



**INTERNATIONAL JOURNAL OF
PHARMACEUTICAL SCIENCES**
[ISSN: 0975-4725; CODEN(USA): IJPS00]
Journal Homepage: <https://www.ijpsjournal.com>



Research Article

Eco-Friendly Pest Control: Evaluating The Insecticidal Effects of *Datura Stramonium* and *Eucalyptus Globulus* Leaves Extracts Against *Cydia Nigricana* on *Pisum Sativum*

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ARTICLE INFO

Published: 23 Dec. 2024

Keywords:

Datura Stramonium and
Eucalyptus Globulus Leaves
Extracts Against *Cydia*
Nigricana on *Pisum*
Sativum.

DOI:

10.5281/zenodo.14548042

ABSTRACT

Medicinal plants are like wealthy resources of components which are often utilized in medicine development pharmacopoeial, non- pharmacopoeial or medications which are artificial. Furthermore, some parts are considered as essential way to obtain nourishment thus these are generally suitable for their values which can be healing. This study assessed the effectiveness of *Datura stramonium* and *Eucalyptus globulus* leaf extracts at concentrations of 10%, 20%, 30%, and 50% over exposure durations of 24, 48, and 72 hours against second instar larvae of *Cydia nigricana* (pea pest) during the winter season (November 2020– January 2021). From November 2020 to January 2021, *Datura stramonium* and *Eucalyptus globulus* extracts showed increasing pest mortality with longer exposure and higher concentrations. Mortality ranged from ~23% at 24 hours to ~45% at 72 hours, with statistical analysis confirming a significant effect ($p < 0.05$). The findings showed that pest mortality rose with increasing extract concentrations and extended exposure times, highlighting their potential as eco-friendly pest control solutions.

INTRODUCTION

The term medicinal plant includes diverse type of plants that used in 'Herbal medicine' or 'Herbology' and also this sort of research include medicinal point associated with the respected plant. The word 'herb' happens to be produced by Latin plus an old French term 'herbe'. More recently natural herb refers to any area of the plant

like fruit, seed, stem bark, flower, leaf stigma or perhaps a root in addition to a non woody plant. Earlier the expression 'herb' was just placed on non flowers which are woody those that come from timber. These medicinal flowers are utilized as meals, flavonoids or perfume also in some tasks. Recently, WHO (World Health Organization) estimated that 80 percent of folks worldwide count

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Relevant conflicts of interest/financial disclosures: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.



on herbs for many facet of their health that is major attention. Based on WHO, around 21,000 plant types possess possibility of getting used as medicinal flowers. Treatment with medicinal plants is known as extremely safe as there is no or certainly minimal side effect. These solutions have been in sync with nature, which is the bonus

.The fantastic fact is that, using herbal treatments are separate of any age ranges additionally the sexes. Pharmacognosy has primarily progressed as an applied discipline concerned with the study of all natural- source medications. Many civilizations have risen and fallen throughout history, But the medical systems they built are still practiced in many regions of the world. In whole world 80 percent of the people are rely on the traditional system. There is different type of cultural systems everyone works differently but we can't deny that as compare to modern method in every area usual procedure is good. Modern allopathic system is globally known as a claimed medicinal system but with the increasing knowledge and awareness of plant based product people are turning back to traditional medicine system. From the ancient era in many tribes where people were unwary of the diseases whenever they faced sickness they took that as a god's curse but gradually they understood that these all are just a human system dysfunction. To resolve this thing they started practicing and searching thing for curing the diseases. In the process of finding and applying they found out the medicinal plant and their property and from that time pharmacognosy came to reveal [1]. Medicinal plants are a prosperous resource of bio dynamic phytocompounds or bio nutrients and bio energetic compounds from therapeutic plants offer limitless prospects for novel treatment leads since of their unrestrained chemical assortment. Studies throughout the precedent 2-3 decades encompass that these phytoelements have a significant function in averting chronic sickness like diabetes, cancer and coronary heart ailment. The chief

