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PHYTOCHEMICAL SCREENING OF LEAF EXTRACT OF ANTHOCEPHALUS CADAMBA AND ITS LARVICIDAL, PUPICIDAL, IGR ACTIVITY ON CULEXQUINQUEFASCIATUS (DIPTHERA)

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ABSTRACT

Methonalic leaf extract of Anthocephalus cadamba was evaluated for phytoconstitutes present in them by UV/Vis absorbtion spectra, FT-IR Analysis. These studies indicated the possible information for correct identification and standardization of the plant materials.

The larvicidal activity of methonalic leaf extract of Anthocephalus cadamba were obtained by solvent extraction and then bioassayed following protocols showed LC50 values from 5 to 80ppm after exposure. The mortality was high as 100% in the 1st instars larva .Minimum mortality was 31% in IV Instar. The LC50 values and LC90 values were represented as follows. Lc50 values and lc90 values for 1st instar was 0.612, 10.125, II instar was 1.291, 15.064 III rd instar was 3.526, 19.979 and IV instar was 5.631, 24.958 respectively.

The LC50 and LC90 value of pupal stage after the treatment of plant extract Anthocephalus cadamba was 10.521 and LC90 value was 35.227 respectively.

IGR activity on filarial vector culex quinquefasciatus after the treatment of plant extract Anthocephaluscadamba is given. The concentrations used for the treatment were 5, 10, 20, 40, 80ppm.Percentage inhibitions were 39, 54, 62, 69, and 75 respectively. EI50 and EI90 were 6.781 and 125.575. The results suggest that the investigated plant extracts are promising larvicides against filarial vector culex quinquefasciatus. This leads in the search for new and biodegradable plant derived larvicidal products.

INTRODUCTION

Phytochemical are bioactive chemicals of plant origin. They are naturally synthesized in all parts of the plant body; bark, leaves, stem, root, flower, fruits, seeds, etc. i.e. any part of the plant body may contain active components (Tiwari *et al*, 2011). Phytochemical have been recognized as the basis for traditional herbal medicine practiced in the past and currently en vogue in parts of the world (Lalitha *et al*, 2012). In the search for phytochemical that may be of benefit to the pharmaceutical industry, researchers sometimes follow leads provided by local healers in a region (Das *et al*, 2010). Following such leads, plant parts are usually screened for phytochemicals that may be present. Then it can be used as the basis for a new pharmaceutical product. Mosquito larvicides from plant origin have been reported to overcome the environmental hazards associated with using synthetic chemicals in mosquito control programme (Kalyanasundram and Babu, 1982). The effects of orange peel ethanol extract of Citrus sinensis had showed larvicidal, pupicidal, repellent and adulticidal activity against Anopheles stephensi, Aedes aegypti and Culex quinquefasciatus (Murugan *et al*, 2012). Extracts from the medicinal plants are used to control mosquito vectors (Kovendan and Murugan, 2011). Limonoids such as azadiractin and gedunin, present in species from the meliaceae and rutaceae are recognized for their toxic effects on insects and are used in several insecticide formulations (Dua *et al*, 1995). Aliphatic Amide from Seeds of *Carica papaya* are used as Mosquito Larvicide, Pupicide, Adulticide, Repellent and Smoke Toxicant (Anjali Rawani *et al*, 2012). Anthocephalus cadamba (Rubiaceae) is widely distributed throughout India and is used as a folk medicine in the treatment of fever, anemia, uterine complaints, blood diseases, skin diseases, leprosy, dysentery, and for improvement of semen quality and also cure diabetes mellitus, diarrheao, inflammation, haemoptysis, cough, vomiting, wounds, ulcers, debility and antimicrobial

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activity. The leaves are recommended as a gargle in cases of stomatitis (Slkar *et. al*, 1996). Some scientific studies have been carried out to reveal its antimalarial (Sianne and Fanie, 2002) and antihepatotoxic activities (Kapil, *et. al*., 1995).

