



# INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

## INSECTICIDAL EFFICACY OF EUCALYPTUS GLOBULUS AND DATURA STRAMONIUM LEAVES EXTRACTS AGAINST THE LARVAE OF CYDIA NIGRICANA

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### ABSTRACT

Medicinal flowers are like wealthy resources of components which are often utilized in medicine development pharmacopoeial, non-pharmacopoeial or medications which are artificial. Medicinal plants are a prosperous resource of bio dynamic phytochemicals or bio nutrients and bio energetic compounds from therapeutic plants offer limitless prospects for novel treatment leads since of their unrestrained chemical assortment. Current study examined the potency of different concentration (10%, 20%, 30%, 50%) leaves extracts of *Datura stramonium* and *Eucalyptus globulus* at 24, 48, 72 hour exposure time against the second instar larvae of *Cydia nigricana* (Pea pest) in winter season from November 2019-January 2020. Obtained outcome expresses that at 10% concentration both of the plant produced lower mortality rate. In December month at 10% concentration and 24 hour exposure time *Datura stramonium* extracts generated lowest mortality  $12.71 \pm 14.22$  of pests and in November at 72 hour highest mortality  $116.38 \pm 9.70$  observed. *Eucalyptus globulus* articulated lowest mortality of pests at 10% concentration and 24 hour exposure time, while at 72 hour exposure time highest mortality  $42.14 \pm 2.5$  of pea larvae were seen. As compare to other groups control groups expresses lesser mortality at every concentration.

**Key words:** Pharmacopoeial, Phytochemicals, Medicinal plants, Mortality.

### INTRODUCTION

Cereals and legumes are the most important dietary components for the majority of people in the world and are usually stored to provide food and feed reserves and seeds [1]. However, the emergence of insect strains resistant to pesticides, edible toxic residues, acute and chronic toxicity to workers, and adverse environmental impacts has also been reported in many countries [2].

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 [3].

Medicinal plants are a prosperous resource of bio dynamic phytochemicals 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.

Studies indicate that essential oils (EOs), plant secondary metabolites may affect significantly the plant, resistance to parasites and microorganisms. The active components are mono terpenes and sesquiterpenes (hydrocarbon and oxygenated terpenoid derivatives), and aliphatic compounds such as alkanes, alkenes, ketones, aldehydes, acids, and alcohols. These compounds are carriers and responsible of the odor of aromatic plants [4]. They are easily extractable, ecofriendly, biodegradable, possess low or no toxicity against mammals and are very effective against wide spectrum of insect pests [5].

The Myrtaceae family includes angiosperms. Which enclosed with wood and essential oils. They are named after the shrub 'myrtus' found near the Mediterranean Sea in North Africa and South America. There are about 140 genera with 3800-5650 species [6]. Famous genera in the Myrtaceae family include houseplants such as leptospermum (Australian tea tree), eucalyptus, verticordia (feather plant), and callistemon (bottlebrush). Certainly economically valuable Myrtaceae include Eucalyptus (wood, natural essential oils), Pimenta (allspice, bay rum), Psidium (guava), Syzygium (clove, jamun, rose apple), and Melaleuca (wood) are also included lesser-known genera of the family but very interesting and important are certainly Finanz Eugenia, Acca/Feijoa, Myrciaria, Ugni, and Rhodomyrtus. In fact, several members of the family have historically important uses as an edible fresh fruit and as a traditional medicine in various ethnobotanical practices of tropical and subtropical terrestrials [7].

Eucalyptus is the first evergreen tree to be discovered From Australia and Tasmania. Today it is grown in over 90 countries. Oils extracted from various parts of the eucalyptus plant (leaves, fruit, buds, bark) have antibacterial, antiseptic, antioxidant, anti-inflammatory and anti-cancer effect. Occurrence of these properties made it therapeutically efficient for many diseases like influenza, flu, sinus, common cold, congestion, cough [8]. Eucalyptus plant is the important source of tannin, proteins and dyes. Its leaves contains many secondary metabolites like saponin, tannins, flavonoids, alkaloids. Its leaves restrain volatile compound called isoprenoids which are responsible for many medicinal properties.

