



Insecticidal Property of Parthenium Hysterosphours and Vitex Nirgundi Leaf Extract (Acetone) Against *Sitophilus oryzae* (Rice Weevil) (Coleptera, Cruculionidae) in Stored Grain Pest

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

Article Information

DOI: 10.9734/AJRCS/2023/v8i4218

Open Peer Review History:

This journal follows the Advanced Open Peer Review policy. Identity of the Reviewers, Editor(s) and additional Reviewers, peer review comments, different versions of the manuscript, comments of the editors, etc are available here: <https://www.sdiarticle5.com/review-history/106688>

Original Research Article

Received: 15/07/2023

Accepted: 20/09/2023

Published: 26/09/2023

ABSTRACT

The insecticidal property of Parthenium hysterosphorous and vitex nigundi leaf extract in acetone' against the rice weevil were very effective to control the pest Different concentration, dose were checked and the result showed that high doses or the extract of Parthenium and vitex were significantly more toxic to Sitophilus oryzae compared to lower dose.

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The probit analysis of data demonstrated mortality rate for acetone extract was mortality % of Parthenium leaf extract in acetone 5%,10%, 15% = 25%, 40%, 60% mortality % of vitex leaf extract in acetone 5%, 10%, 15 % = 15%, 35% 65%, Mortality % of mixture of Parthenium and vitex leaf extract in acetone =5% 10%, 15%, 30%, 40%, 80%, respectively from 10 days. Hence we concluded that leaf extract of Parthenium hysterophorus and vitex nigundi served as a potential insecticide used against (Rice weevil).

Keywords: *Parthenium hysterophorus*; *vitex nigundi*; *rice weevil*; *stored grain mortality insecticide*.

1. INTRODUCTION

Stored products are attacked by insects in different ways. Particularly in developing countries 5 to 10% cereal grains in temperate and 20 — 30 % loss in tropical countries is a serious problem due to the insect infestation during storage [1-4]. Different types of stored product pests are seen in India. Like rice weevil, Indian meal moth, sawtoothed green beetle, red flower beetle, cowpea weevil (*Sitophilus oryzae*). (Coleoptera, Curculionidae) is one of the most widely spread destructive major insect pest of stored grains [5-8].

Control of infestation of stored grains by insects is primarily achieved by the use of synthetic chemicals. Insecticides like methyl bromide & phosphine [9-11]. In most countries due to environmental concerns and human health, hazardous chemicals have been either banned or restricted [12]. Chemical pesticides are toxic to use as they have high toxicity and residual value and hence are not suitable to treat the pest in stored grains [13,14]. There is no doubt that botanical pesticides are more than 250,000 plant species growing on our planet have been properly evaluated for these purposes many weeds, medicinal plants and spices have been used to pest control agents (Lale NES 1992). Farmers and researchers often claim the successful use of plant material in insect pest control included ash (Ofuya IT, 1986), vegetable oil [Schoohovern Av, 1978], plant extract and botanical powders (Bindu VR et al) has been reported.

Chemical Constituents:- Negundoside, flavonoids, pectin, limonene, linalol, sandalwood, Vitricin (Alkaloids') (Rasthogi & Metrotra 1993 & 1995).

Mode of Action: - Antifeedant, insecticidal and repellent. Keeping this in view the present study was carried out to test the efficacy of the leaf extract of two plants i.e. Parthenium hysterophorus, Vitex nigundo.

1.1 Insecticidal Property

Parthenium:-

Higher plants are rich sources of novel substances that can be used to develop safe methods for insect control. Parthenium hysterophorus is labeled as a serious weed of pasture wasteland and agricultural fields in the world. It is a highly adaptable weed and can grow anywhere but it contains several important chemical components like lactone, Parthenon, histamine, saponin. The presence of several important chemical components in Parthenium hysterophorus and their prominent biological activity in animals and humans and human models indicate that a weed can be used as an ovicidal, antifeedant, insect growth regulator, insecticidal, weedicidal, antiviral, antibacterial active compound. There are analogs due to the cytotoxic and pharmacological in the future may find an important place as medicine. The nutritional value of the plant indicates its utility as food and fodder also and it is also used as an insecticide.

Vitex:-

The plant is indigenous to the Mediterranean countries and central Asia. It is found in India, Burma, Sri Lanka, Afghanistan, India, in all districts. The insecticidal property of Vitex as well as its essential oil is well known. And it is effective against pulse beetle *C. chinensis* (Jadhav & Jadhav, 1984). Leaf extract of *V. nigundo*. Under different extraction methods viz. Cold water, hot water, cold alcoholic Soxhlet extraction with methanol and petroleum ether were tested for their toxicity against *S. litura* on tobacco. The application of extract exhibited considerable mortality after 48 and 72 hrs. of exposure period and found significantly superior over control. Higher mortality was observed at higher concentrations. Similarly, more mortality was also reported with higher exposure periods (K.B Budjugar, S.S. Kasar, and N.V. Nemade).

