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Comparative *In vitro* Larvicidal Activity on Various Extracts of *Dalbergia oliveri* and *Lagerstroemia speciosa* Leaves

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Abstract | **Original Research Article**

The present investigation compares the in vitro phytochemical composition and biological activities of extracts from Dalbergia oliveri and Lagerstroemia speciosa. Qualitative phytochemical screening confirmed the presence of various secondary metabolites, including alkaloids, flavonoids, tannins, saponins, and terpenoids in both extracts. Larvicidal assays conducted on Aedes aegypti larvae showed a concentration-dependent increase in mortality for both plant extracts, with D. oliveri being notably more effective. Collectively, the results demonstrate that both plant species exhibit substantial phytochemical and bioactive potential, supporting their relevance in the development of natural environmentally sustainable mosquito control agents.

Keywords: *In-vitro* Larvicidal, Lagerstroemia speciosa, Dalbergia oliveri, Comparative studies.

1. INTRODUCTION

Herbal medicine

Human beings have depended on nature for their simple requirements as the source for medicines, shelters, foodstuffs, fragrances, clothing, flavors, fertilizers, and means of transportation throughout the ages. For the large proportions of the world's population, medicinal plants continue to show a dominant role in the healthcare system. This is mainly true in developing countries, where herbal medicine has a continuous history of long use. The development and recognition of medicinal and financial aids of these plants are on the rise in both industrialized and developing nations. The foundations of typical traditional systems of medicine for thousands of years that have been in existence have formed from plants. The plants remain to offer mankind new medicines [1,26,24].

Lagerstroemia Speciosa

Banaba (*Lagerstroemia speciosa*) under the family Lythraceae. It is a type of crepe myrtle that grows in India, the Philippines, and Southeast Asia. [2,21,25] The leaves are used as medicine; Banaba might reduce blood sugar and help the body use insulin more efficiently. Plants that contain chemical constituents are ellagic acid and its derivatives, triterpenes, tannins, triterpenoids, Corosolic acid, quercetin, iso quercetin, flavones and glycosides. The different parts of the plant that used for anti-viral, xanthine oxidase inhibition, cytotoxic activity [3], anti-obesity, anti- tussive, anti-oxidant, anti-inflammatory and anti-microbial activity.

Dalbergia Oliveri

Dalbergia Oliveri under the family as Fabaceae. *Dalbergia oliveri* is a deciduous tree that grows about 30 m in height and with an open, spreading crown. It is commonly found in Southeast Asia, specifically in Myanmar, Thailand, Laos, Cambodia, and Vietnam. It is highly valued for its red lumber used in making furniture, cabinets, and handicrafts among others. It is considered as an endangered species due to overharvesting [3,4,28]. Plant that contain the chemical constituent are Flavonoids (orientin, vitexin, hispidulin, scrophulein, chrysin, 5-hydroxy-6,7-dimethoxy-2 phenyl-4H-chromen-4-one, diosmetin), Eight isoflavones (daidzin, ononin, daidzein, glycitin, genistein, glycidein, formononetin, biochanin A), One flavonol (isorhamnetin), 3 flavanones (liquiritigenin, 2-(3,4-dihydroxyphenyl)-7-hydroxy-3,4-dihydro-2H-1-benzopyran-4-one, naringenin) [5,22].The different parts of the plant that used for cardiovascular health, anti-diabetic activity, wound healing, cough and respiratory relief, treat fever, anti-fungal, antibacterial, anti-oxidant and anti-inflammatory activity [5,23].

2. MATERIALS AND METHODS

Plant collection and authentication

The leaves of *Lagerstroemia speciosa* and *Dalbergia oliveri* plants were collected which was originated from Western Ghats near Mettur Dam and Yercaud, in October 2023. The leaves of both plants were collected by the pick-and-pluck method from the plant. The leaves of both plants were identified, documented and authenticated by Professor Dr. P. Radha Research officer a botanist, at siddha medicinal plants garden (central council for research in siddha, Ministry of Ayush, Government of India) located in Mettur Dam, Dist. Erode, Tamil Nadu, India. The authentication of both plants was documented with reference number L071224227S and D081432428O.

Preparation of plant extracts by Soxhlet apparatus:

A coarse powder consisting of 200 grams of dried leaves from *Lagerstroemia Speciosa* and *Dalbergia oliveri* were packed into a Soxhlet apparatus for extraction. [6,7] The organic solvents were selected based on polarity (from low to high) for the extraction of both plant leaves coarse powder. The solvents used for extraction process were included i.e. petroleum ether, ethyl acetate, alcohol. Extraction was carried out for minimum 72 hours at temperature between 60 to 80 degrees Celsius.

Preliminary Phyto chemical investigation:

To determine the primary and secondary phytochemical component characteristics of the of all plants extract, various qualitative chemical analysis was carried out. [8-10] The methodologies were followed in the qualitative phytochemical screening evaluation described by Dr. C.K. Kokate. To find out what different plant-based constituents present in these extracts.

Larvicidal activity

Bioassay for larvicidal activity:

The assay was carried out according to guidelines of WHO (1996), larvae are added to 249 ml of water and 1.0 ml of prepared plant extracts by maintaining five replicates. The control will be maintained without extract and the replicates are left for exposure for 24 h and 48 h. [14,15] Then the number of viable larvae will be reported for assessment of mortality rate from the mean of triplicates. The numbers of dead larvae counted i.e., larvae which are unable to move, shrink to the bottom of the beaker. Percentage mortality = (No of dead larvae /No of larvae introduced) x100 Study involves 20 larvae for each sample. The stock solution (1000 ppm) was prepared by combination of 100 ml of distilled water, 0.4 ml of acetone, 100 mg of extract and 0.02 ml of Tween 20 (for complete dissolution of extract). By diluting further, solutions of concentration 10, 25, 50, 75,100ppm was obtained. Negative control was maintained for all the samples containing only solvent without extract. Experimental design: Five beakers of 500 ml capacity are taken. They were labeled as I, II, III, IV, and V. Beaker-I - Standard drug. Beaker -II - Control. Beaker -III - Ethanolic extract Beaker -IV - Ethyl acetate [16].

