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Sini NB
Department of Organon of
Medicine, A NSS
Homoeopathic Medical
College, S Puram P O,
Kottayam Kerala India

Mahesh KM
Intern, A NSS Homoeopathic
Medical College, S Puram P O,
Kottayam Kerala India

A comparative study to appraise the role of Homoeopathic medicine Cantharis 6x over Cypermethrin in controlling Henosepilachna vigintioctopunctata (Hadda beetles) in Solanum melongena (Egg plant)

Sini NB and Mahesh KM

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Abstract

Homoeopathic medicines are used in agriculture to increase the yield and to control the diseases of plants. Here, Cantharis 6x is used in comparison with Cypermethrin to control the Hadda beetles in Egg plants. In this study, a significant difference [$P < 0.001$] in percent can be seen in the mortality of *H. vigintioctopunctata* by the application of insecticides. The study results show that Cypermethrin is effective to control Hadda beetles in all treatment groups in comparison to Cantharis 6X and the negative control. Bioassay results showed a significant mortality of *H. vigintioctopunctata* grubs by Cantharis 6X treatment. When we consider the ecological consequences of conventional synthetic insecticides, there is a need to find more effective alternatives that can control pests with less environmental impact. Cantharis 6X is effective when it is used against *H. vigintioctopunctata* grubs.

Keywords: Homoeopathic medicine, Cantharis 6X, Cypermethrin, Henosepilachna vigintioctopunctata, Eggplant (*Solanum melongena*), Biological pest control, Eco-friendly insecticide, Hadda beetle management

Introduction

Agriculture is a primary activity that serves as the producer for the food of life on earth ^[1]. As the increasing population is calling for increased agricultural productivity, we should adopt creative solutions to increase crop yields. So, pesticides have become a vital tool in modern agriculture ^[2]. India is now the second largest manufacturer of pesticides in Asia ^[1]. But the long-term exposure to pesticides is linked with chronic health problems like cancer and neurological diseases. Acute exposure can cause poisoning ^[2].

Agrohomeopathy is a chemical free, non-toxic method which is used to treat garden and agriculture ^[3]. The proper selection of homeopathic drugs can be highly effective in enhancing abiotic stress tolerance in various crop species. The Similia principle of Homoeopathy is significant in plant models also. With proper selection of drugs and its potency, agrohomeopathy can be an efficient and very cost-effective alternative. It can reduce the cost of chemical fertilizers and insecticides and thereby increase the farmer's income ^[4].

Brinjal or eggplant (*Solanum melongena* L.) has been cultivated in India for the last 4,000 years. It is an important crop of sub-tropics and tropics. It can be grown throughout the year. It is low in calories and fats and is a good source of minerals and vitamins. It is also rich in total water-soluble sugars, free reducing sugars, amide proteins etc ^[5].

100 grams of raw eggplant contains the following nutrients ^[5]:

- **Calories:** 26
- **Carbohydrate:** 5.4 grams
- **Fibre:** 2.4 grams
- **Protein:** 0.85 gram
- **Manganese:** 0.106 mg
- **Folate:** none
- **Potassium:** 222 mg

Corresponding Author:
Sini NB
Department of Organon of
Medicine, A NSS
Homoeopathic Medical
College, S Puram P O,
Kottayam Kerala India

- **Vitamin K:** none
- **Vitamin C:** none

The antioxidant content in eggplants improves heart function and protects against heart disease. Eggplants are high in fibre and polyphenols (which help to reduce blood sugar levels). It is high in fibre but low in calories (promotes weight loss). Eggplants contain solasodine rhamnosyl glycosides, which may aid in cancer treatment [6].

Hadda beetle (*Henosepilachna vigintioctopunctata*) also known as the spotted/epilachna beetle or 28-spotted potato ladybird. It is a polyphagous pest of various cultivated and wild vegetable crops in India. In Asian countries, Hadda /spotted beetles are the most harmful and the first ranked pest, causing up to 60 per cent fruit yield. It is highly destructive and considered as a key pest damaging brinjal crop from the seedling stage to maturity throughout the country [7].