2. MATERIALS

Parthenium hysterophorus Family; Asteraceae, Vitex nigundi Family; Verbanaceae, Solvent; Acetone, Insectpest; Rice weevil, stored grain's (jawar)

2.1 Methods

Preparation of leaf extract in Acetone parthenium and vitex leaf Extracts. Collect the healthy and fresh leaves of parthenium and vitex Wash With tan Water, Wash With DIW ,Dry under shade for 10 days Grind the dried leaves (separately) Take 50 gm. Of powder Of Parthenium leaves & vitex leaves Separately dissolve in 300 ml of Acetone, Filter the extract through watman filter paper No-1 Keep for 10 days in dark brown bottle, Evaporate the excesses solvent with use of rotarv evaporator Make final volume (SO ml) Keep in cold temperature.

Mortality Studies:- The mortality of Sitophilus oryzae adult was recorded after 10 days and parentage data collected was analyzed and determination of mortality rate for 10 days was done by using following formula.

$$\text{Mortality \%} = \frac{\text{No of death of insect}}{\text{Total no. of insect used for experiment}} \times 100$$

Review literature of some plant/ botanicals against stored grain pest Effect of ethanol extract of the leaf of plants Hydrocotyl asiatica, Boerhavia diffusa, Bacopa monieri and Trichosanthes cucumarina was tested against the pulse beetle Callosobruchus chinensis Bindhu VR.

The insecticidal property of Datura stramonium seed extracts against the rice weevil, Sitophilus oryzae was tested in the laboratory. The experiments were conducted at (28±3) 0C and (78±3) % relative humidity

Nilesh jawalkar: Powder and essential oil obtained from dry ground leaves of Chenopodium ambrosioides were tested under laboratory conditions (25+/-1 o C, 70-75% r.h.) for their ability to protect grains from damage by six insect pests, Callosobruchus chinensis, C. maculatus, Acanthoscelides obtectus, Sitophilus granarius, S. zeamais and Prostephanus truncatus.

L.A. Tapondjou: Powder and Ash made from parts of neem tree seed, seed shell ,leaf and bark were compared at rate 0.25 g and 0.50 g

per 10 g seed as protectant against infestation of cowpea seed by callosobruchus maculatus .a very serious storage pest. (G.L Buraimoh.T .I Ofuya).

Acanthoscelides obtectus (Say) is a major pest of stored dry beans (Phaseolus vulgaris L.) and other legumes world wide. The objective of this study was to assess the efficacy of castor (Ricinus communis L.) and cottonseed (Gossypium hirsutum) oils against A. obtectus on stored dry beans under laboratory conditions. Castor and cottonseed oils at 0, 3, 4.5, 6, 7.5 and 9 ml kg-1 were tested against A. obtectus. (P. NANA1,2, F. NCHU3, R.M. BIKOMO1 and H.L. KUTIMA)

different plant products against rice weevil S. oryzae on paddy indicated that, among different plant powders, seed treatment with neem leaf powder, custard apple leaf powder and nilgiri leaf powder at 5 per cent against rice weevil, S. oryzae found effective by showing highest per cent mortality, least grain damage and weight loss. (AD Rojasara, DR Patel, DM Pathak and RR Patel)

Ricebean [Vigna umbellata (Thunb.) Ohwi and Ohashi] is an important food legume grown in Nagaland, India. It is a versatile underutilized pulse crop grown as a dry pulse and also used as green manure and fodder. Insect pests are one of the major constraints encountered and the pulse beetle, [Callosobruchus chinensis (L.)] is an important pest that causes considerable damage to Vigna seeds. This experiment was carried out to determine the basis of resistance among different ricebean cultivars against pulse beetle which will help in development of resistant varieties. (Khrieketou Kuotsu Pankaj Neog*, L. Imtinoro, Rumki H. Ch. Sangma).

In Ayurveda nirgundi has been used as ancient time .in Sanskrit that which keep body free from diseases. (S C Ahuja).