3. RESULTS

Phytochemical investigations:

The phytochemical analysis is very much important to evaluate the possible medicinal utilities of a plant and also to determine the active principles responsible for the known biological activities exhibited by the plants. Hence, two or more different tests should be performed for more accurate results represented in the Table 1.

Table 1: Phytochemical investigation of both plant extracts

Plant Name	***Lagerstroemia Speciosa***			***Dalbergia Oliveri***		
Extract	**Pet.ether**	**Ethyl acetate**	**Ethanol**	**Pet.ether**	**Ethyl acetate**	**Ethanol**
Alkaloid	-	+	+	-	+	+
Flavonoid	-	+	+	-	+	+
Phenolic	-	+	+	-	+	+
Carbohydrates	+	+	+	+	+	+
Glycoside	-	+	+	-	+	+
Protein and amino acids	-	+	+	-	+	+
Tannin	+	+	+	+	+	+
Terpenoid	+	+	+	+	+	+
Steroid	+	+	+	+	+	+
Saponin	+	+	+	+	+	+

Larvicidal activity:

The present investigations revealed that the different solvent extract of leaves extract of *Lagerstroemia Speciosa* and *Dalbergia Oliveri* possess remarkable larvicidal activity against *Culex quinquefasciatus*, *Aedes aegypti* larvae. The percentage mortality of the larvae is represented in Table 2 & 3.

Table 2: Comparative investigation of *Lagerstroemia Speciosa* and *Dalbergia Oliveri* against the Percentage mortality in the 3rd and 4th instar of *Culex quinquefasciatus*

Plant name	Concentration in (µg/ml)	*Lagerstroemia Speciosa*										*Dalbergia Oliveri*									
Duration		**Percentage mortality of 3rd instar *Culex quinquefasciatus* larvae dead**					**Percentage mortality of 4th instar *Culex quinquefasciatus* larvae dead**					**Percentage mortality of 3rd instar *Culex quinquefasciatus* larvae dead**					**Percentage mortality of 4th instar *Culex quinquefasciatus* larvae dead**				
		5	**25**	**50**	**75**	**100**	**5**	**25**	**50**	**75**	**100**	**5**	**25**	**50**	**75**	**100**	**5**	**25**	**50**	**75**	**100**
In 24 hours	**Control**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Standard	60	70	75	80	95	55	60	70	80	90	55	65	70	80	90	50	55	65	75	90
	Pet.ether	0	10	20	30	45	0	5	10	25	40	0	5	10	20	30	0	5	10	20	45
	Ethyl acetate	5	15	20	40	50	0	10	15	30	45	5	10	20	30	40	0	5	10	25	35
	Ethanol	10	25	35	55	70	5	15	25	35	55	10	20	30	50	65	5	10	15	25	45
In 48 hours	**Control**	0	0	0	0	0	0	0	0	0	0	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
	Standard	65	75	80	90	100	60	65	80	85	95	55	65	75	85	90	60	60	75	80	95
	Pet.ether	5	15	30	40	50	0	10	20	35	45	5	10	20	30	40	0	5	15	25	45
	Ethyl acetate	10	25	35	45	55	5	15	25	40	50	5	15	25	35	45	0	10	20	30	45
	Ethanol	30	40	55	75	90	10	25	40	45	65	20	35	45	65	75	5	20	30	40	55

Table 3: Comparative investigation of *Lagerstroemia Speciosa* and *Dalbergia Oliveri* against the Percentage mortality in the 3rd and 4th instar of *Aedes aegypti*

Plant name	Concentration in (µg/ml)	*Lagerstroemia Speciosa*										*Dalbergia Oliveri*									
Duration		**Percentage mortality of 3rd instar *Aedes aegypti* larvae dead**					**Percentage mortality of 4th instar *Aedes aegypti* larvae dead**					**Percentage mortality of 3rd instar *Aedes aegypti* larvae dead**					**Percentage mortality of 4th instar *Aedes aegypti* larvae dead**				
		10	**25**	**50**	**75**	**100**	**10**	**25**	**50**	**75**	**100**	**10**	**25**	**50**	**75**	**100**	**10**	**25**	**50**	**75**	**100**
In 24 hours	**Control**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Standard	55	65	80	85	95	55	60	70	80	90	50	60	75	85	90	40	50	60	80	90
	Pet.ether	0	10	15	40	45	0	10	15	35	50	0	5	10	30	40	0	5	10	25	45
	Ethyl acetate	5	15	20	50	55	5	15	20	45	50	5	10	15	40	50	5	10	15	40	50
	Ethanol	10	25	35	65	80	10	20	30	60	75	10	20	30	55	80	10	15	25	55	70
In 48 hours	**Control**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Standard	65	75	85	90	100	60	65	80	85	95	60	70	80	85	95	50	55	60	85	95
	Pet.ether	5	15	30	35	50	0	15	25	45	55	5	10	25	30	40	0	10	20	40	50
	Ethyl acetate	10	25	35	65	70	10	30	35	65	70	5	20	30	55	60	10	25	30	55	65
	Ethanol	15	40	45	75	95	15	35	40	75	80	10	35	40	65	85	15	30	35	65	75

Comparative studies Larvicidal Activity:

The comparative results of treatments for larvicidal activity are presented in Figure 1 to 8. The effects of various extracts were studied in a dose dependent manner. The ethanolic extract of *Lagerstroemia Speciosa* and *Dalbergia Oliveri* was found to have higher rate of percentage mortality, the concentration of extracts has to be increased for better larvicidal activity. *Dalbergia Oliveri* demonstrated maximum activity of 75% and 55% of mortality in ethanolic extract against third and fourth instar of *Culex quinquefasciatus* in 48 hrs respectively. Ethyl acetate extract showed maximum activity of 45% of mortality against third and fourth instar of *Culex quinquefasciatus* in 48 hrs respectively**.** Against *Aedes aegypti Dalbergia Oliveri* demonstrated maximum activity of 85% and 75% of mortality in ethanolic extract against third and fourth instar in 48 hrs respectively. Ethyl acetate extract showed maximum activity of 60% and 65% of mortality against third and fourth instar of *Aedes aegypti* in 48hrs respectively. Over all plant extracts of *Lagerstroemia speciosa* demonstrated potent larvicidal activity comparatively with *Dalbergia Oliveria*.

