



# Larvicidal Activity of *Dalbergia lanceolaria* subsp. *paniculata* (Roxb.) Thoth. Methanolic Leaf and Bark Extract against *Aedes aegypti* Linn. Larvae

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**Abstract :** *Dalbergia lanceolaria* subsp. *paniculata* (Roxb.) Thoth. is a very important medicinal plant in the deciduous forest. Whole parts of the plant are rich in secondary metabolite, which impart miraculous medicinal uses to the plant. Plant bark is used for anthelmintic, astringent to the bowels, cures 'Kapha' and 'Vata', dysentery, leucoderma, urinary discharges, blood diseases, ulcers, skin diseases, biliousness, burning sensation and anaemias. Among the hill tribes of Chota Nagpur a decoction of the bark is given when urine highly coloured. It shows potential antibacterial, antioxidant and anti-cancerous activity. It is also good oral hypoglycemic agents and used for anti- depressant activity. It is used to treat Diabetes mellitus. It shows significant protective effect against hepatotoxicity induced by carbon tetrachloride.

The present investigation is carried out to reveal the larvicidal activity of the *Dalbergia lanceolaria* subsp. *paniculata* (Roxb.) Thoth. methanolic bark and leaf extract against *Aedes aegypti* Linn. Larvae. It showed that the bark extract has more larvicidal activity than the leaves extract. As the source of the plant is very common and the formulation is not costly. The present study may open new approach towards the eco-friendly, biodegradable and effective larvicidal against *Aedes aegypti* Linn. larvae..

**Keywords** –Larvicidal Activity, *Dalbergia lanceolaria* .

## I. INTRODUCTION

Plants are one of the two major kingdoms of life forms. They are the only life forms that can produce their own food using energy from sunlight through the process of photosynthesis. People depend upon plants to satisfy their basic human needs such as food, clothing, shelter, and medicine. To date, these basic human needs are growing rapidly because of a growing world population, increasing incomes, and urbanization (Fernando, 2012). Each plant consists of several important ingredients that can be used in medical field, and can be involved in the development of different kind of drugs. A lot of undeveloped countries or even developed countries are using herbal medicine in maintain human wellbeing, personal health condition, and treating certain type of disease (Mohammed, 2019). The medicinal plants consider as a rich resources of ingredients which can be used in drug development and synthesis. Besides that these plants play a critical role in the development of human cultures around the whole world (Yudharaj, *et.al.*, 2016). Traditional Indian medicine is one of the oldest medical sciences in the world. Ayurveda, the most widely used system in traditional Indian medicine, emphasizes holistic medicine, which takes the body, mind, and spirit as a whole. It is based on the principle that human beings achieve physical, mental, and emotional health through harmonious coexistence with nature (Shi, *et.al.*, 2021)

*Dalbergia lanceolaria* subsp. *paniculata* (Roxb.) Thoth. is a very important medicinal plant in the deciduous forest. It is large tree belongs to the family Fabaceae and is commonly called as *Dandusa*, *Kaurchi*, or *Sondhara*. Whole parts of the plant are rich in secondary metabolite, which impart miraculous medicinal uses to the plants. It was also known to use for timber yielding tree belonging to family leguminosae. It was reported that it has potent antioxidant activity, ant-inflammatory activities, antimicrobial activity, oestrogenic and larvicidal properties (Wankhade, *et.al.*, 2019). It was evaluated that stem bark used for baldness and dysmenorrhea (Krishna, *et.al.*, 2011, Murthy, 2012). It was reported that leaves were used as antifilaria (Kumar and Suryanarayana, 2013). Number of compounds were isolated from the plant (Saha, *et.al.*, 2013). Four isoflavonoids were isolated from ethanolic extracts of stem bark and leaves of plant (Amin, *et.al.*, 2012).

Plant products are offer as a promising substitute for synthetic chemical agents for insect management and control. Phytochemicals belonging to different chemical classes such as terpenes, steroids, alkaloids and phenolic constituents were examined earlier for insect control and are potential and found promising. There is a need for an alternate source with least risk to environment and human health, and the present investigation has intends to recognize potential plant-based mos-quito larvicides against the mosquito vectors.