Eucalyptus oil contains an exponential amount of secondary metabolites such as 1, 8- cineole, citronellal, citronellyl acetate, p-cymene, eucamalol, limonene, linalool,  $\beta$ - pinene,  $\gamma$ -terpinene,  $\alpha$ terpinol, alloocimene and aromadendrene [8][9] which possess anti-inflammatory, analgesic, antimicrobial, anticancer, antioxidant and insecticidal properties. Certain secondary metabolites contain anticancer cytochrome p40 inhibitors which reveal the medicinal importance of Eucalyptus oil [10].

The uses of the plants typically have been many, but we are able to also reap the benefits of Datura when we look at the future [11]. *Datura stramonium* is especially called Angel's trumpet, Locoweed, Jimson weed or genus Datura, it belongs to asterid dicot family [12][13]. It grows up to a height of 2-4 legs and customarily reaching a diameter of 4-6 feet and they are pubescent (young) and plant can be actually branched.

Plant contains 0.2- 0.6% alkaloids. The most alkaloids tend to be poisonous substance and alkaloid (scopolamine). Additionally it includes macromolecule poisonous substance and simple protein. Poisonous substance is formed from poisonous substance by racemization. In young flowers alkaloid is predominant organic compound.

The focus of complete alkaloids inside the leaves of *Datura stramonium* is 0.2– 0.5% poisonous substance turning into the ingredient which can be actually major alkaloid (hyoscine), Apo poisonous substance, tropine, belladonna and poisonous substance N-oxide little compounds. Poisonous substance, alkaloid and poisonous substance tend to be anticholinergics, specifically antimuscarinics [14].

## MATERIALS AND METHODS

Extracts of *Eucalyptus globulus* and *Datura stramonium* leaves prepared from plant material which were collected in season November 2019 to January 2020 from Beawar, Ajmer, Rajasthan and nearby region in flowering season. To make the extracts, Eucalyptus and Datura leaves were plucked from the parent plants and shed dried. It was later grounded in powder with a mortar and pestle. Following that, 500 gm of each plant's leaves powder and 1000 ml of ethanol were poured into a Soxhlet apparatus for extraction (separately). Ethanolic extract was filtered and then concentrated in vacuum and dried at 40° C for ethanol exclusion before being placed in the universal bottle and refrigerated for later use. The solvent desorption yielded the dry weight of the plant extracts (56 gram of Eucalyptus, 60 gram of Datura) which were used to calculate concentration in g/ml. The ethanolic extract obtained as a result was unquestionably used in the assay of insecticidal activity against the *Cydia nigricana* larvae. Percent mortality calculated by Abbot Formula.

## RESULT AD DISCUSSION

(A) Pea pests larvae mortality rate after treatment with *Eucalyptus globulus* leaves extracts-

1. In November month 2019 (Mean mortality):

Concentration	After 24 hour	After 48 hour	After 72 hour
10%	24.32±2.64	26±2.64	27.67±2.64
20%	26.19±2.7	28±2.07	29.80±2.64
30%	29.93±2.7	32±2.64	34.06±2.64
50%	35.54±2.64	38±2.64	40.45±2.7
Control	20.56±2.36	18.62±2.26	17.45±1.86

2. In December month 2019 (Mean mortality):

Concentration	After 24 hour	After 48 hour	After 72 hour
10%	24.32±2.64	26±2.64	27.67±2.64
20%	26.19±2.7	28±2.07	29.80±2.64
30%	29.93±2.7	32±2.64	34.06±2.64
50%	35.54±2.64	38±2.64	40.45±2.7
Control	20.56±2.36	18.62±2.26	17.45±1.86

3. In January month 2020 (Mean mortality):

Concentration	After 24 hour	After 48 hour	After 72 hour
10%	24.32±2.64	26±2.64	27.67±2.64
20%	26.19±2.7	28±2.07	29.80±2.64
30%	29.93±2.7	32±2.64	34.06±2.64
50%	35.54±2.64	38±2.64	40.45±2.7
Control	20.56±2.36	18.62±2.26	17.45±1.86