Hadda/Epilachna beetle

- **Scientific name:** *Henosepilachna vigintioctopunctata* (Fabricius)
- Taxonomic position:
- **Kingdom:** Animalia
- **Phylum:** Arthropoda
- **Class:** Insecta
- **Order:** Coleoptera
- **Family:** Coccinellidae
- **Genus:** *Henosepilachna*
- **Species:** *vigintioctopunctata*

Female ladybirds lay clusters of yellow eggs. A larva hatches from each egg. There are four larval stages. The newly hatched larva is pale yellow and covered with tubercles. There are three pairs of legs. When the fourth larval instar is fully grown, it attaches itself to a sheltered place on a plant. Adults hatch from pupae and mate. Both adult and larval stages have three pairs of legs that can be used for walking. Larvae also use the tip of the abdomen for holding onto the substrate. Adults have wings and can fly. The adult and larval ladybirds feed on plant leaves. [8]

The homeopathic medicine cantharis is obtained from a green colour beetle called *Lytta vesicatoria*, commonly known as the Spanish fly or the blister beetle. This beetle is approximately 1.3 cm in length. The Spanish fly produces a potent poison called cantharidin. It mostly affects the urinary tract, resulting in a burning and painful sensation accompanied by vomiting. The poison produced by the Spanish fly is so acidic that it results in the formation of blisters when it comes in contact with the skin [9]. The primary symptom of Cantharis is a burning sensation. Plants, especially the leaves, appear burned, as seen by sunburn blisters. In such cases, it accelerates regrowth and healing [10].

In this study, we use Cantharis 6x potency. In this scale, the first potency contains 1/10th part of the original drug, and the 6th potency will contain 1/10th part of the fifth potency [11].

Cypermethrin-(RS)- α -cyano-3-phenoxybenzyl(1RS,3RS,1RS,3SR)-3-(2,2-dichlorovinyl)-2,2-dimethylcyclopropanecarboxylate. Empirical formula - C₂₂H₁₉Cl₂NO₃. Molecular weight - 416.3. Specific gravity - 1.24 at 20°C. It is used as an insecticide on a large scale

[12].

According to the National Pesticides Telecommunications Network, Cypermethrin is highly toxic to fish, bees, and aquatic insects. It is found in many household ant and cockroach killers. Therefore, vegetables should be harvested only after 10 days of cypermethrin application to avoid any health risk of consumers. When rabbits were treated with cypermethrin, a significant difference in the numbers of corpora lutea and microscopic changes in the ovaries and uteri were observed. Cypermethrin (CYP) causes hepatic DNA damage and up-regulates genes related to apoptosis in the liver and nervous system in zebrafish embryos [12].

Review of Literature

Review on biology and management of *Henosepilachna vigintioctopunctata* (Hadda beetle) on Brinjal crop - says that pests were present throughout the year due to their diverse host range. Profit diminishes as the number of insect pest applications rises [13].

Relative toxicity of some commonly used insecticides against Hadda beetles in Brinjal states that - the order of toxicity was found to be cypermethrin > fenvalerate > deltamethrin > phosphamidon > chlorpyrifos > quinalphos > monocrotophos > endosulfan [14].

Study on management of damage caused by *Henosepilachna vigintioctopunctata* in brinjal - Chemical control has its own limitations due to the inherent character of the pest to rise again at a very fast rate and the problem of residual toxicity due to the frequent plucking of edible fruits. Environmental pollution with insecticides is also a matter of great concern. Highly residual insecticides can pass well beyond their intended targets and may reduce populations of beneficial insects and wildlife. The development of insecticide resistance in strains of several pest species is another major issue [15].

Aims and Objectives

The main objective of this study is to compare the effectiveness of Cantharis 6x over Cypermethrin in controlling the Hadda beetles in *Solanum melongena*. If it is found to be effective, Cantharis 6x can be distributed among farmers in order to overcome the hazardous effects of chemical pesticides which, ruin the equilibrium of our ecosystem.