The main objective of the present research work was to check the presence or absence of the phytochemical constituents in the methonalic leaf extracts of Anthocephalus cadamba and their activity against the larvae of mosquito Culex quinquefasciatus the vector of bancroftian filariasis in India.

MATERIALS AND METHODS

Collection of plant and Preparation of plant extracts

The plant materials of Anthocephalus cadamba (Rubiaceae) were collected from in and around Palani hills, Palani, Tamilnadu, India. The plant materials of Anthocephalus cadamba leaves washed with tap water, shade dried at room temperature and powdered by an electrical blender. From each sample, 100g of the plant materials were extracted with 300ml of organic solvent methanol for 8hrs in a soxhlet apparatus (Vogel, 1978). The crude plant extracts were evaporated to dryness in rotary vacuum evaporator. Plant extracts were subjected to various qualitative chemical tests to screen for phytochemical constituents.

UV-VIS and FTIR Spectroscopic analysis

The extracts were examined under visible and UV light for proximate analysis. For UV-VIS and FTIR spectrophotometer analysis, the extracts were centrifuged at 3000 rpm for 10 min and filtered through Whatmann No. 1 filter paper by using high pressure vacuum pump. The sample is diluted to 1:10 with the same solvent. The extracts were scanned in the wavelength ranging from 200-1100 nm using Perkin Elmer Spectrophotometer and the characteristic peaks were detected. FTIR analysis was performed using Perkin Elmer Spectrophotometer system, which was used to detect the characteristic peaks and their functional groups. The peak values of the UV-VIS and FTIR were recorded. Each and every analysis was repeated twice for the spectrum confirmation.

Larval and pupal toxicity test of plant extracts Anthocephalus cadamba

Laboratory colonies of mosquito and pupae were used for the larvicidal/ pupicidal activity. Twenty-five numbers of first, second, third and fourth instar larvae and pupae will be introduce into the 500 ml glass beaker containing 249 ml of de-chlorinated water and 1ml of desired concentrations of plant extracts Anthocephalus cadamba was added separately. Larval food was given for the test larvae. At each tested concentration 2 to 5 trials will be made and each trial consisted of three to four replicates. Mixing 1ml of acetone with 249 ml of de-chlorinated water set up the control. The control mortalities will be corrected by using (Abbott's formula 1925)

$$\text{Percentage mortality} = \frac{\text{number of dead larvae/pupae}}{\text{number of larvae/pupae introduced}} \times 100$$

LC_{50}, LC_{90}, regression equation and 95% confidence Limit of Lower Confidence of Limit (LCL) and Upper Confidence Limit (UCL) were calculated from toxicity data by using probit analysis (6).

IGR Bioassay- (WHO, 2005)

IGR activity was assessed using 3rd instars. An accurate initial count of the larvae was made to avoid recording-missing (as dead) larvae as a result of cannibalistic or scavenging behaviour during long exposure period, larvae provided with a small amount of food (finely ground dog biscuits and Yeast) at a concentration of 10 mg/l at 2 day intervals. The food powder should be suspended in water and one or two drops added per cup until mortality counts were made. Mortality or survival is counted every day until the complete emergence of adults. At the end of the observation periods, the number of larvae that don't develop successfully into viable adults or larvae and pupae were dead as well as adult mosquitoes not completely separated from pupal cases were recorded and expressed as percent of inhibition emergence (EI). The experiment was terminated when all larvae or pupae in the controls had died or emerged as adults. The total mean emergence inhibitions were calculated on the basis of the number of third stage larvae exposed and EI is calculated using the formula.

$$EI\ (\%) = \frac{100-[Tx100]}{C}$$

Where T=% of emergence in treated cohorts and
C=% of emergence in the control

Statistical Analysis

The data gets from the bioassay subject to statistical analysis. The SPSS software package was computing all the data including profit analysis. (Finney, 1971)

RESULTS AND DISCUSSION

Mosquitoes are the most deadly vectors for several of these diseases causing organisms.