## II. MATERIALS AND METHOD

### COLLECTION OF PLANT MATERIALS

Leaves and bark of *Dalbergia lanceolaria* subsp. *paniculata* (Roxb.) Thoth. was collected from Kinwat forest (N 19° 42.548' E 078° 13.256') in Nanded district of Maharashtra. Specimens were identified and authenticated by Herbarium, Department of Botany,

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad (Accession No- 17395). Freshly collected leaves and stem bark of *Dalbergia lanceolaria* subsp. *paniculata* (Roxb.) Thoth. was dried in shade and pulverized to coarse powder. The powder was stored in an airtight container and kept in a cool, dark, and dry place (Hassan, *et.al.*, 2014; Das, *et.al.*, 2014).

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**Fig. 1: Showing *Dalbergia lanceolaria* subsp. *paniculata* (Roxb.) Thoth. morphology (a) Bark and (b) Leaf**

#### METHOD OF PREPARATION OF METHANOL EXTRACT

The extraction was carried out by hot continuous method using Soxhlet apparatus. The 25 gm powder of bark and leaves were extracted using 250 ml methanol for 72 hours. The methanolic extract of leaves and bark of the plants were used for the further study (Vijayalakshmi, *et.al.*, 2012).

#### Larvicidal activity

Larvicidal activity was done according to “WHO Guideline for laboratory and field testing of Mosquito Larvicides” (Anonymous, 2005) with some modification. Batches of 25 third and fourth instar larvae of *Aedes aegypti* Linn. were used for the present larvicidal activity (Mathalaimuthu, *et.al.*, 2015, Kamaraj, *et.al.*, 2011 ).

Larvae Mortality percentage was calculated with the help of following formula.

$$\text{Mortality (\%)} = (X - Y)/X \times 100$$

Where, X = percentage survival in the untreated control and Y =percentage survival in the treated sample.

### III. RESULTS AND DISCUSSION

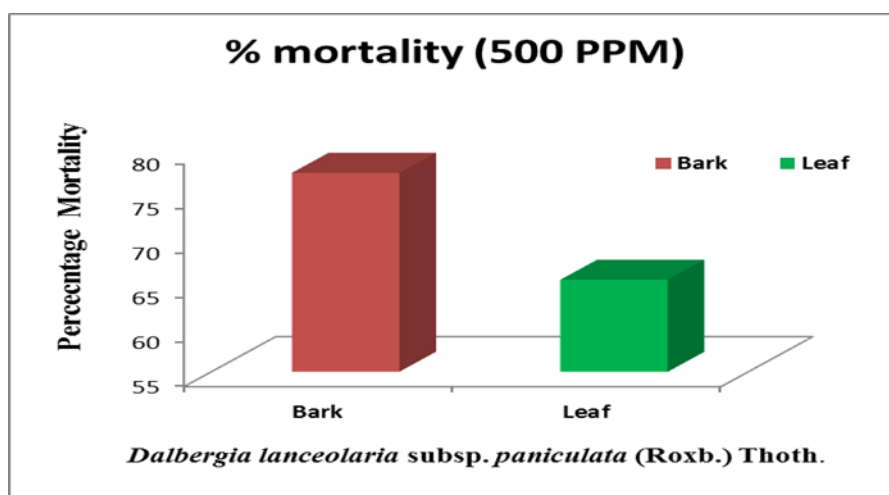
#### Larvicidal activity of bark and leaves extract of *Dalbergia lanceolaria* subsp. *paniculata* (Roxb.) Thoth.

Larvicidal activity decreased with decrease in the concentration of the plant extract from 500 PPM to 100 PPM. Larvicidal activity of the plant showed that bark methanolic extract ( $77.33 \pm 1.63$  %) has more % mortality than the leaf extracts ( $65.33 \pm 1.63$  %) at 500 PPM (Fig. No. 52). LC 50 value for the bark extract was  $85.49 \pm 8.01$  PPM and for the leaf extract value was  $224.62 \pm 10.91$  PPM. Similarly 95% confidence LFL-UFL (LFL: Lower fiducidal limit, UFL: Upper fiducidal limit.) lower for the bark extract was 74.99-97.49 PPM and 208.92-239.77 PPM for the leaves extract (Table No. 1). The present study showed that the bark extract has more potent larvicidal activity than that of the leaves extract.

Table No. 1 -Larvicidal activity of bark and leaves extract of *Dalbergia lanceolaria* subsp. *paniculata* (Roxb.) Thoth.