Material and Methods

Study setting

The study was conducted in the Ground field condition of the Pharmacy Garden of ANSS Homoeopathic Medical College, Kottayam, Kerala. As a tropical area, Kottayam has relatively high temperatures (25 °C – 28 °C) from November to June. Mean annual humidity is 80% [16].

Materials Required

30 seedlings of Kiran-F1 variety of purple round brinjal (from The Agriculture Department, Government of Kerala) are collected.

Conduction of the test

Insect rearing

Adult Hadda beetles were collected from a brinjal garden situated in the pharmacy garden. The leaves, along with beetles were cut-off with the help of scissors and were brought to the laboratory in plastic jars. Adults Hadda

beetles were kept in a glass cage (20 × 20 × 30 cm). The insects were reared under controlled conditions at 25±2 °C temperature and 65±5%R.H. Fresh brinjal (*Solanum melongena* L., cultivar Nirala) leaves were placed in cages and 10% sugar solution was provided to adults. Eggs were picked from the rearing cages and were arranged on moist filter paper discs lined in 60 mm glass Petri-plates. Newly emerged grubs were shifted to clean plastic jars, and soft and tender leaves were provided to them. The culture was maintained up to three generations and, 3rd instar grubs were used in the bioassays. Newly laid eggs of Hadda beetles are pale yellow to orange yellow in colour, elongated, usually in clusters of 5 to 45 eggs. newly hatched larvae or grubs are approximately 1.5 mm in length and light yellow in colour. Freshly emerged adult of Hadda beetle is straw or cream yellow in colour, and shortly after emergence, 28 black spots with variable size appear on the dorsal elytra.

Preparation of insecticide (Cypermethrin)

1ml of Cypermethrin is dissolved in 1 litre of water [17]
Preparation of Homoeopathic pesticide (Cantharis 6x) - Cantharis is a homoeopathic remedy obtained from the insect *Lytta*; common names are Spanish fly or blister beetle. Cantharis 6x liquid dilution is used. 5 drops of Cantharis 6x in 1 litre of water.

Placebo as a control

1 L of distilled water is used.

Time line of the experiment was from November 2024 to June 2025.

Bioassays

Leaf-dip bioassay method [18] was followed to test the efficacy of 3 pesticides. Leaves of brinjal (*S. melongena*) were collected from the field and were washed with distilled water. Leaves were dried at room temperature (27°C), and then were soaked in specific concentrations of insecticidal treatments for 10 sec and were dried for 10 min. Treated leaves were placed in 60 mm glass Petri Plates. Five grubs were released in each Petri plate. Each concentration of tested chemicals was replicated five times, and five grubs were exposed in each replication. The same bioassay was performed for adult stages. Mortality data of grubs and adults were recorded after 3 hours, 6 hours, 9 hours of treatment applications.

Group one: Standard pesticide Cypermethrin is used (1 ml/1000 ml)

Group two: Homoeopathic pesticide Cantharis 6x is used. (5 drops/ 1000 ml)

Group three: Kept as a control, placebo

Data analysis

Data regarding the mortality of *E. grubs* and adults were subjected to Abbott's formula (Abbott, 1925) [19] for correction prior to the statistical analysis. Data were analysed by two-factor analysis of variance (ANOVA) by keeping insecticides or botanicals and concentrations as main factors.

Abbot's formula

Let X: the percent living in the check.

Let Y: the percent living in the treated plant.

Then X - Y: the percent killed by the treatment.

And the percent killed by the treatment (X - Y) divided by the percent living in the check (X) gives the control or expressed by an equation,

$X - Y / X \times 100 = \text{percent control.}$

Observations and Results

Grubs 3 hour – Results

	Treatment group	Mean corrected mortality Mean±SD	F	P value
1	Negative control	5±2.5	525	< 0.001
2	Cantharis	20±3.16		
3	Cypermethrin	80±5.33		

The F- statistics (F – 525, $P < 0.001$) shows that the variation in mean corrected mortality among the three treatment groups is significant at the 0.001 level. Since the F test is found significant, post – hoc analysis is carried out.