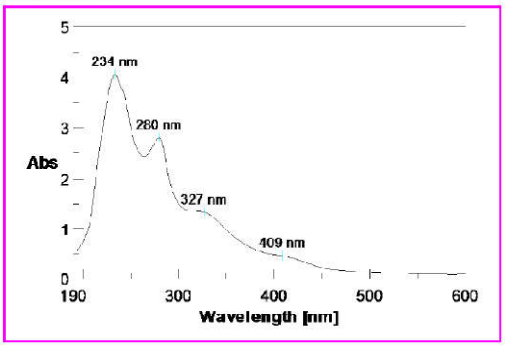
Lymphatic filariasis caused by Wuchereria bancrofti is an important public health problem in India. Both parasites produce essentially similar clinical presentations in man, related mainly to the pathology of the lymphatic system. Filariasis is endemic in 17 States and six Union Territories, with about 553 million people at risk of infection. Recently, the filarial control programme focused more on the elimination of mosquitoes in larval stage with plant extract. The advantage of targeting larvae is that they cannot escape from their breeding sites until the adult stage and also reduce overall pesticide use in control of adult mosquitoes. The tested solvent plant extracts have exerted a promising activity.

Different types of biological activities are played by the wide variety of secondary metabolites of plants. Most studies reported active compounds like Steroidal saponins, Alkaloid, Phenolic are responsible for mosquitocidal property.

In the present study the crude methanol extract of Anthocephalus cadamba is further analyzed by the UV/Vis. absorption spectra. Crude extracts shows the three absorption bands are 234 nm, 280 nm, 327 nm and 409 nm (Fig. 1). The absorption range between 200-400 nm indicates the presence of the flavonoids as a major constituent in the crude methanol

extract of Anthocephalus cadamba. In the previous studies it has been proved that the flavonoids are used as anti-inflammatory, anticancer, antiviral agents. (Umachigi *et al*, 2007) Many reported that Flavonoid extract from flower-buds of Vitex particularly was found to have higher rate of larvicidal activity against An. Stephensi and Ae. aegypti, whereas in the case of other extracts (obtained from different parts), the concentrations had to be increased for better larvicidal effect (keerthi *et al*, 2013) In previous research Bioactivity of four flavonoid compounds from Poncirus trifoliate L. was tested against the dengue fever vector (Rajkumar & jebanesan, 2008).

FIG 1: UV/Vis. absorption spectra.



The crude methanol extract of Anthocephalus cadamba is further analyzed by the FT-IR spectra to find out the functional groups. Fig. 2 shows the FT-IR spectra of crude methanol extract of Anthocephalus cadamba. Table 1 shows the observed stretching frequencies of crude methanol extract of Anthocephalus cadamba show bands are 3394.83, 2926.11, 2364.81, 1707.06, 1612.54, 1523.82, 1371.43, 1203.62, 1448.59, 1371.43, 1203.62, 1107.18, 1068.60, 819.77, 769.62, 715.61, 667.39, 611.45, 586.38, and 424.35. The bands around 3394.83, 2926.11, 2364.81, 1707.06, 1612.54 manifest major IR bands, While the minor bands at 1523.82, 1371.43, 1203.62, 1448.59, 1371.43, 1203.62, 1107.18 and 1068.60.