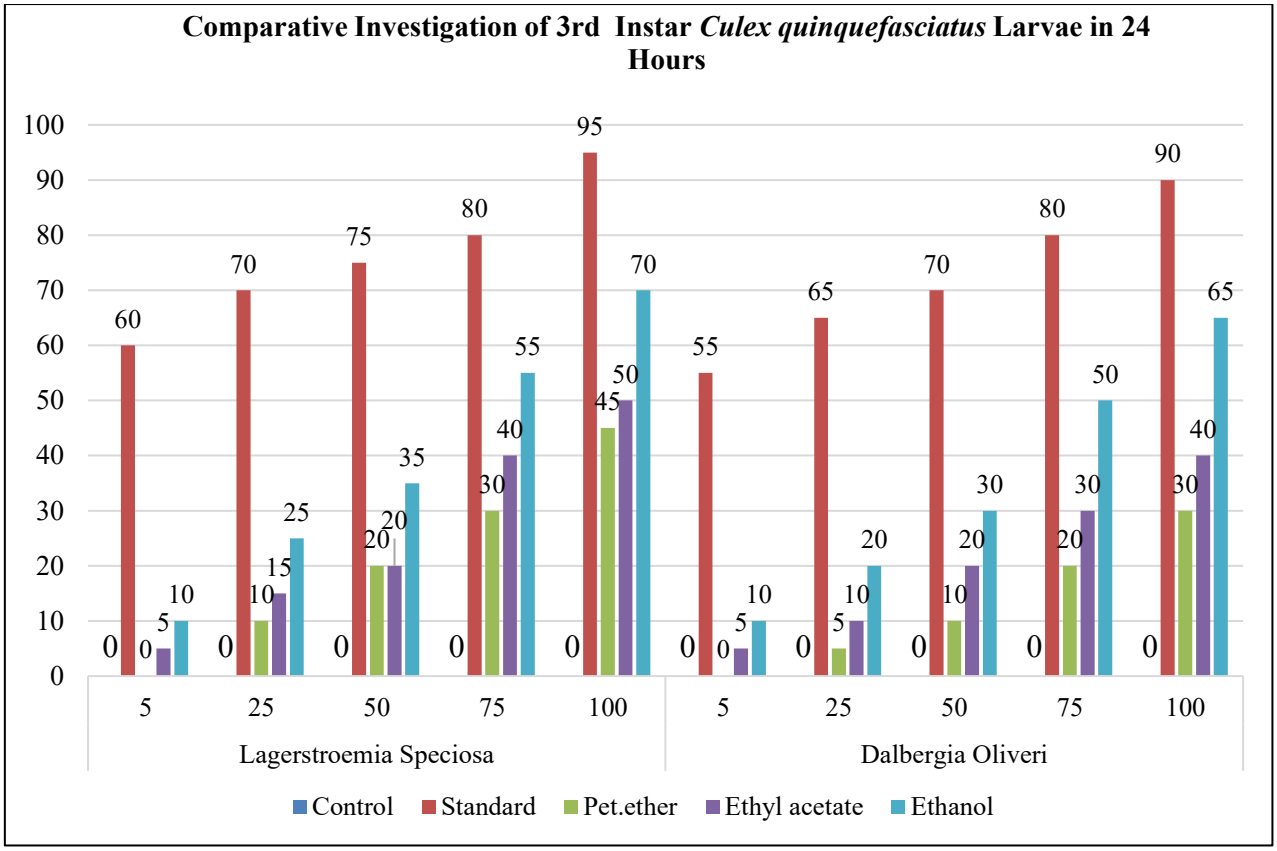

Figure 1: Comparative investigation of 3rd instar *Culex quinquefasciatus* larvae in 24 hours