Treatment group	Treatment groups	Mean difference	P value
Negative control	Cantharis	-15	< 0.001
	Cypermethrin	-75	
Cantharis	Negative control	15	< 0.001
	Cypermethrin	-60	
Cypermethrin	Negative control	75	< 0.001
	Cantharis	60	

The Mean corrected mortality is significantly high with Cypermethrin treatment compared to Cantharis treatment and treatment with negative control. It is also significantly higher with Cantharis treatment compared to Negative control.

Grubs 6 hours - Results

	Treatment group	Mean corrected mortality Mean±SD	F	P value
1	Negative control	10± 2.23	2913.04	< 0.001
2	Cantharis	80±2.00		
3	Cypermethrin	100±1.58		

The F- statistics (F –2913.04, $P < 0.001$) shows that the variation in mean corrected mortality among the three treatment groups is significant at the 0.001 level. Since the F test is found significant, post – hoc analysis is carried out.

Treatment group	Treatment groups	Mean difference	P value
Negative control	Cantharis	-70	< 0.001
	Cypermethrin	-90	
Cantharis	Negative control	70	< 0.001
	Cypermethrin	-20	
Cypermethrin	Negative control	90	< 0.001
	Cantharis	20	

The Mean corrected mortality is significantly high with Cypermethrin treatment compared to Cantharis treatment and treatment with a negative control. It is also significantly high with Cantharis treatment compared to Negative control.

Grubs 9 hours – Results

	Treatment group	Mean corrected mortality Mean±SD	F	P value
1	Negative control	5±1.00	100.05	< 0.001
2	Cantharis	100±20.00		
3	Cypermethrin	100±7.071		

The F- statistics ($F = 100.05$, $P < 0.001$) shows that the variation in mean corrected mortality among the three treatment groups is significant at the 0.001 level. Since the F test is found significant, post – hoc analysis is carried out.

Treatment group	Treatment groups	Mean difference	P value
Negative control	Cantharis	-95	< 0.001
	Cypermethrin	-95	
Cantharis	Negative control	95	< 0.001
	Cypermethrin	0	
Cypermethrin	Negative control	95	< 0.001
	Cantharis	0	

The Mean corrected mortality is significantly high with Cypermethrin treatment compared to Cantharis treatment and treatment with a negative control. It is also significantly high with Cantharis treatment compared to Negative control.

Adults 3 hours – Results

	Treatment group	Mean corrected mortality Mean $\pm$ SD	F	P value
1	Negative control	5 $\pm$ 1.22	250.00	< 0.001
2	Cantharis	10 $\pm$ 2.00		
3	Cypermethrin	40 $\pm$ 4.00		

The F- statistics ($F = 250.00$, $P < 0.001$) shows that the variation in mean corrected mortality among the three treatment groups is significant at the 0.001 level. Since the F test is found significant, post – hoc analysis is carried out.

Treatment group	Treatment groups	Mean difference	P value
Negative control	Cantharis	-5	< 0.001
	Cypermethrin	-35	
Cantharis	Negative control	5	< 0.001
	Cypermethrin	-30	
Cypermethrin	Negative control	35	< 0.001
	Cantharis	30	

The Mean corrected mortality is significantly high with Cypermethrin treatment compared to Cantharis treatment and treatment with a negative control. It is also significantly high with Cantharis treatment compared to Negative control.

Adults 6 hours - Results

	Treatment group	Mean corrected mortality Mean $\pm$ SD	F	P value
1	Negative control	5 $\pm$ 1.87	1715.43	< 0.001
2	Cantharis	19 $\pm$ 2.64		
3	Cypermethrin	100 $\pm$ 3.53		

The F statistics ($F = 1715.43$, $P < 0.001$) shows that the variation in mean corrected mortality among the three treatment groups is significant at the 0.001 level. Since the F test is found significant, post – hoc analysis is carried out.