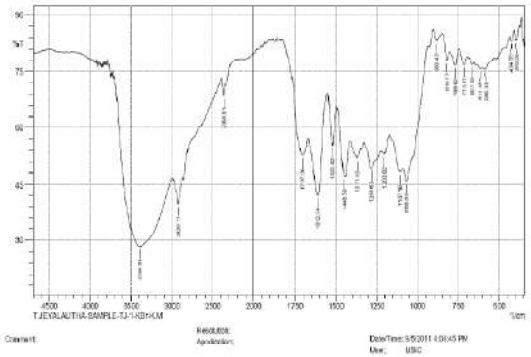
The band around 1371 cm^{-1} can be assigned to methyl groups. To a large extent, the band at 1068 cm^{-1} might be contributed by the –C=O groups of the polyphenols such as flavones, terpenoids and the polysaccharides present in the crude methanol extract of Anthocephalus cadamba. The bands around 1734 cm^{-1} can be assigned to C=O stretching vibrations of the carbonyl functional groups. The various functional groups observed in the different extracts probably indicate the presence of carbohydrates, carotenoid, Glycogen, aminoacids, amides, starch, caltropin , calotropogenin, phosphates, lipids, glycogen and cellulose. (Ragavendran *et al*, 2011, Thangarajan starlin *et al*, 2012., Kareru *et al*, Gaurav kumar and Ramasamy, 2010, Parag *et al*, 2013, Ramamurthy and Kennan 2007, Mueen Ahmed *et al*, 2005, Muruganantham *et al*, 2009), Presence of OH group has got the ability of forming hydrogen bounding capacity. So this extract has the higher potential towards inhibitory activity against microorganism. (Ashok kumar and Ramaswamy, 2013). Presence of peptide bounds also inhibits the growth of bacteria (KimA. Brogden, 2014).

Larval and pupal mortality of Culex quinquifasciatus after the treatment of methanolic extract of anthocephalus cadamba leaves was observed. In the present research Larval and pupal toxicity effect of leaves extract Anthocephalus cadamba on Culex quinquefasciatus is shown in the table 2.The percentage mortality of Culex quinquefasciatus after the treatment of leaves extract Anthocephalus cadamba on I to IV instars larvae and pupal from 5, 10, 20, 40 and 80 ppm were carried out. Higher mortality rate was 100 at 80 ppm concentration in the I instars larvae and the minimal mortality rate was 31± 0.5 at 5 ppm concentration in the IV instars larvae. At 5pm concentration mortality was 46 ± 0.7 in the I instars larva. The LC_{50} values for the I instars was 12.152, II instars was 15.148, III instars was 21.817, and IV instars was 31.292 respectively.

Table 1: List of phytochemicals shown in FT-IR spectrum of crude extract of *Anthocephalus cadamba*

S.NO.	Wave Number	Functional Groups
1	3394.83	Phenols & Alcohols
2	2926.11	Carboxylic Acid
3	2364.81	Nitriles
4	1707.06	Aldehyde
5	1612.54	Amine
6	1523.82	Nitro Groups
7	1448.59	Secondary Amine
8	1371.43	Nitro Groups
9	1284.63	Aromatic amines
10	1203.62	Aliphatic Amines
11	1107.18	Ketones
12	1068.60	Amides
13	883.43	N-H Primary Secondary Amines
14	819.77	N-H Primary Secondary Amines
15	769.62	N-H Primary Secondary Amines
16	715.61	N-H Primary Secondary Amines
17	667.39	S-O stretch – Sulfonates
18	611.45	C-Cl stretch alkyl halides C-Br stretch alkyl halides C-Cl stretch acid chlorides
19	586.38	C-Cl stretch alkyl halides C-Br stretch alkyl halides C-Cl stretch acid chlorides
20	424.35	C-Cl stretch alkyl halides
21	399.28	C-Cl stretch alkyl halides

FIG 2: FT-IR spectra



against Culex (Kannathasan *et al*, 2007). It had been reported that four species of Vitex against Cx. quinquefasciatus showed differential larvicidal efficacy. (Kannathasan *et al*, 2008). The LC_{50} value of pupal stage after the treatment of plant extract Anthocephalus cadamba, was 46.482 and LC_{90} value was 149.970 respectively. Thus toxicological study showed the Plant extract Anthocephalus cadamba had larvicidal and pupicidal activity against Culex quinquefasciatus. The percentage mortality increases as the concentration increases. Thus this work proves that green plants represent a reservoir of effective chemicals, therapeutans and can provide valuable sources of natural pesticides (Kamalakannan *et al*, 2009,)