Name of the plant	% mortality (500 PPM)	LC 50 PPM	95% Confidence LFL -UFL	Regression equation (Y= a + βX)	Chi-square (X <sup>2</sup> )
<i>Dalbergia lanceolaria</i> Bark	77.33 ±1.63	85.49± 8.01	74.99-97.49	Y= 3.34 + 0.86 X	0.55
<i>Dalbergia lanceolaria</i> Leaf	65.33 ±1.63	224.62± 10.91	208.92-239.77	Y= 2.97 + 0.86 X	0.06

Fig No. 2-Larvicidal activity of bark and leaf extract of *Dalbergia lanceolaria* subsp. *paniculata* (Roxb.) Thoth.



Larvicidal activity of the some of the species of the *Dalbergia* and other leguminosae plants are carried out by the some the researcher, but the larvicidal activity of bark and leaf extract of *Dalbergia lanceolaria subsp. paniculata (Roxb.) Thoth.* is new to the world. Larvicidal and repellent actions were studied by oil extracts obtained through hydrodistillation of *Dalbergia sissoo* Roxb against *Anopheles stephensi*, *Aedes aegypti* and *Culex quinquefasciatus*. It revealed that larvicidal activity is directly proportional to the concentration of dosage (Ansari, et.al., 2000). Compound isolated from *Dalbergia sissooides* flower Biochanin-A, showed the prominent larvicidal activity (LC 50-308.238ppm, LC90 -1889.926 ppm) against *Culex quinquefasciatus* (Nagarajan, et.al., 1998). Compound rotenoids isolated from *Dalbergia monetaria* seeds showed 100% mortality against *Aedes aegypti* L. within 3 days (Abe, et.al., 1985). 100% mortality was observed in Cassia fistula benzene leaves extracts against *Aedes aegypti*. Methanolic flower extract *Delonix regia* showed significant larvicidal activity against the *Hyblaea puera* Cramer (Deepa and Remadevi, 2011). Larvicidal activity and phytochemical investigation of *Albizia julibrissin* Durazz. methanolic leaf and bark extract shows significant result against *Aedes aegypti* Linn. Larvae (Wankhade and Mulani, 2016). Maximum larvicidal activity was observed in ethanol extracts of *Gliricidia sepium* as compared to the ethyl acetate extract at 250 ppm concentration (Krishnappa, et.al., 2012).

#### IV. CONCLUSION

The present investigation suggests that the methanolic bark extract of the *Acacia leucophloea (Roxb.) Willd* shows the potential larvicidal activity against the third and fourth instar larvae of *Aedes aegypti* Linn. The plant leaf and bark extract contains effective larvicidal bioactive principles which may be needed for further purification to obtain natural product larvicidal drug. The present research work is further used to prepare eco-friendly, environmentally safe, biodegradable, and low-cost natural products larvicidal which can be applied to relatively small areas where larvae are concentrated.

