



e-ISSN: 2319-8753 | p-ISSN: 2347-6710

IJRSET

International Journal of Innovative Research in
SCIENCE | ENGINEERING | TECHNOLOGY

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 11, Issue 6, June 2022

ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

Impact Factor: 8.118

 9940 572 462

 6381 907 438

 ijirset@gmail.com

 www.ijirset.com

Repellent Properties of *Nyctanthes arbor-tristis* Seed Extract against the Adult Pulse Beetles

P. C. Bhati

Assistant Professor, Department of Zoology, SRKP Government PG College, Kishangarh, Rajasthan, India

ABSTRACT: Repellent properties of the seed extract of *Nyctanthes arbor-tristis* against adult beetles of *Callosobruchus chinensis* L. was assessed with the help of an Olfactometer. Average percent of insects in the control arm calculated was 63.33 whereas the percent of insects in the treated arm of the olfactometer was recorded to be 26.66. With 56.77 percent repellency, the extract depicted moderate repellent properties at the highest concentration level.

KEYWORDS: *Nyctanthes arbor-tristis*, repellent, *Callosobruchus chinensis*.

I. INTRODUCTION

Plants are invaluable gift of nature to mankind as the floristic diversity on our planet provides almost all ingredients for different needs ranging from food to firewood. When the ancient hunter-gatherer man learned agriculture and started growing plants for food and fodder he was able to fulfil his need of food in a rather small area. This advancement was an important breakthrough towards the civilization and led to formation of human settlements. One of the conditions for the large human settlements was uninterrupted food supply throughout the year. As the harvesting was done only in a particular period of the year, it was imperative to store food grains for the remaining period of the year. Among the challenges for storing food grains for future consumption was the menace of pests. To protect stored gains from pests, plant and plant products were initially used as repellent and phagodeterrents giving relief to certain extent.

Later with the advent of the modern synthetic chemical pesticides in the last century, the problem of agriculture pests initially seemed to be manageable. However, the dire consequences of indiscriminate use of chemical pesticides shifted attention of researchers towards plant based safer and ecofriendly pesticides. In this pursuit, a number of plant species have been evaluated around the world for their potency against insect pests. *Nyctanthes arbor-tristis*, known as Harsinghar or Parijata, is a famous medicinal plant which is used to cure a number of ailments in tradition therapeutic practices. The present study also deals with the evaluation of repellent properties of *Nyctanthes arbor-tristis* seed extract against the adult pulse beetles, *Callosobruchus chinensis* L.

II. MATERIAL AND METHODS

Rearing of experimental insect

Culture of *Callosobruchus chinensis* was maintained in pre-sterilized jars containing disinfested cowpea seeds in the laboratory. The optimum condition of $27\pm 2^{\circ}\text{C}$ temperature and 60 ± 10 percent relative humidity was maintained. Freshly emerged adults (0-24 hrs) were taken for experimentation.

Collection and extraction of plant materials

Nyctanthes arbor-tristis is small terrestrial woody shrub with white flowers. This plant species can be cultivated in tropical and subtropical regions all over the world from sea-level up to 1500 m [1]. It has brown compressed, flat round or heart shaped capsule. The capsule has two sections and the each section contains a single seed. Exalbuminous sees are with thick testa and heavily vascularized outer layer of transparent cells. Cotyledons are flat with inferior radical [2]. Seeds of *Nyctanthes arbor-tristis* were collected from botanical garden of University of Rajasthan and nearby areas which were thoroughly washed with water to remove the dust and dirt particles. Further,



plant materials were dried in shade and powdered with the help of an electric grinder. The extract was prepared by Soxhlet extraction method [3] using acetone as solvent. 30 gm of powder was extracted with 300 ml of acetone keeping the ratio 1:10. The duration of extraction process was kept eight hours. After filtration, the extract was kept in refrigerator as stock solution.

Experimental Design

Olfactory response of the pulse beetle, *Callosobruchus chinensis* towards *Nyctanthes arbor-tristis* seed extract was studied with the help of a ‘Y’ shaped Olfactometer [4], having three arms viz. (i) Base arm (ii) Control arm (iii) Experimental arm. A piece of sponge soaked in solvent was kept in control arm while in experimental arm a piece of sponge soaked in 1 ml of the extract (100% concentration) was kept. 20 freshly emerged adults were introduced in the base arm. After 30 minutes, the number of individuals in each arm was counted and three replicas were run. The percent repellency was calculated using the following formula [5].

$$\% \text{repellency} = \frac{\text{No. of insects in C.A.} - \text{No. of insects in E.A.}}{\text{No. of insects in C.A.}} \times 100$$

where

C.A. = Control Arm

E. A. = Experimental Arm (Treated Arm)

III. RESULTS AND DISCUSSION

A perusal of table 1 indicates that average number of insects in the base arm of Olfactometer was 2 whereas the average numbers of insects in the control and treated (experimental) arms of the Olfactometer were 12.33 and 5.33, respectively. Average percentage of insects in the control arm calculated was 63.33 whereas the percent of insects in the treated arm of the Olfactometer was 26.66. With 56.77 percent repellency the seed extract of *Nyctanthes arbor-tristis* depicted moderate repellent properties against adult pulse beetles, *Callosobruchus chinensis* at the highest concentration level.