Table 2: Larvicidal and pupicidal activity of filarial vector, Culex quinquefasciatus after the treatment of methanolic extracts of Anthocephalus cadamba

Larval and pupal stages	% of larval and pupal mortality (Mean ± SD) Concentration (ppm)					Stand ard Error	LC_{50} (LC_{90}) (ppm)	95% Confidence limit		Chi square value
								LC_{50}	LC_{50}	
	5	10	20	40	80			LCL-UCL (ppm)	LCL - UCL(ppm)	
I	46±0.7^{cd}	49±0.5^{cd}	57±1.5^{c}	72±0.7^{b}	100^{a}	.003	12.152 (56.619)	5.58-22.30	41.39-103.29	6.399
II	43±1.6^{cd}	47±0.9^{cd}	53±2.1^{c}	67±0.9^{b}	98±1.1^{a}	.003	15.148 (64.717)	9.62-19.85	55.88-78.10	4.977
III	37±1.2^{cd}	41±1.1^{cd}	48±1.3^{c}	61±1.2^{b}	92±0.5^{a}	.003	21.817 (79.516)	16.10-27.09	68.54-96.25	1.534
IV	31±0.5^{cd}	35±0.9^{cd}	43±0.7^{c}	56±2.1^{b}	81±2.1^{a}	.002	31.292 (102.130)	24.87-38.00	86.58-127.18	.076
PUPAE	26±1.2^{cd}	29±1.6^{cd}	35±1.5^{c}	47±1.1^{b}	66±0.5^{a}	.002	46.482 (149.970)	37.15-59.69	119.05-211.22	2.986

Table 3: IGR activity of filarial vector, Culex quinquefasciatus after the treatment of methanolic extracts of Anthocephalus cadamba

Treatment	% inhibition	EI_{50} (ppm)	EI_{90} (ppm)
Control	00	00	00
5	39		
10	54		
20	62	6.781	125.575
40	69		
80	75		

** Significant at 1% level

LC_{90} value of I instars was 56.619, II instars was 64.717, III instar was 79.516, and IV instars was 102.130 respectively. At 5 ppm concentration of leaves extract Anthocephalus cadamba the pupal mortality rate was 26 ± 1.2 where as it has been increased to 66± 0.5 at 80 ppm. The methanol extract of A. alnifolia leaf against C. quinquefasciatus had values of LC_{50} for I , II ,III &IV instar and pupae were 198.79, 172.48, 151.06, 140.69 and 127.98 ppm and LC(90) = 458.73, 430.66, 418.78, 408.83 and 386.26 ppm, respectively. The leaf extract of A. alnifolia also shows similar results as good larvicide. (koventhan, 2 012) In fact many researchers have reported that Larvicidal activity of partially purified extracts of leaves of V. negundo, Nerrium oleander and seeds of Syzygium jambolanum have Larvicidal activity of on different instars of Culexquinquefasciatus and An. Stephensi (Pushpalatha E, Muthukrishnan J.1995). It have been reviewed that Larvicidal activity of fatty acid methyl esters of different species of Vitex

IGR activity if filarial, Culex quinquefasciatus after the treatment of extracts of Anthocephalus cadamba is given in table 2. The IGR activity of the extract of A. monophylla tested against the larvae of Culex quinquefasciatus showed EI_{50} as 0.004 and EI_{90} as 0.047respectivel (Sivagnaname and Kalyanasundaram, 2004). In the present work the concentrations used for the treatment were 5,10,20,40 and 80 ppm. Percentage inhibitions were 39, 54, 62, 69 and 75 respectively. EI_{50} and EI_{90} were 6.781 and 125.575.Interaction of acalypa alnifolia and vitex negundo showed the growth regulatory effect against Aedes aegypti (sivakamalakannan *et al*, 2015) Growth regulatory effect is due to the presence of bioactive compounds,with many of these containing phytoecdysones, phytojuvenoids and anti-juvenile hormones, which act IGRs(Varma J, dubey NK,.1998).