classes of phytochemicals through disease-avoiding functions are nutritional filaments, antioxidants, detoxifying agents, anticancer, immunity-potentiating representative and neuropharmacological negotiator. Every group of these practical agents consists of a broad variety of compounds with conflicting influence. Some of these phytochemicals evaluating their impending in defense beside dissimilar types of diseases. Insects are the foremost various species of animals living on earth with the exception of the open ocean. Insects may be found all told habitats; marshes, jungles, deserts, even in extremely callous environments like pools of rudimentary petroleum [2]. Herbivorous insects are same to be chargeable for destroying one fifth of the world's total crop production annually [3]. Insect pests are capable of evolving to biotypes which will adapt to new things, for instance, overcome the result of harmful materials or bypass natural or plant that's artificial, the that additional confound problem [4].The challenge that has been human race that's forever facing a sustaining of a food. A basis that's major this challenge is that the competition from insect pests. principally within the tropics and subtropics, wherever the climate provides an atmosphere that's extremely favorable a good vary of insect pests, huge efforts are being needed to suppress population densities of the various pests in order that to attain associate adequate provider of food [5].The problem of competition from insect pests is additional sophisticated with a fast annual increase within the human population (2.5-3.0 percent) as compared to a 1.0 % increase in food production in developing countries[5]. It is ease to being used and less harmful to humans and pesticides which are prone we reconsidered their particular impacts from the biosphere all together. Whenever chemical pesticide entered to our environment we will see impacts being negative environment, water, soil, humans and pets. It is vital to pay attention to the following impacts that



possibly emanate from production, usage, managing, and disposal of pesticides in order to think of a proactive new item development and practical management system this is certainly ecological.

MATERIALS AND METHOD

Leaves of Datura and Eucalyptus were collected, washed, and left to dry in the shade for 30 days. Once dried, the leaves were crushed into powder. About 500 g of powdered leaves were mixed with ethanol in a Soxhlet extractor. The liquid extract was filtered, dried under low heat to remove ethanol, and stored in clean bottles in a fridge for later use. From 500 g of leaves, 60 g of Datura extract and 56 g of Eucalyptus extract were obtained. The yield was 12% for Datura and 11.2% for Eucalyptus, showing how much extract was obtained compared to the original plant material. Pea pods infected with larvae were gathered from local markets in Ajmer and

Beawar. Larvae were kept in ventilated containers, fed fresh peas and pea leaves, and maintained under lab conditions (28°C during the day, 15°C at night). Groups of 50 larvae each were exposed to water solutions containing different concentrations of the plant extracts. A control group (no extract) was included for comparison. Mortality (death) rates of the larvae were tracked for different extract concentrations. Statistical tests, like ANOVA, were used to see if the extracts caused significant effects compared to the control. The LC50 is the concentration needed to kill 50% of the larvae. It shows how strong the extracts are. Abbott's formula was used to adjust mortality data if some larvae in the control group also died naturally.

RESULT AND DISCUSSION

(A) Pea pests after treatment with Datura stramonium leaf extracts-

1. In November Month 2020 (Mean Mortality)

Concentration	After 24 hour	After 48 hour	After 72 hour
10%	23.94±2.88	26.25±3.16	27.80±3.16
20%	29.46±2.88	32.31±3.16	34.21±3.16
30%	33.76±2.88	37.02±3.16	39.20±3.16
50%	36.83±2.88	40.39±3.16	42.77±3.16
Control	19.52±1.84	15.14±1.55	12.61±1.26

2. December Month 2020

Concentration	After 24 hour	After 48 hour	After 72 hour
10%	26.68±3.51	29.9±2.75	35.42±0.95
20%	24.94±3.51	27.95±2.75	33.11±0.95
30%	31.32±3.51	35.1±2.75	41.58±0.95
50%	33.06±3.51	37.05±2.75	43.89±0.95
Control	19.52±1.84	15.14±1.55	12.61±1.26

3. In January Month 2021

Concentration	After 24 hour	After 48 hour	After 72 hour
10%	26.86±2.70	29.10±2.62	34.02±2.16

20%	27.46±2.70	29.75±2.62	34.78±2.16
30%	29.85±2.70	32.33±2.62	37.81±2.16
50%	35.82±2.70	38.80±2.62	45.37±2.16
Control	19.52±1.84	15.14±1.55	12.61±1.26

(A) Mean mortality of biopesticide of Datura stramonium against *Cydia nigricana* with reference to concentration and time from November 2020-January 2021: Insecticide property of ethanolic extracts of Datura stramonium were studied under the laboratory condition against the *Cydia nigricana* larvae. Concentrations for experiments taken were