Leaves of Vitex negundo were shaded, dried, powdered and were extracted using three different solvents petroleum ether dichloromethane and ethanol. Preliminary phytochemical screening of the extracts revealed that the presence of simple phenols, terpenoids, flavonoids, anthraquinones and carotenoids [15-17]. The presence of these bioactive constituents is associated with the antimicrobial activity of the plant. The leaf extracts of vitex negundo solvented by ethanol, showed the

spectrum of inhibition on salmonella paratyphi. Most of the bacterial pathogens like salmonella paratyphi, klebsiella pneumonia, vibrio cholera, streptococcus mutans and E. Coli were found to be susceptible in leaf extracts of the vitex negundo. Petroleum ether leaf extract of vitex negundo showed good activity against salmonella paratyphi and entrobactor. (Merlin Rose)

3. RESULTS

In the insecticidal property of Parthenium leaf extract (Acetone) shows the mortality % of 10%,

150/0=250/0, In the insecticidal property of Vitex leaf extract show the mortality % of 5%, 10%, 15%=15%, 35%, 65%.

In the insecticidal property of mixture of Parthenium and Vitex leaf extract (Acetone) shows the mortality % of 5%, 10%, 40%, 80%. In the insecticidal property Of Parthenium leaf extract and Vitex leaf extract show the low rate of mortality percentage. The Mixture of Parthenium and Vitex leaf extract (Acetone) shows the mortality percentage in 15% conc. Extract shows 80% of mortality rate.

Observation Table:-

Table 1. Effect of Parthenium leaf (Acetone) extract on mortality of *Stiophilus oryzae*

Name of Plant Extract	Time of exposure in days	Dose	Total no of insert used for expt.	No of death of insert	Mortality
Parthenium	10	5%	20	5	25%
	10	10%	20	8	40%
	10	15%	20	12	60%

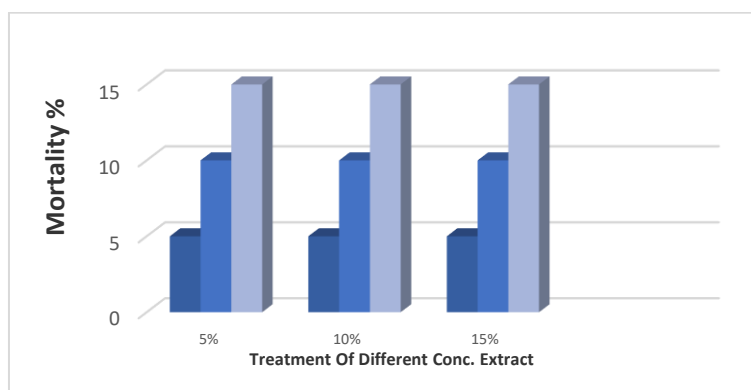
Table 2. Effect of Vitex nigrundi leaf extract (Acetone) extract on mortality of *Sitophilus oryzae*

Name of Plant Extract	Time of exposure in days	Dose	Total no of insert used for expt.	No of death of insert	Mortality
Vitex Nigundi	10	5%	20	3	15
	10	10%	20	7	35
	10	15%	20	13	65

Table 3. Effect of mixture of Parthenium & Vitex leaf extract (Acetone) extract on mortality of *stiophilus oryze*

Name of Plant Extrant	Time of exposure in days	Dose	Total no of insert used for expt.	No of death of insert	Mortality
Parthenium & Vitex	10	5%	20	6	30%
	10	10%	20	8	40%
	10	15%	20	16	80%

Graph:-



Graph 1. The graph shows mortality % of *S. oryae* for treatment of different conch extract

- Mortality % Parthenium leaf extract
- Mortality % Vitex leaf extract
- Mortality % Parthenium Vitex leaf extract

Toxicity of plant extract to adult Insect:- The stock culture Of Weevils. *Sitophilus oryzae* reared in laboratory condition were used for experiment. On the bottom Of petriplate simple filter paper disc were placed singly at the bottom of petriplate [3 sets of 3 petriplates one set for parthenium one set for vitex & another for mix of Parthenium & Vitex i.e. 5%, 10%, 15%.] The extract were applied at different doses on petriplate & dried the 20 gm. By jawar grains were placed on the paper. 20 insect released in each petriplate. And fix with the help of rubber band of muslin cloth observation were recorded on the 10th day after the treatment.

4. CONCLUSION

Weed shows rich source of novel nature substance that can be used to develop safe method for insect, This result show the acetone leaf extract parthenium and vitex lethal toxic to *S.oryzea* but the mixture Of parthenium and vitex acetone leaf extract more toxic to rice weevil or tested against stored grain pest i.e. *S.oryzea*. Research reveals that extract prepared from plants have a variety of properties including insecticidal activity, repellent to pest, antifeedent, insect growth regulator etc. The plant like Vitex and Parthenium contains various components which are known to be insect repellent and toxic to the insect [18]. The various chemical compounds present in vitex like Negondoside, flavonoids, pinene, limonene, comphylitricin, and in parthenium chemical compounds like lacton and parthenine.

The various chemical compounds present in that plants that's why it's vary toxic to stored grain insect, i.e. *S. oryzea*.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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