Treatment group	Treatment groups	Mean difference	P value
Negative control	Cantharis	-14	< 0.001
	Cypermethrin	-95	
Cantharis	Negative control	14	< 0.001
	Cypermethrin	-81	
Cypermethrin	Negative control	95	< 0.001
	Cantharis	81	

The Mean corrected mortality is significantly high with Cypermethrin treatment compared to Cantharis treatment and treatment with negative control. It is also significantly high with Cantharis treatment compared to negative control.

Adults 9 hours – Results

	Treatment group	Mean corrected mortality Mean $\pm$ SD	F	P value
1	Negative control	4.6 $\pm$ 1.14	1289.14	< 0.001
2	Cantharis	39.6 $\pm$ 3.64		
3	Cypermethrin	100 $\pm$ 3.53		

The F statistics ($F = 1289.14$, $P < 0.001$) shows that the variation in mean corrected mortality among the three treatment groups is significant at the 0.001 level. Since the F test is found significant, post – hoc analysis is carried out.

Treatment group	Treatment groups	Mean difference	P value
Negative control	Cantharis	-35	< 0.001
	Cypermethrin	-95.4	
Cantharis	Negative control	35	< 0.001
	Cypermethrin	-60.4	
Cypermethrin	Negative control	95.4	< 0.001
	Cantharis	60.4	

The Mean corrected mortality is significantly high with Cypermethrin treatment compared to Cantharis treatment and treatment with negative control. It is also significantly high with Cantharis treatment compared to negative control.

Discussion

- In Grubs 3 hour after treatment group the Mean corrected mortality is significantly high with Cypermethrin treatment compared to Cantharis treatment and treatment with negative control. It is also significantly high with Cantharis treatment compared to Negative control
- In Grubs 6 hours after treatment group the Mean corrected mortality is significantly high with Cypermethrin treatment compared to Cantharis treatment and treatment with negative control. It is also significantly high with Cantharis treatment compared to Negative control
- In Grubs 9 hour after treatment group the Mean corrected mortality is significantly high with Cypermethrin treatment and Cantharis treatment compared to treatment with negative control.
- In Adults 3 hours after treatment group the Mean corrected mortality is significantly high with Cypermethrin treatment compared to cantharis treatment and treatment with negative control. It is also significantly high with cantharis treatment compared to Negative control
- In Adults 6 hours after treatment group the Mean corrected mortality is significantly high with Cypermethrin treatment compared to Cantharis treatment and treatment with negative control. It is also significantly high with Cantharis treatment compared to Negative control
- In Adults 9 hours after treatment group the Mean corrected mortality is significantly high with Cypermethrin treatment compared to Cantharis treatment and treatment with negative control. It is also

significantly high with Cantharis treatment compared to Negative control

Conclusion

- There was a significant difference [$P < 0.001$] in percent mortality of *E.vigintioctopunctata* by the application of insecticides.
- Overall, the study results show that Cypermethrin is effective to control Hadda beetles in all treatment groups in comparison to Cantharis 6X and negative control.
- In Grubs 6 hour and 9 hour treatment groups, Cantharis 6X shows significant mortality of *E.vigintioctopunctata* grubs.

Summary

The use of synthetic insecticides is still the most effective strategy to control insect pests. However, the use of safer products for humans and the environment is a major concern. In this study synthetic pesticide and homoeopathic pesticides were tested against grubs and adults of hadda beetles (*E.vigintioctopunctata*) which is a key pest of solanaceous and cucurbitaceous crops.

Bioassay results showed a significant mortality of *E.vigintioctopunctata* grubs by Cantharis 6X treatment. Keeping in view the ecological consequences of conventional synthetic insecticides, there is a need to find more effective alternatives that can control the pests with less environmental impact. Cantharis 6X is effective when it is against *E.vigintioctopunctata* grubs.

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Author's Contribution

Not available

Conflict of Interest

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Appendix -

1. *E.vigintioctopunctata* beetle on the brinjal leaf



2. Eggs of *E. vigintioctopunctata*



3. Adults and Grubs of *E.vigintioctopunctata* in the Glass jar



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4. Dead Grubs after treatment with Cantharis 6X



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5. Dead Grubs after treatment with Cypermethrin



6. Skeletonization of leaf caused by *E.vigintioctopunctata*