10%, 20%, 30% and 50 %. According to data at 10 % concentration on 24 hr time obtained lowest mortality was 23.94 in November than 26.68 in December and higher was 26.86 in January. At 48 hr exposure time 29.9 was higher in December in contrast to November and January 26.25, 29.1. After 72 hour death rate of pests larvae increased till 35.42 in December than 27.8 and 34.02 in November and January. *Datura stramonium* expressed the dissimilar mortality rate through the different concentration as It has been shown that after 24 hr and at 20 % concentration 29.46 (in November) was highest mortality than 27.46 and 24.94 in December and January. In November 27.95 was lowest mortality than 29.75 and 32.31 in January and December. At 72 disclosure time mortality was seen slightly fluctuated from November to January as 34.21, 33.11, 34.78. *D. stramonium* extracts's insecticidal behavior increased with the increasing concentration. After the treatment of 30% at 24 hr mortality were 33.76, 31.32, 29.85 which is higher in November than other two months but at 48 hr coverage time in January 32.33 was lowest mortality rate than 35.1 in December but highest observed in November as 37.02. In December pests death rates increased highly than November and January from 41.58 to 39.2 & 37.81. At highest concentration of 50 % at 24 hr time 36.83 was elevated (in November) than 35.82 and 33.06 in January and December. After the 48 hr of extracts application mortality was lowest 37.05 in

December than November (40.39 and 38) January. At 72 exposures time in November month death rate was so lower 42.77 than December and January 43.89,45.37. In December month at 20% concentration observed death rate was 30.56 at 24 hr and slight changed occurred in November and January to lower rate as 23.67, 18.61 in November and December. As opposed to 42.77 (December) at 48 hr mortality rate reduced as 37.8 and 35.82 in November and December. At 72 hr 58.61 is highest transience than other two months 50.52,34.93 which is extremely low. At 30% concentration (24 hr) lower examined death value was 26.99 than 33.68 & 33.81 in January and November. 35.82 in January show higher variation in transience than 54 and 84.99in November & December at 48 hr. In January mortality at 72 hr 38.49 was the degraded value than other months 72.17, 84.99. Pests were exposed to leaf extract and because of leaves toxicity and increasing concentration and time exposure mortality also increased. At 50% concentration killing process enhance with the different time exposure as 54.52, 35.67, 5.55 at 24 hr. In November mortality was went high till 87.08 and reduced in December as 81.98 and more reduced in January as 37.81 at 48 hr exposure and at 72 hr disclosure time in November highest killing property shown by leaves against pests as 112.34 than December and January 112.34 and 40.63.

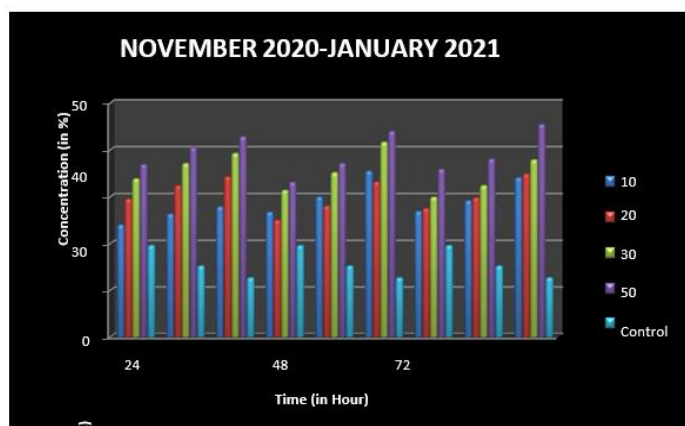


Figure: Mortality rate of *Cydia nigricana* larvae from different concentration of *Datura stramonium* leaves extracts in November 2020 to January 2021

(B) Pea pests larvae mortality rate after treatment with *Eucalyptus globulus* leaf extracts-

1. In November Month 2020 (Mean Mortality).

Concentration	After 24 hour	After 48 hour	After 72 hour
10%	24.73±2.64	28.14±2.08	31.12±1.70
20%	28.26±2.64	32.16±2.08	35.57±1.70
30%	29.44±2.64	33.50±2.08	37.05±1.70
50%	33.56±2.64	38.19±2.08	42.24±1.70
Control	19.52±1.84	15.14±1.55	12.61±1.26

2. In December Month 2020

Concentration	After 24 hour	After 48 hour	After 72 hour
10%	26.81±2.21	29.54±1.89	33.63±2.38
20%	27.41±2.21	30.20±1.89	34.38±2.38
30%	29.20±2.21	32.17±1.89	36.62±2.38
50%	34.56±2.21	38.08±1.89	43.35±2.38
Control	19.52±1.84	15.14±1.55	12.61±1.26

3. In January Month 2021

Concentration	After 24 hour	After 48 hour	After 72 hour
10%	23.87±2.21	26.38±2.05	29.73±2.02
20%	26.85±2.21	29.68±2.05	33.45±2.02

30%	29.84±2.21	32.98±2.05	37.17±2.02
50%	33.42±2.21	36.94±2.05	41.63±2.02
Control	19.52±1.84	15.14±1.55	12.61±1.26

