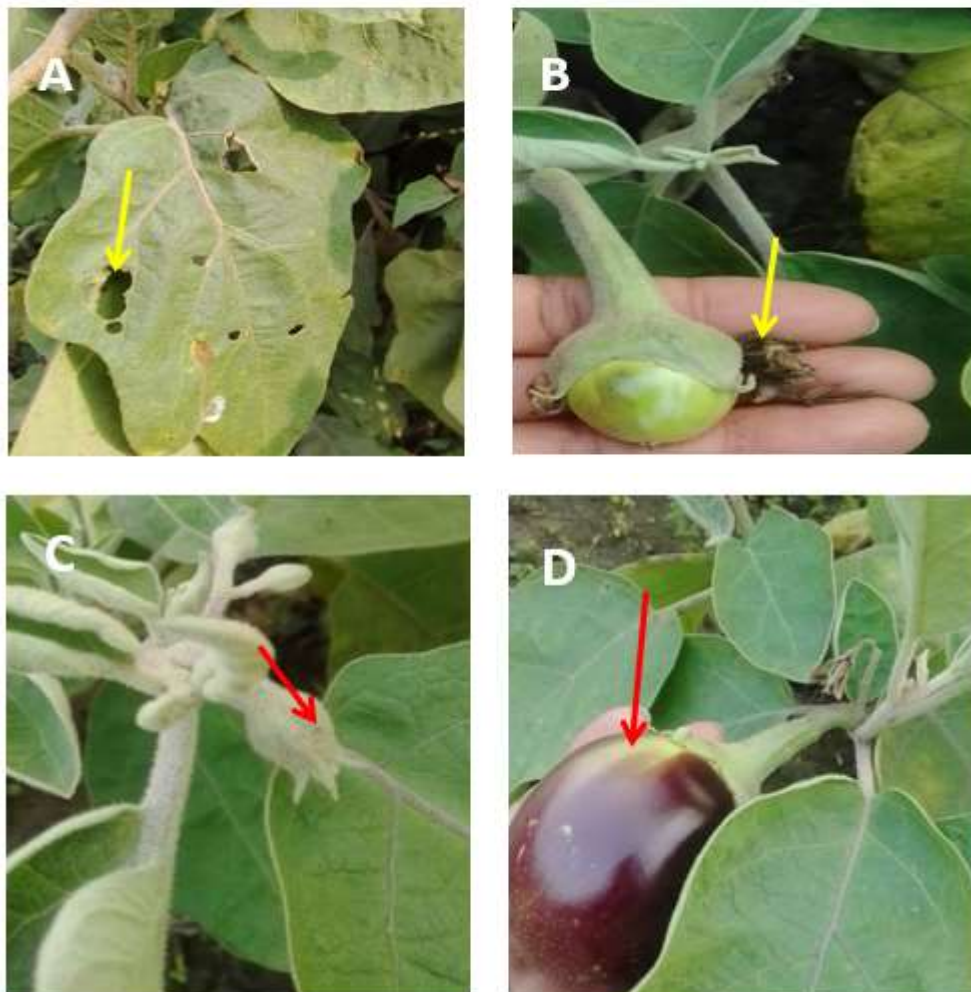


Figure no. 01: The effect on infested plant before and after treatment

Photograph A and B represent Pre-treatment plant status with yellow arrow show damage due to pests; whereas photograph C and D represent post-treatment plant wherein red arrow points to the improvement in parts of the plant.

Discussion:

We demonstrated the potential outcome of sprayed Dashaparni Ark on fruit borer pests in eggplant. The plants were treated for at least four weeks and were observed weekly to check the impact on wellbeing of the plant in the form of developments of its parts. The organic liquid biopesticide prepared with the mixture all these ten medicinal plants was effective in reducing the harmful effects of pest when sprayed on the eggplant. It is useful to control pests and diseases that occur in any crop, vegetables and fruit crops. Its natural ingredients from plant resources are critical for the protection of the plant from these fruit borer pests. Dashaparni ark could be useful due to its reported antifungal and insect repellent property in vegetable and fruit crops (Hendawi MY et al.,2013).

The active chemicals in the plant extract may have resulted in restriction of development and growth of pest that indicates ability to protect plant and repel harmful insects. We investigated Dashaparni Ark for saponin and reported absence of it whereas tannins and alkaloids were present. These chemical constituents differ in concentration and exert effectiveness at various parts of the plant to be considered as insect repellent and a pesticide. Additionally, the treatment with Dashaparni ark induced resilience in crop plant against other bacterial or fungal attack as seen in better development of the treated plants. We observed absence of visible damage to leaves and steady development of fruits of the eggplant due to reduced infestation ability of pests. This natural preparation of the extract or ark is economical as we used medicinal plants available in the surrounding field and nearby places. This provides a cost effective option for a farmer without experiencing the toxic effects on health due to synthetic chemical pesticides. The development of these naturally occurring and traditionally used chemical preparations may provide vital societal contribution (Kuman N et al., 2015). In Indian scenario the agricultural sector needs direction to develop and practice the use of uncontaminated crop, ensure nutritious food grains to vast population of our country by incorporating environment friendly habits and approaches. The economic viability of organic farming is bound to increase the income of the farming community and provide reduced health hazards to immediate user as well as population who exposed to the farm produce.

Conclusion:

In conclusion, we propose development of the Dashaparni ark as a better option for avoiding fruit borer pest and provide economical pesticide for vegetables and crops. The Dashaparni Ark is effective biopesticide that Prevents damage to crop due to various pests. The reduced damage to leaves fruit suggested excellent developmental stages of crop plant. The alkaloids and tannins could be vital to attribute the beneficial effect of the Dashaparni ark in eggplant.

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