CONCLUSION

Phytochemicals present in leaves of Anthocephalus cadamba indicates their potential as a sources of mosquitocides. Further more, isolation, purification and characterization of the phytochemicals present in the methonalic leaf extract of Anthocephalus cadamba will make studies interesting.

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Reference

Abbott, W.S., 1925. A method of computing the effectiveness of an insecticide. *Journal of entomology*, 18:265–267.

Anjali Rawani, Anupam Ghosh, Subrata Laskar, Goutam Chandra, 2012. Aliphatic Amide from Seeds of Carica papaya as Mosquito Larvicide, Pupicide, Adulticide, Repellent and Smoke Toxicant. *Journal of Mosquito Research*, Vol. 2, No. 2 doi: 10.5376/jmr.2012.02.0002.

Ashokkumar, R., Ramasamy, M., 2014. phytochemical screening by ftir spectroscopic analysis of leaf extracts of selected Indian Medicinal Plants. Int. J. Curr. Microbiol. App. science 3(7) 395-406.

Das,K., Tiwari, R.K.S., Shrivastava, D.K., 2010. Techniques for evaluation of medicinal plant products of medicinal plant products as antimicrobial agent: current methods and future trends.J. Med. Plant Res, 4(2), 104-111

.Dua, V.K., Nagpal B.N., Sharma V.P., 1995. Repellent action of neem cream against mosquitoes. Indian J Malariol, 32: 47-53.

Finney. D.J., 1971.Probit analysis: a statistical treatment of the sigmoid response curves, Cambridge University Press, LoI london, 3redn., 333-336

Gaurav kumar, R., and Ramasamy, M2010. Phytochemical composition and invitro Antimicrobial activity of Bauhimia racemosa Lamk (CAESALPINIACEAE). *International journal of pharmaceutical Sciences and research*. 162, 264-275.

Kalyanasundaram M., C.J. Babu, C.J., 1982. Biologically active plant extracts as mosquito larvicides. *Indian Journal of Medical Research*, 76: 102–106.

Kamalakannan.S., Murugan, K., Thiyagarajan,P., Nareshkumar, A., and D. Abirami .D., 2009. Larvicidal and Smoke Toxicity effect of Tridax procumbens against malarial vector, Anopheles stephensi (Diptera: Culicidae). Asian Jr. of Microbiol. Biotech. Env. Sc., Vol. 11, No. (2): 293-297.

Kapil, A., Koul, I., Suri, O. P., 1995. Antihepatotoxic effects of chlorogenic acid from Anthocephalus cadamba. Phytother. Res, 9(3): 189-193. 92.

Kim A. Brogden., 2014. Antimicrobial peptides:pore formers or metabolic inhibitors in bacteria? . Peak Journal of Medicinal Plant Research, Vol. 2 (4), 45-49

Kannathasan K, Senthilkumar A, Venkatesalu V, ChandrasekaranM.2008. Larvicidal activity of fatty acid methyl esters of *Vitex* species against *Culex quinquefasciatus*. *Parasitol res, 103*(4): 999–1001.

Kannathasan K, Senthilkumar A, Venkatesalu V, Chandrasekaran M.2007. Differential larvicidal efficacy of four species of *Vitex* against *Culex quinquefasciatus* larvae. *Parasitol Res 101:* 1721–23.

Kareru p.GKeriko. Gachanja, J.M., and Kenji A.N@008. Direct detection of triterpenoid saponin in medicinal plants. *African Journal of Traditional, Complementary and alternative medicines*. (1056-60)

Keerthi Gautam, Padmakumar & Sawitri Poonia.2013." larvicidal activity and GCMS analysis of flavonoids of vitex negudo and Andrographis paniculata against two vector mosquitoes Anopheles stephensi and aedes aegypti"Jvector borne diseasepp171-178.