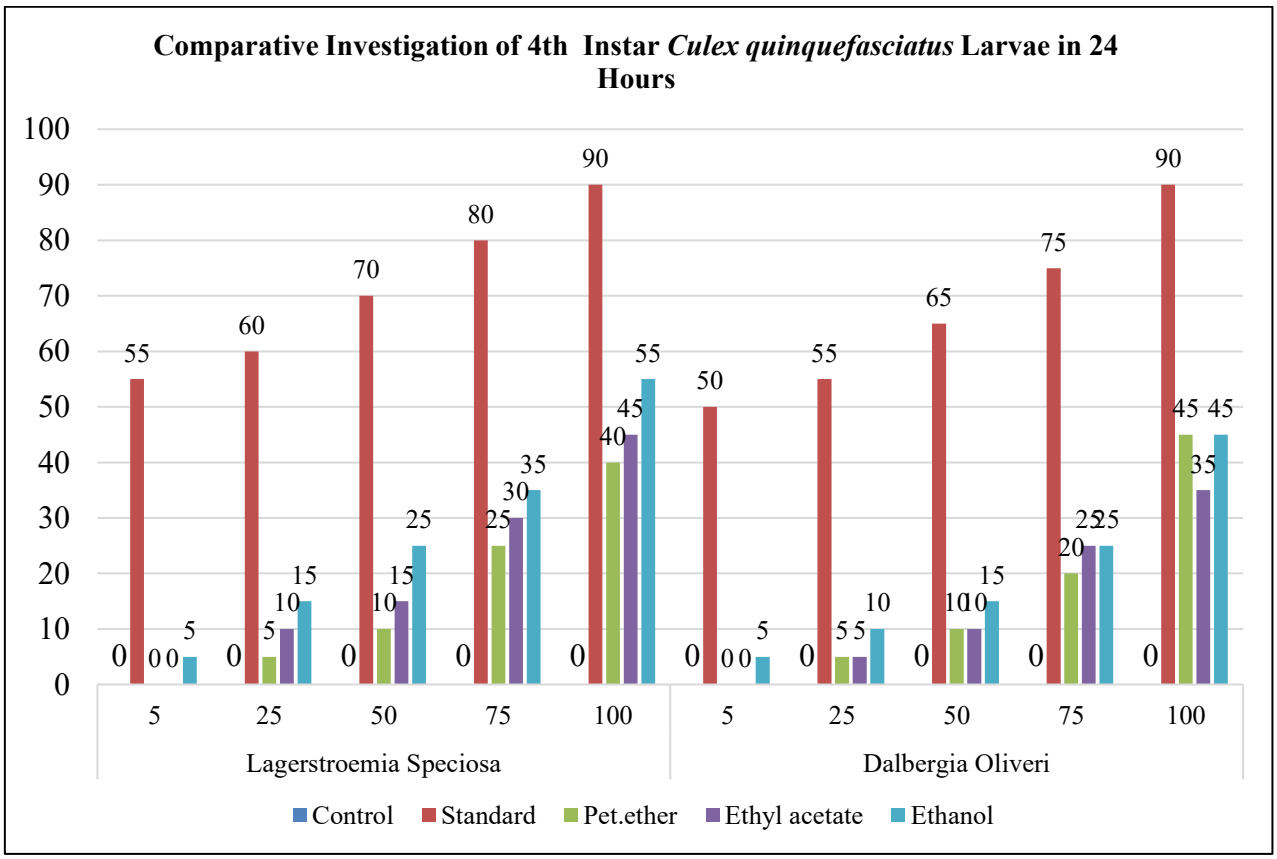

Figure 2: Comparative investigation of 4th instar *Culex quinquefasciatus* larvae in 24 hours

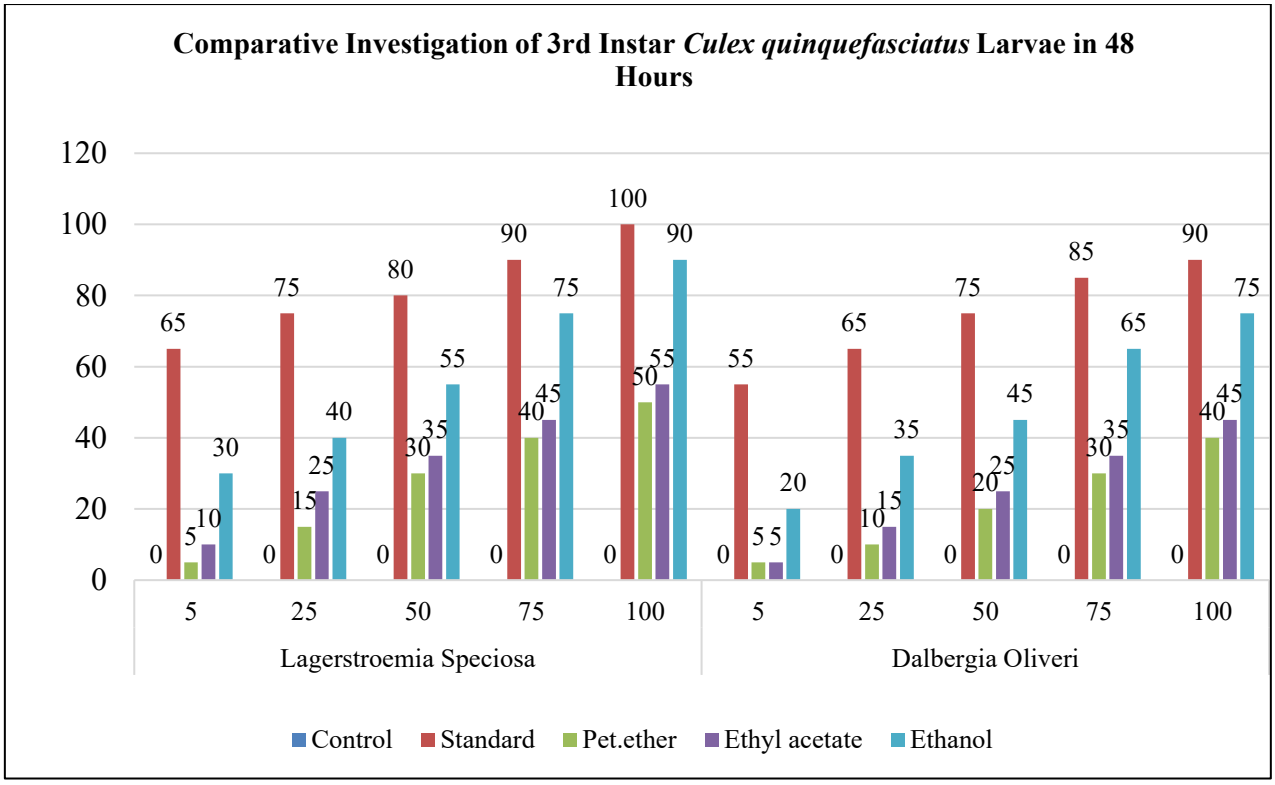

Figure 3: Comparative investigation of 3rd instar *Culex quinquefasciatus* larvae in 48 hours