In another study [6] the seed extract of *Nyctanthes arbor-tristis* was recorded to be a considerable ovicide as it showed 69.23% corrected egg mortality at 100% concentration level of the extract. The ovicidal action of extracts tends to decrease with the decrease in concentration level. Hence the registered percent corrected egg mortality at 75%, 50% and 25% dose levels was 53.84%, 45.29% and 35.03%, respectively. The seed extract of this plant has also exhibited 48.786, 72.888, 80.020 and 85.078 percent seed protection over control for 25%, 50%, 75% and 100% dose levels, respectively [7]. Many researchers have also studied toxicity of different plant species [8], [9], [10]. These findings also support the phagodeterrent and repellent properties of the plant extract. Phytochemical analysis of *Nyctanthes arbor-tristis* revealed the plant to contain various phytochemicals such as flavonoids, saponins, glycosides, tannins, alkaloids, phenolic compounds, steroids, etc [11]. These phytochemicals may be responsible for the toxicity of the plant extract against the pulse beetle, *Callosobruchus chinensis*.

Table 1: Repellent properties of seed extract of *Nyctanthes arbor-tristis* against adult *Callosobruchus chinensis*

S.No.	No. of insects in base arm	No. of insects in control arm (A)	No. of insects in treated arm (B)	% of insects in control arm (% of A)	% of insects in treated arm (% of B)	% repellency
1.	2	12	6	60	30	56.77
2.	3	11	6	55	30	
3.	1	15	4	75	20	
Mean	2	12.33	5.33	63.33	26.66	

Number of replications – 3

Number of adults in each replication - 20



IV. CONCLUSION

The seed extract of *Nyctanthese arbor-tristis* exhibited repellent properties against adult beetles of *Callosobruchus chinensis* L. The study was carried out with the help of an Olfactometer. The number of insects in control arm was higher than the number in the treated arm of the Olfactometer. With 56.77 percent repellency, the extract depicted moderate repellent properties at the highest concentration level.

V. ACKNOWLEDGEMENT

The author is thankful to Council of Scientific and Industrial for the financial assistance.

REFERENCES

- [1] Hiremath, V., Hiremath, B.S., Mohapatra, S, Das, A.K. (2016). Literary review of Parijata (*Nyctanthus arbor-tristis* Linn.) An herbal medicament with special reference to Ayurveda and Botanical literature. *Biomed Pharmacol J*, 9(3): 1019-1025.
- [2] Rani, C., Chawla, S., Mangal, M., Mangal, A., Kajla, S., Dhawan, A. (2012). *Nyctanthes arbor-tristis* Lnn. (Night Jasmine): A sacred ornamental plant with immense medicinal potentials. *Indian Journal of Traditional Knowledge*, 11: 427-435.
- [3] Deshmukh, S.D. and Borle, M.N. (1975). Studies on insecticidal properties of indigenous plant products. *Ind. J. Ent.*, 35(1): 111-118.
- [4] Read, D.P., Feency, P.P. and Root, R.B. (1970). Habitat selection by the aphid parasite, *Diaerctiella rapae* (Hymenoptera : Broconidae) and hyper parasite, *Charpis brassicae* (Hymenoptera : Cypinidae). *Can. J. Ent.*, 102: 1567-1578.
- [5] Granett, P., Haynes, H.L., Connola, D.P., Bowery, T.G. and Barker, G.W. (1949). Two butoxyethylene glycol compound as fly repellents for live stock. *J. Econ. Ent.*, 42(2): 281-286.
- [6] Dwivedi, S.C. and Bhati, P.C. (2006). Efficacy of five plant extracts as ovicide against pulse beetle, *Callosobruchus chinensis* (L.). *Indian J. Environ. & Ecoplan.*, 12 (2): 325-328.
- [7] Bhati. P.C. (2017). Evaluation of phagodeterrent action of *Nyctanthese arbor-tristis* seed extract against *Callosobruchus chinensis*. *Life Science Bulletin*, 14(2): 245-246.
- [8] Obembe, O. M. and Kayode, J. (2018). Evaluation of Toxic Properties of Cotyledon Powders and Oils of Sandbox, *Hura crepitans* L. against *Sitophilus zeamais* Motschulsky (coleoptera: curculionidae). *Bio-Science Research Bulletin*, 34(2): 40-47.
- [9] Alim, M.A.; Song, J.; Lim, U.T.; Choi, J.J. and Hossain, M.A. (2017). Bioassay of plant extracts against *Aleurodicus disperses* (Hemiptera: Aleyrodidae). *Florida Antomologist*, 100(2): 350-357.
- [10] Lu, Jianhua and Wu, Shuhui (2010). Bioactivity of essential oil from *Ailanthus altissima* bark against 4 major stored-grain insects. *Afr. J. Microbiol. Res.*, 4(3):154-157.
- [11] Rawat, H., Verma, Y., Ayesha, Saini, N., Negi, N., Pant, H. C., Mishra, A., Singhal, M., Khan, A., and Gaurav, N. (2021). *Nyctanthes arbor-tristis*: A traditional herbal plant with miraculous potential in medicine. *International Journal of Botany Studies*, 6(3): 427-440.



INNO SPACE
SJIF Scientific Journal Impact Factor
Impact Factor: 8.118



ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

 **9940 572 462**  **6381 907 438**  **ijirset@gmail.com**



www.ijirset.com

Scan to save the contact details