## Mean mortality of biopesticide of *Eucalyptus globulus* against *Cydia nigricana* with respect to different concentration in November 2019-January 2020:

Observation concluded that through different concentration solution of *Eucalyptus globulus* pea pests larvae expressed different mortality rate. The present data revealed that at 10%, 22.82 was lower mortality in December and higher observed in January 25.15 than 24.32 in November. In December At 48 hr 28.31 was higher transience than 28.14 in January and lower in November 26. At 72 hr in December higher mortality was 30.85 than 30.7 in January and lower 27.67 in November.

At 20 % concentration mortality was 31.14 in January and lower in 26.19 in November and than in December 26.72. At 48 hr 28 was lower mortality in November and highest 34.84 was in January and in December mortality was 33.15. At 72 hr exposure time in January highest mortality were seem 38.01 than December 36.12 and lowest in 29.8.

At 30% concentration highest mortality was 29.93 at 24 hr exposure time in November and lower in December 27.27 and 29.35 in January. At 48 hr death rate was 32.00 in November which is lower than in December and January 33.84, 32.83. At 72 hr 36.87 was higher mortality in December and lower in November 34.06 and 35.81 in January.

At 50% 24 hr exposure time lowest mortality was 31.17, 32.34 in December and January and higher in November 35.54. At 48 hr contacted time 38.68 was higher mortality than 38 in November and lower scrutinized was 36.18. At 72 hr exposure time 42.14 in December higher mortality was expressed by larvae and then in November 40.45 and lowest at 39.47 in January. As compare to other groups control groups expresses lowest mortality but least at 72 hr exposure time as 12.61.

*Eucalyptus* and *Datura* species included in the therapeutic plant category because of their phytoconstituents as saponin, terpenes, glycosides, phenols, alkaloids and because of their chemical compounds they used as anti-inflammatory, ant cholinergic, asthmatic, antibacterial, antifungal, antiseptic, antiviral, insecticidal, ovicidal, larvicidal. Because of that their plant parts utilized in paper industry, medicine, drugs, soil erosion control, timber etc. and extracted oil from plant these leaves used in many purposes.

Many research scientists worked on *Eucalyptus* plant to investigate its impending properties. (Reda et al 2021) experimented on *Sitophilus granarius* (L.) and *Rhizopertha dominica* (Fab.) by Many plants powder including *Eucalyptus* at 3, 6, 9 days exposure time and in their researches 69.74 % mortality observed which justify our result.

Our outcome is showing the justification with (Qasim et al 2021). 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 (Elbanna et al 2006), 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<sup>-1</sup>.