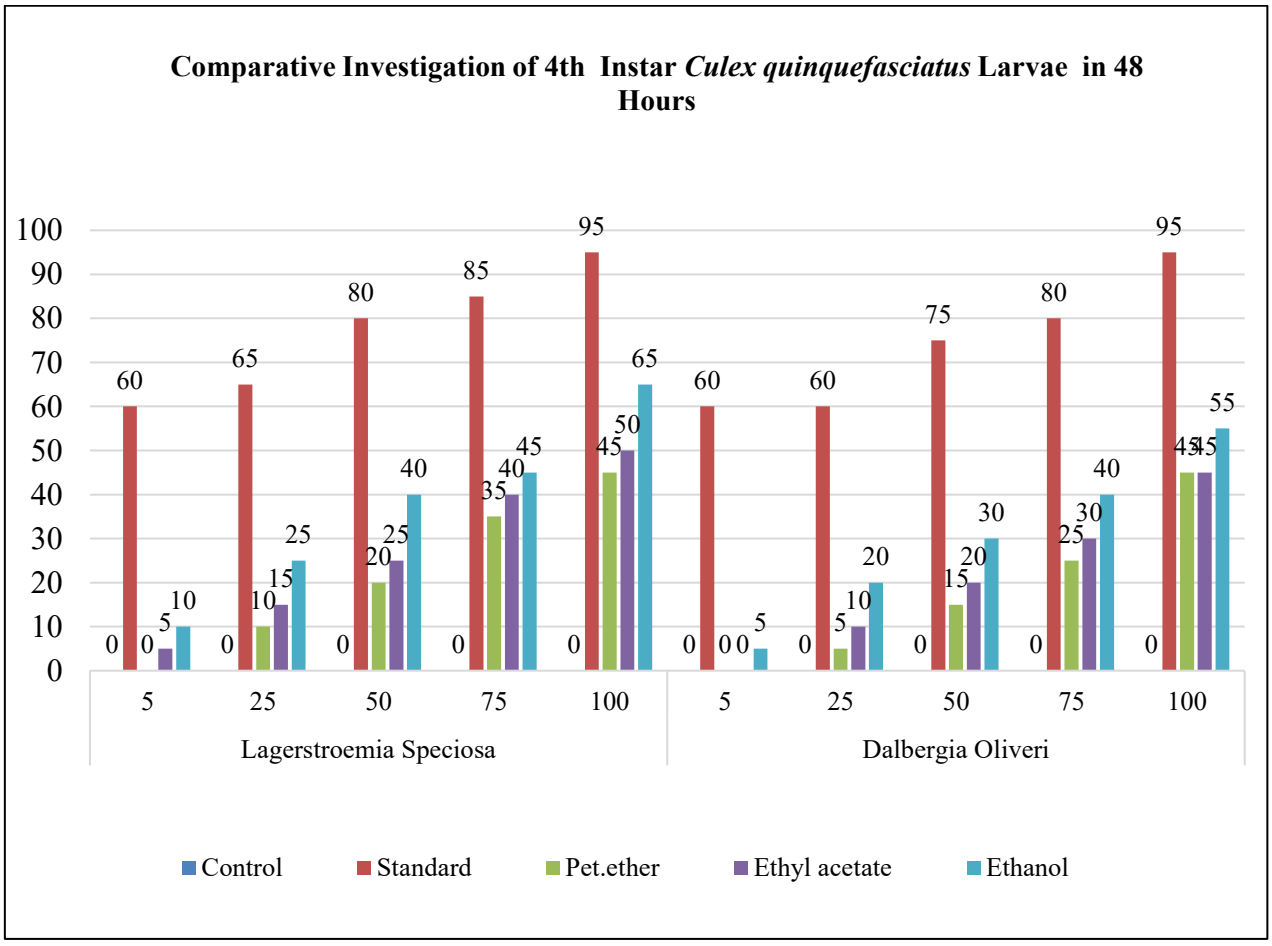

Figure 4: Comparative investigation of 4th instar *Culex quinquefasciatus* larvae in 48 hours

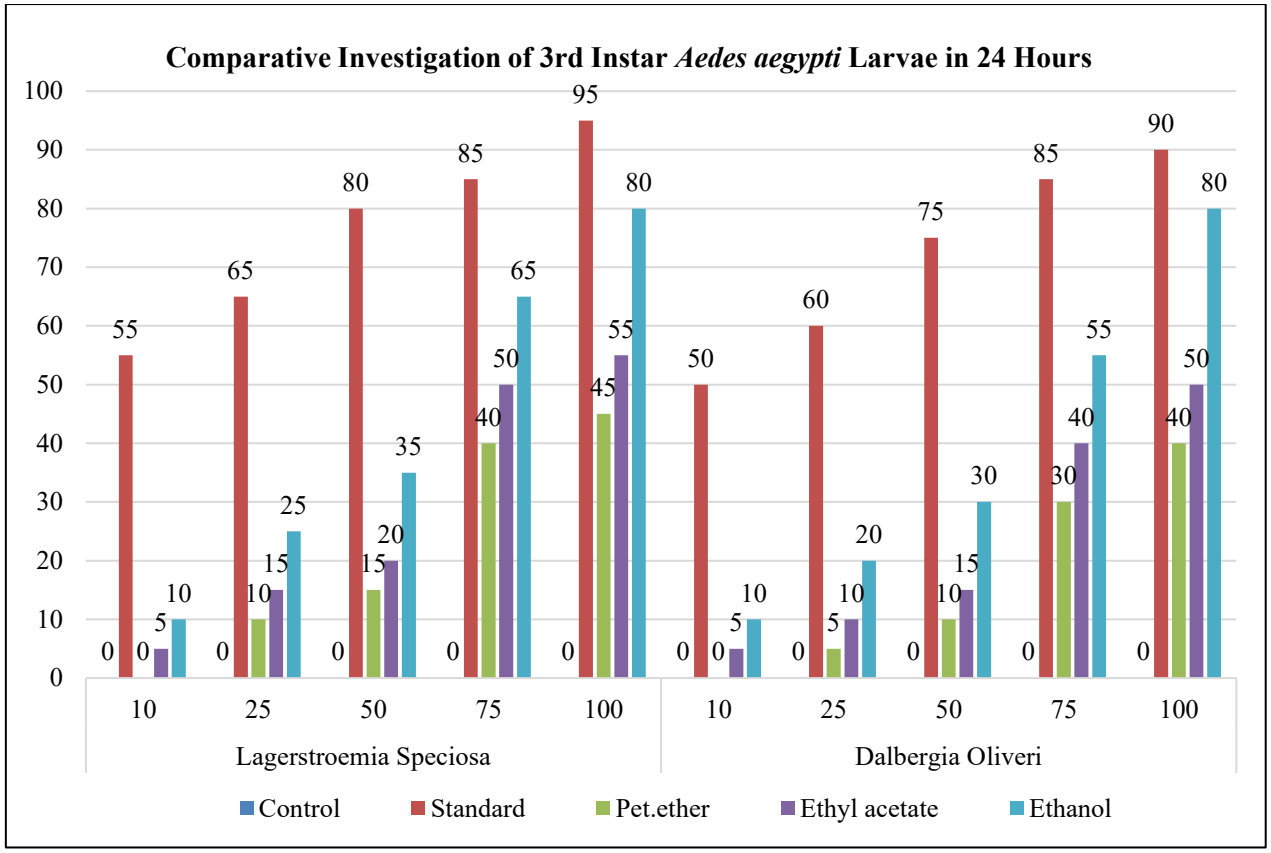

Figure 5: Comparative investigation of 3rd instar *Aedes aegypti* larvae in 24 hours