(B) Mean mortality of biopesticide of *Eucalyptus globulus* against *Cydia nigricana* with reference to concentration and time from November 2020-January 2021:

According to the obtained data values at 10% concentration 23.87 was lowest mortality rate in December than 24.3 in November and highest in January 26.85. At 48 hr 29.54 was highest in December and lowest was 26.38 in January and 28.14 in November. At 72 hr exposure time 33.63 was highest mortality rate in December than 31.12 and 29.73 in November and January. At 20% concentration 28.26 was higher transience than 27.41 In November December and lower was 26.85 in January at 24 hr. 32.16 was higher death rate which observed in November month and 30.2 and 29.68 in December and January at 48 hr time period. At 72 hr exposure time 35.57 was higher than 34.38 in November and December and then lowest in January 33.45. At 30% concentration higher mortality was 29.84 in January than 29.44 in November and lowest in December 29.2. At 48 hr time exposure 32.17 was lower mortality rate.

Higher mortality 33.5 observed in November than 32.98 in January. At 72 hr time period in January 37.17 was higher mortality and than in November 37.05 and lowest in December 36.62. At 50% concentration in December at 24 hr time exposure

34.56 was higher mortality than November and January 33.56, 33.42. At 48 hr time disclosure 38.19 was higher mortality in November than 38.08 in December and in January lower mortality observed as 36.94.

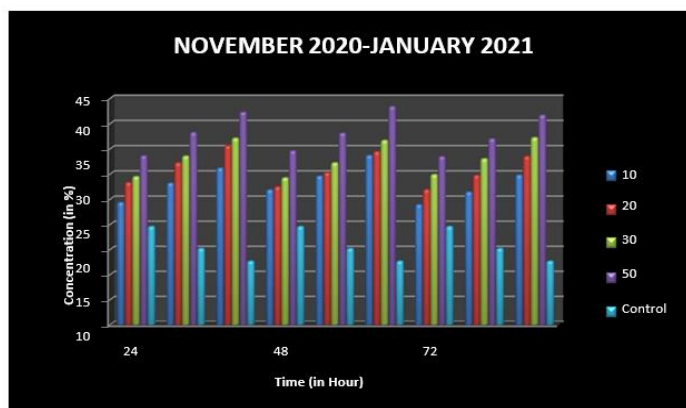


Figure: Mortality rate of *Cydia nigricana* larvae from different concentration of *Eucalyptus globulus* leaves extracts in November 2020-January 2021

At 72 hr time coverage time 43.35 was higher transience rate in December than 42.24 in November and lowest mortality observed in January 41.63. Our outcome is showing the justification with [6]. They worked against *Myzus persicae* and found the aphicidal action by many plants including *Eucalyptus globulus* oil with tea tree oil expresses 2.95% mortality. Consequences of our experiment provide acceptable explanation with regard to [7] which bestowed that *Eucalyptus globulus* leaves extracts expresses 80% mortality against *Culex pipiens*. *Eucalyptus cinerea* also revealed the higher larvicidal property at LC₅₀, 0.38 mg mL⁻¹.

SUMMARY AND CONCLUSION

Plants are a rich source of minerals, antioxidants, vitamins, carbohydrates, and proteins; they have been utilised for food, fibre, tan, gum, oil, latex, and other purposes since ancient times, and as a result, they have contributed immunomodulatory effects. Based on the information presented above, we decided that *Datura stramonium* and *Eucalyptus globulus* has therapeutic characteristics used to treat cancer, rheumatism, ear discomfort, headaches, wounds, and burns

stress, sadness, sleeplessness, asthma, boils, and inflammation are all symptoms of inflammation [8]. Mortality graph indicated that as compare to control group other treated pests expressed higher mortality and with the increasing application and time exposure mortality also enhanced. According to all statistical test and obtained results we would reject the null hypothesis that there is no significant relation between time and concentration with respect to the mortality rate of pest and accept the alternative hypothesis and concluded that $p < 0.05$ and there is significant correlation between the time and concentration.

ACKNOWLEDGEMENT

I am grateful to God and my co author for their continuous support.

Disclaimer

All the information of research data and results are the original work of the co responding authors.

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HOW TO CITE: Grace Cornelius*, Dr Rashmi Sharma, Eco-Friendly Pest Control: Evaluating The Insecticidal Effects of *Datura Stramonium* and *Eucalyptus Globulus* Leaves Extracts Against *Cydia Nigricana* on *Pisum Sativum*, *Int. J. of Pharm. Sci.*, 2024, Vol 2, Issue 12, 3022-3028. <https://doi.org/10.5281/zenodo.14548042>