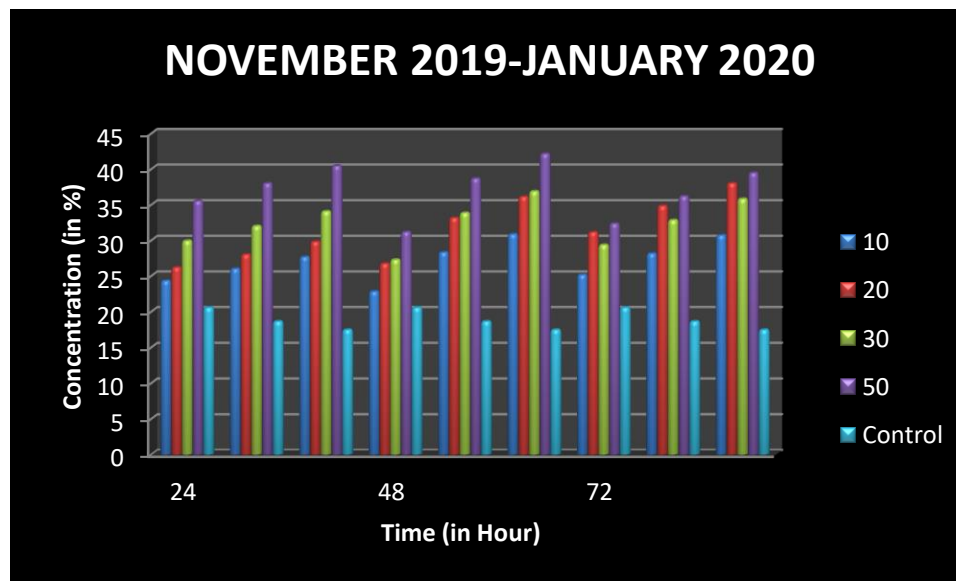


Figure: Mortality rate of *Cydia nigricana* larvae from different concentration of *Eucalyptus globulus* leaves extracts in November 2019-January 2020

(B) Pea pests larvae mortality rate after treatment with *Datura stramonium* leaves extracts-

1. In November month 2019 (Mean mortality):

Concentration	After 24 hour	After 48 hour	After 72 hour
10%	21.98±14.22	35.10±12.44	46.91±9.70
20%	23.67±14.22	37.80±12.44	50.52±9.70
30%	33.81±14.22	54.00±12.44	72.17±9.70
50%	54.52±14.22	87.08±12.44	116.38±9.70
Control	20.56±2.36	18.62±2.26	17.45±1.86

2. In December month 2019 (Mean mortality):

Concentration	After 24 hour	After 48 hour	After 72 hour
10%	12.71±10.43	29.22±12.90	40.05±9.05
20%	18.61±10.43	42.77±12.90	58.61±9.05
30%	26.99±10.43	62.01±12.90	84.99±9.05
50%	35.67±10.43	81.98±12.90	112.34±9.05
Control	20.56±2.36	18.62±2.26	17.45±1.86

3. In January month 2020 (Mean mortality):

Concentration	After 24 hour	After 48 hour	After 72 hour
10%	26.19±2.21	27.86±2.21	29.94±2.16
20%	30.56±2.21	35.82±2.21	34.93±2.16
30%	33.68±2.21	35.82±2.21	38.49±2.16
50%	35.55±2.21	37.81±2.21	40.63±2.16
Control	20.56±2.36	18.62±2.26	17.45±1.86

## Mean mortality of biopesticide of *Datura stramonium* against *Cydia nigricana* with respect to different concentration in November 2019-January 2020:

The *Datura stramonium* leaf extract had strong toxicity against *Cydia nigricana*. The mortality increased with rising concentration from 10% to 50 % and with exposure times of 24, 48 hr and 72 hr. During the first experimenting season in November 2019 data show the mean mortality values was lowest in December 12.71 and highest 26.19 in January at 10 % and 24 hr exposure time. At 48 hr 35.1 was highest in November than 29.22, 27.86 in December and January and at 72 hr 29.22 was lowest death rate than 46.91, 40.05 in November and January.

According to the result data at 20% concentration with the 24 hr exposure time in December mortality was lower 18.61 than in November 23.67 and in January mortality was higher than others 30.56 at 24 hr time. In December observed mortality was 42.77 which was higher than 37.8 in November and in January obtained value was 35.82 which was lowest at 48 hr exposure time. At 72 hr time higher death rate monitored were 58.61 in December and lowest in January 34.93 than November 50.52.

Mortality rate more increased as concentration enhanced. At 30% and 24 hr exposure time 33.81 in November was higher as compare to 26.99 and 33.68 in December and January. At 48 hr exposure time in January 35.82 was lower than 62.01 & 54 in December and November. At 72 hr time interval 84.99 transience rate was higher in December and lowest in January 38.49 as compare to 72.17 which was higher than in November.

At 50 % concentration pests shows highest mortality as compare to other concentrations. At 24 hr contact time in January month 35.55 was lowest mortality and highest were in November and December 54.52, 35.67. At 48 hr 87.08 was highest death rate (November) than 81.98, 37.81 in December and January. At 72 hr contacted time higher mortality observed in November 116.38 than 112.34 in December and 40.63 in January.

As compare to every group, control group furnished lower mortality but lowest observed in 72 hour exposure time was 17.45.