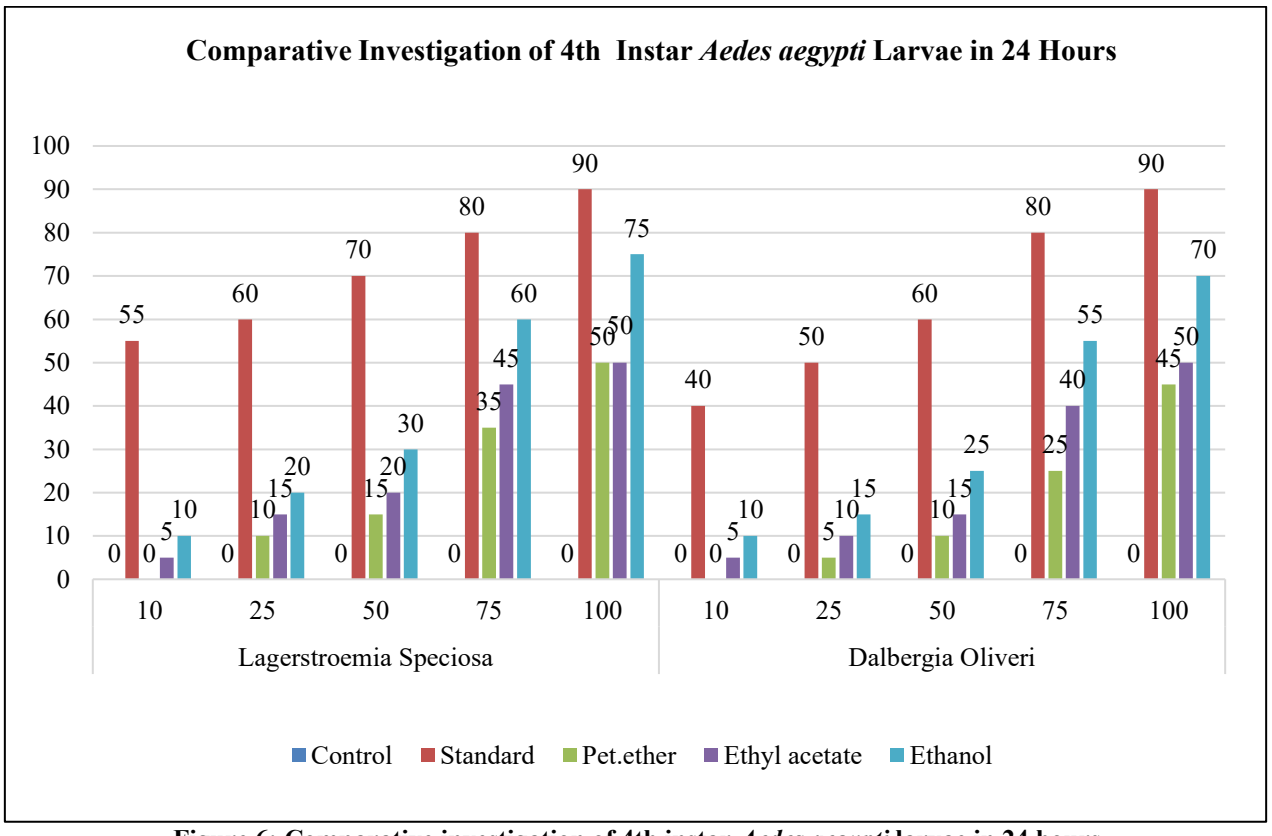

Figure 6: Comparative investigation of 4th instar *Aedes aegypti* larvae in 24 hours