#### REFERENCES

- [1] Fernando, D.W.G. (2012). Plants: An International Scientific Open Access Journal to Publish All Facets of Plants, Their Functions and Interactions with the Environment and Other Living Organisms. *Plants*.1-5.
- [2] Mohammed, A.H. (2019). Importance of Medicinal Plants. *Research in Pharmacy and Health Sciences*. Vol. 5(2), 151.
- [3] Yudharaj, P., Shankar, M., Sowjanya, R., Sireesha, B., Naik, E. A., Priyadarshini, R.J. (2016). Importance and uses of medicinal plants – An Overview. *International Journal of Preclinical & Pharmaceutical Research*. Vol. 7(2), 67-73.
- [4] Shi, Y., Zhang, C., Li, X. Traditional medicine in India. *Journal of Traditional Chinese Medical Sciences*. Vol.8, S51-S55.
- [5] Wankhade, M.S., Solanke, S.N., Pangikar, P.P. (2019). Quantitative estimation of bioactive phytoconstituents present in *Dalbergia lanceolaria subsp. paniculata (Roxb.) Thoth.* methanolic leaf and bark extract. *International Journal of Advance and Innovative Research*. Vol. 6(1). 369-373.
- [6] Krishna, M. B., Mythili, S., Kumar, K. S., Ravinder, B., Murali, T., Mahender, T. (2011). Ethno Botanical Survey of Medicinal Plants in Khammam District, Andhra Pradesh, India. *International Journal of Applied Biology and Pharmaceutical Technology*. Vol. 2(4). 366-370.
- [7] Murthy, E. N. (2012). Ethno medicinal plants used by gonds of Adilabad district, Andhra Pradesh, India. *Int. J. of Pharm. & Life Sci*. Vol. 3(10), 2034-2043.
- [8] Kumar, R. B., Suryanarayana, B. (2013). Ethnomedicinal recipes for Skin and dermatitis & allied diseases from Tribals of Sriharikota Island, Andhra Pradesh. *Journal of Pharmacognosy and Phytochemistry*. Vol. 2 (2). 234- 249.
- [9] Saha, S., Shilpi, J. A., Mondal, H., Hossain, F., Anisuzzman, M., Hasan, M. M., Cordell, G. A., (2013). Ethnomedicinal, phytochemical, and pharmacological profile of the Genus *Dalbergia* L. (Fabaceae). *Phytopharmacology*. 4(2), 291-346.
- [10] Amin, E., Abouzid, S., Seida, A., (2012). Phytochemical and Biological Studies on Isoflavonoids from *Dalbergia paniculata* Cultivated in Egypt. *Pharmacologia*. Vol. 3(3). 84- 90.
- [11] Hassan, L.E., Ahamed, M.K., Majid, A. A., Baharetha, H. M., Muslim, N.S., Nassar, Z.D. and Majid, A. A. (2014). Correlation of antiangiogenic, antioxidant and cytotoxic activities of some Sudanese medicinal plants with phenolic and flavonoid contents. *BMC Complementary and Alternative Medicine*. Vol.14, 406.
- [12] Das, N., Islam, M. E., Jahan, N., Islam, M. S., Khan, A., Islam, M. R. and Parvin, M. S. (2014). Antioxidant activities of ethanol extracts and fractions of *Crescentiacujete* leaves and stem bark and the involvement of phenolic compounds. *BMC Complementary and Alternative Medicine*. Vol.14, 45.
- [13] Vijayalakshmi, A., Ravichandiran, V., Malarkodi V., Nirmala, S. and Jayakumari, S. (2012). Screening of flavonoid “quercetin” from the rhizome of *Smilax china* Linn. for anti- psoriatic activity. *Asian Pacific Journal of Tropical Biomedicine*. 269-275.

- [14]Phatak, R. S. (2015). GC-MS analysis of bioactive compounds in the methanolic extract of *Kalanchoe pinnata* fresh leaves. *Journal of Chemical and Pharmaceutical Research*. Vol.7(3) 34-37.
- [15]Ansari, M. A., Razdan, R. K. Tandon, M., Vasudevan, P. (2000). Larvicidal and repellent action of *Dalbergia sissoo* Roxb. (F. leguminosae) oil against mosquitoes. *Bioresources Technology*. Vol. 73(3), 207-211.
- [16]Nagarajan, N. S., Manoj, C. N., Priya, R., Daniel, T., Sakthivadivel, M. (1998). Effect of biochanin – a against filarial vector. *Ancient Science of Life*. Vol. 18(1), 1-4.
- [17]Abe, F., Donnelly, D. X., Moretti, C., Polons, J. (1985). Isoflavanoid constituents from *Dalbergia monetaria*. *Phytochemistry*. Vol. 24( 5),1071-1076.
- [18]Deepa, B., Remadevi, O. K. (2011). Larvicidal activity of the flowers of *Delonix regia* (Bojer Ex Hook.) Rafin. (Fabales: Fabaceae) against the teak defoliator, *Hyblaea puera* Cramer. *Current Biotica*. Vol.5(2), 237-240.
- [19]Krishnappa, K., Dhanasekaran, S., Elumalai, K. (2012). Larvicidal, ovicidal and pupicidal activities of *Gliricidia sepium* (Jacq.) (Leguminosae) against the malarial vector, *Anopheles stephensi* Liston (Culicidae: Diptera). *Asian Pacific Journal of Tropical Medicine*. 598-604.
- [20]Wankhade, M.S., Mulani, R. M. (2016). Larvicidal Activity and Phytochemical Investigation of *Albizia julibrissin* Durazz. Methanolic Leaf and Bark Extract against *Aedes aegypti* Linn. Larvae. *International Journal of Pharmacy and Pharmaceutical Research*. Vol. 6 (3): 172-179.