Our result agreed with the (Habib et al 2011). They worked on *Callosobruchus maculatus* at 24 and 48 exposure time and different concentration and expressed that at 24 hr highest mortality were seen and they expressed that datura can be the good agent to control insect.

Our result also clearly expressed the similarity with (Aneeb et al 2018). They explained that aqueous extract of datura affect the population of *Trogoderma granarium* with the increasing concentration (1.5%, 3%, 6%, 9 %) and at 24, 48, 72 and 96 hour contact time and highest mortality 69.67% were seen at 9% concentration and 96 hour time. Our result also fulfilled the expectancy with the result of (Karimzadeh et al 2020). They worked on *Plutella xylostella* and discovered the larvicidal efficacy with datura stem, flower, seed, root and leaves and stated that every part of the datura contain phytoconstituents which expresses different mortality rates in which through leaves extract pests shows 28.3% mortality.

Our outcome also justified the Output of the data of (Kamal et al 2018). Their obtained result indicated that extracts of *Datura alba* leaves at 25% gives highest insecticidal effect against *Helicoverpa armigera*. Datura is a highly potential plant and its every species contain higher amount of secondary metabolites. Our experiment and attained end result shows resemblance with the outcome of (Loc et al 2014). Their biological activity testing result of *Datura metel* against *Plutella xylostella* with methanol extract at lower 10% were 74.08% (highest) and at aqueous extract at 40% were 81.38%.

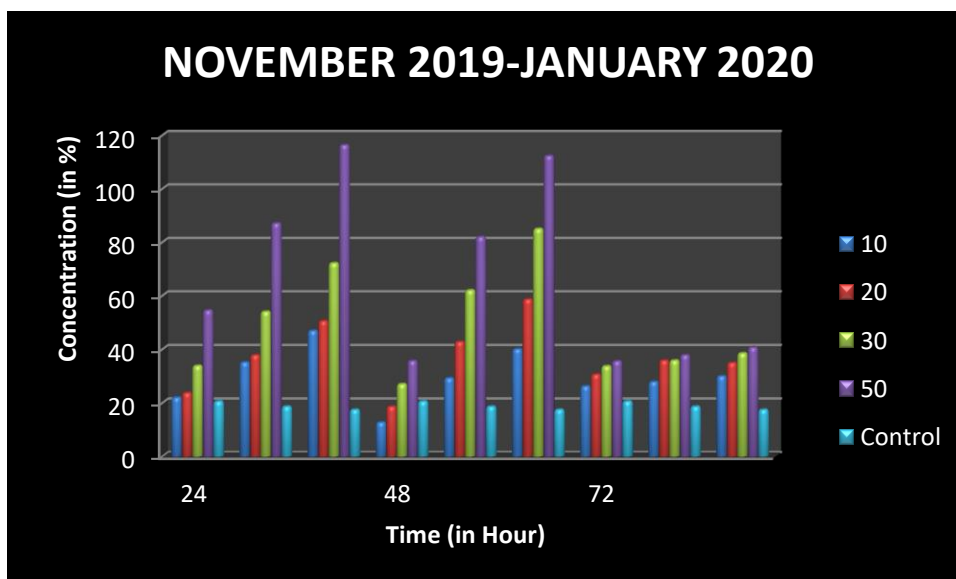


Figure: Mortality rate of *Cydia nigricana* larvae from different concentration of *Datura stramonium* leaves extracts in November 2019-January 2020

## CONCLUSION

Many research which were conducted through the plant leaves extracts of *Datura stramonium* and *Eucalyptus globulus* proposed that these medicinal plants contain many phytoconstituents and because of these phytoconstituents plant shows antibacterial, anti-inflammatory, antiviral, aticholinergic, asthmatic, antifungal, larvicidal, ovicidal and many other activities. Our outcome of investigation stated that with the increasing concentration of the plant extracts and exposure time *Datura stramonium* and *Eucalyptus globulus* plant leaves expresses increasing mortality against the *cydia nigricana*.

## ACKNOWLEDGEMENT

I am grateful to all my co authors 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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