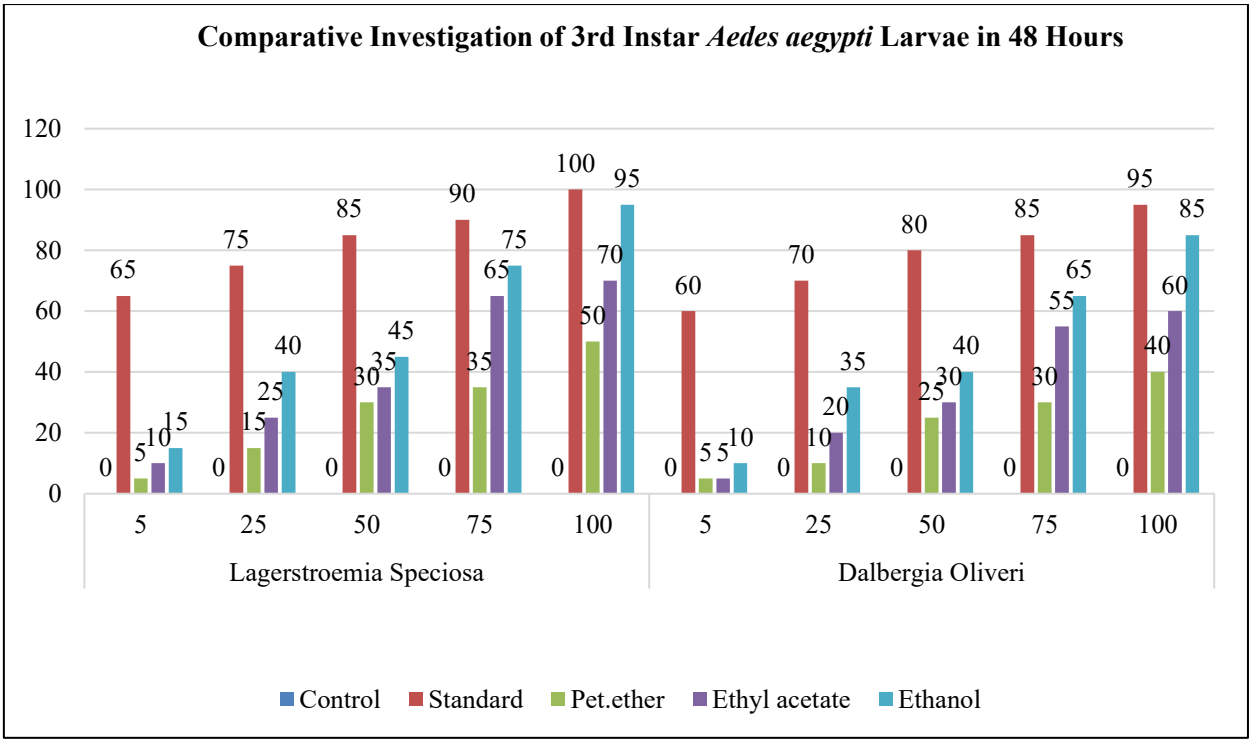

Figure 7: Comparative investigation of 3rd instar *Aedes aegypti* larvae in 48 hours

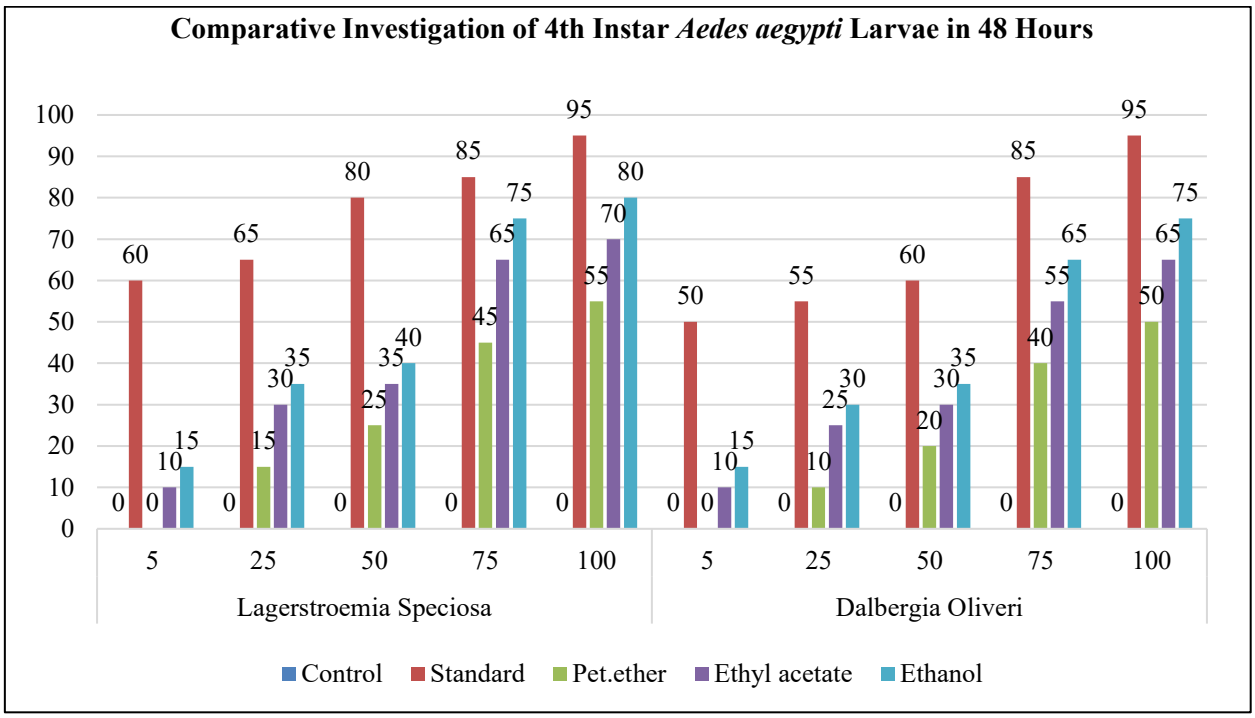

Figure 8: Comparative investigation of 4th instar *Aedes aegypti* larvae in 48 hours

4. DISCUSSION

This study presents a comparative phytochemical analysis and evaluation of the in vitro antibacterial, antifungal, and larvicidal activities of extracts from two medicinal plants: *Dalbergia oliveri* and *Lagerstroemia speciosa*. Qualitative phytochemical screening revealed the presence of bioactive compounds such as alkaloids, flavonoids, tannins, saponins, terpenoids, and phenols in varying concentrations across different solvent extracts. Larvicidal activity was evaluated against *Aedes aegypti* larvae. The results demonstrated that both plant extracts possess dose-dependent larvicidal effects, with *Lagerstroemia speciosa* exhibiting higher mortality rates at lower concentrations compared to *Dalbergia oliveri*. Overall, the findings suggest that both *Dalbergia* oliveri and *Lagerstroemia speciosa* are rich in bioactive compounds with promising larvicidal properties, highlighting their

potential use in natural drug development and vector control strategies.

5. CONCLUSION

The comparative analysis of *Dalbergia oliveri* and *Lagerstroemia speciosa* extracts confirms the presence of various phytochemicals, including flavonoids, alkaloids, tannins, and saponins, which are likely responsible for the observed biological activities. In terms of larvicidal activity, *Lagerstroemia speciosa* demonstrated greater potency against *Aedes aegypti* larvae. These findings suggest that both plants possess significant pharmacological potential and could serve as sources of natural bioactive compounds for the development of vector control agents. Further studies, including isolation of individual compounds and *in vivo* evaluations, are recommended to better understand their mechanisms of action and therapeutic applications.

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REFERENCES

1. WHO, (1998). Regulatory situation of herbal medicines. A worldwide review. Pp 1-5. Geneva, Switzerland.
2. Fakim, A.G. (2006) Medicinal plants: Traditions of yesterday and drugs of tomorrow. Molecular aspects of medicine 27: 1-93.
3. Harrison, P. (1998). Herbal medicine takes roots in Germany. Canadian Medical Association Journal10: 637-639.
4. Jones, W.B. (1998) Alternative medicine-learning from the past examining the present advancing to the future. Journal of American Medical Association 280: 1616-1618.
5. Hamburger, M. and Hostettmann, K. (1991). Bioactivity in plants: the link between phytochemistry and medicine. Phytochemistry 30: 3864- 3874.
6. Singh, P. and Singh, C. L. (1981). Chemical investigations of Clerodendraon fragrans. Journal of Indian Chemical Society 58: 626-627.
7. Rastogi, P. R. and Meharotra, B. N. (1990). In Compendium of Indian Medicinal Plants. Vol. I, 339; a) (1993) III: 194. PID, CSIR, New Delhi, India.
8. Philipson, M. N. (1990). A symptomless endophyte of ryegrass (Lolium perenne) that spores on its host a light microscope study. New Zealand Journal of Botany 27: 513–519.
9. Galbley, S. and Thiericke, R. (1999). Drug Discovery from Nature, Series: Springer Desktop Editions in Chemistry, Springer, Berlin.
10. Cragg, G.M., Newman, D. J. and Snader, K. M. (1997). Natural products in drug discovery and development. Journal of Natural Products 60: 52-60.
11. Abdallah E.M. Plants: An alternative source for antimicrobials. J. Appl. Pharm. Sci. 2011; 1:16–20. [Google Scholar]
12. Thomson W.A.R., Schultes R.E. Medicines from the Earth. McGraw-Hill; New York, NY, USA:1978. [Google Scholar]
13. Goodman L.S., Gilman A. The Pharmacological Basis of Therapeutics: A Textbook of Pharmacology, Toxicology and Therapeutics for Physicians and Medical Students. Macmillan; New York, NY, USA: 1943. [Google Scholar]
14. Ventola C.L. The antibiotic resistance crisis: Part 1: Causes and threats. Pharm. Ther. 2015; 40:277. [PMC free article] [PubMed] [Google Scholar]
15. Schcolnik-Cabrera A. Current Approaches to Overcome Antimicrobial Resistance. Curr. Med. Chem. 2023; 30:3–4. doi: 10.2174/0929867330012211041215552. [DOI] [PubMed] [Google Scholar]
16. Khwaif J., Hayyawi A., Yousif T. Cholera outbreak in Baghdad in 2007: An epidemiological study. EMHJ-East. Mediterr. Health J. 2010; 16:584–589. doi: 10.26719/2010.16.6.584. [DOI][PubMed] [Google Scholar]
17. Murray C.J., Ikuta K.S., Sharara F., Swetschinski L., Aguilar G.R., Gray A., Han C., Bisignano C. Rao P., Wool E. Global burden of bacterial antimicrobial resistance in 2019: A systematic analysis. Lancet. 2022; 399:629–655. doi: 10.1016/S0140-6736(21)02724 0. [DOI] [PMC free article] [PubMed] [Google Scholar]
18. WHO Global Priority List of Antibiotic-Resistant Bacteria to Guide Research, Discovery, and Development of New Antibiotics. 27 February 2017. [(accessed on 20 February 2022)];2020 Available online: http://www.who.int/medicines/publications/WHO-PPL Short_Summary_25Feb-ET_NM_WHO.pdf.
19. Rosenblatt-Farrell N. The Landscape of Antibiotic Resistance. National Institute of Environmental Health Sciences; Durham, NC, USA: 2009. [DOI] [PMC free article] [PubMed][Google Scholar]
20. Dantas G., Sommer M.O. How to fight back against antibiotic resistance. Am. Sci.2014; 102:42–51. doi: 10.1511/2014.106.42. [DOI] [Google Scholar] (at the golden era)
21. Santos Filho, D.; Sarti, S.J.; Bastos, J.K.; Leitão Filho, H.F.; Machado, J.O.; Araujo, M.L.C.; Lopes, W.D.; Abreu, J.E. Atividade antibacteriana de extratos vegetais. Rev. Cien. Farm. 12, 39-46, 1990.

22. Saxena, G.; McCutcheon, A.R.; Farmer, S.; Towers, G.H.N.; Hancock, R.E.W. Antimicrobial constituents of Rhus glabra J. Ethno pharmacol 42, 95-99, 1994.
23. R.V. Fleming et al. Emerging and less common fungal pathogens Infectious Disease Clinics of North America (2002)
24. Pramono, E. 2002. The Commercial Use of Traditional Knowledge and Medicinal Plants in Indonesia. Scientific Paper on Multi-Stakeholder Dialoque on Trade, Intellectual Property and Biological Resources in Asia, BRAC Centre for Development Management, Rajendrapur, Bangladesh, April 19-21. 13 pp.
25. Ficker, C.E., J.T. Arnason, V.S. Vindas, L.P. Alvarez, K. Akpagana, M. Gbéasor, C.D. Souza, M.L. Smith. 2003. Inhibition of Human Pathogenic Fungi by Ethnobotanically Selected Plants Extracts. Mycoses, 46: 29-37.
26. Kumar A, Valecha N, Jain T, Aditya P. Dash burden of malaria in India: retrospective and prospective view. Am J Trop Med Hyg. 2007;77 :69–78. [PubMed] [Google Scholar]
27. Senthilkumar N, Varma P, Gurusubramanian G. Larvicidal and adulticidal activities of some medicinal plants against the malarial vector, Anopheles stephensi Liston. Parasitol Res. 2009; 1042:237–44. doi: 10.1007/s00436-008-1180-4. [DOI] [PubMed] [Google Scholar]
28. Jaswanth A, Ramanathan P, Ruckmani K. Evaluation of mosquitocidal activity of Annona squamosa leaves against filarial vector mosquito, Culex quinquefasciatus Say. Indian J Exp Biol. 2002; 403:363–5. [PubMed] [Google Scholar]
29. An account of Dalbergia (Leguminosae-Papilionoideae) in Thailand Publication Thai For. Bull. (Bot.) 30 124-166 2002 Author Chawalit Niyomdham Year2002ISBN
30. Hargreaves, Dorothy; Hargreaves, Bob (1970). Tropical Trees of the Pacific. Kailua, Hawaii: Hargreaves. p.16.