Kovendan K, Murugan K, Vincent S. (2012) Evaluation of larvicidal activity of Acalyph alnifolia Klein ex Willd. (Euphorbiaceae) leaf extract against the malarial vector, Anopheles stephensi, dengue vector, Aedes aegypti and Bancroftian filariasis vector, Culex quinquefasciatus (Diptera: Culicidae). parasitol Res ;110(2):571-81.

Lalitha,T. P, Jayanth.P, 2012. Preliminary studies on phytochemicals and antimicrobial activity of solvent extracts of Eichhornia crassipes (Mart.) Solms Asian J. Plant Sci. Res, 2(2), 115-122.

Murugan K., Mahesh Kumar P., Kovendan K., Amerasan D., Subrmaniam J., and Hwang J.S., 2012, Larvicidal, pupicidal, repellent and adulticidal activity of Citrus sinensis orange peel extract against Anopheles stephensi, Aedes aegypti and Culex quinquefasciatus (Diptera: Culicidae), Parasitol.res.,111(4):1757-1769

Mueen Ahmed KK, Rana A.C, DixitV.K. 2005. Calotropis species (Asclediaceae). A comprehensive review. Pharmacognosy Magazine. 1(2): 48-52.

Muruganantham s, Anbalagan G and Ramamurthy N.2009. FT-IR and SEM_EDS Comparative analysis of Medicinal plants, Eclipta alba Hassk and Eclipta prostrate Linn. *Romanian journal of Biophysics*. 19(4):285-294.

Parag A, Pednekar, Bhanu raman .2013. Antimicrobial and Antioxidant potential with FTIR analysis of Ampelocissus latifolia (roxb)planch. Leaves. *Asian journal of apharmoceutical and Clinical Research*. 6(1:67-73).

Pushpalatha E, Muthukrishnan J.1995. Larvicidal activity of a few plant extracts against *Culex quinquefasciatus* and *Anopheles stephensi*. *Indian J Malariol* 1995; *32*(1): 14–23.

Ragavendran P, Sophia D, ArulRaj C, and GopalaKrishnan V.K. 2011. Functional group analysis of various extracts of Aerva Lanata(L.,)by FTIR spectrum pharmacology on line. 1, 358-364.

Rajkumar S, Jebanesn A.2008. Bioactivity of flavonoid compounds from *Poncirus trifoliate* L. (Family: Rutaceae) against the dengue vector, *Aedes aegypti* L. (Diptera: Culicidae). *Parasitol Res 104*: 19–25.

Ramamurthy N and Kennan S. 2007.Fourier transformerinfrared spectroscopic analysis of a plant(Calotropis gigantean Linn) from an industrial village, Cuddalore Dt, Tamilnadu, India. Romanian journal of Biophysics. 17(4)269-276

Slkar I.V, Kakkar K.K, Chakre O.J., .1992. Glossary of Indian Medicinal Plants with Active Principles. CSIR, New Delhi, Part I, pp 75.

Sianne, S. & Fanie, R. van H. 2002. Antimalarial activity of plant metabolite. Nat. Prod. Rep. 19: 675? 692.

Sivagnaname N, Kalyanasundaram M. 2004. Laboratory evaluation of methanolic extract of *Atlantia monophylla* (Family: Rutaceae) against immature stages of mosquitoes and non-target organisms.Vector Control Research Centre, Indian Council of Medical Research, Indira Nagar, Pondicherry, 605 006, India.

Sivakamalakannan, Kadarkarai murugan, Balamurugan chandramohan. 2015. Insect growth regulatory activity

of Acalypha alnifolia (Euphorbiaceae) and (Verbenaceae) leaf extract of vitex negundo against Aedes aegypti (Diptera:Culicidae) *International journal of mosquito Research* 2015;2(1):47-52 .

Tiwari, B. Kumar, M. Kaur, G. Kaur, H. 2011. Phytochemical screening and extraction: A Review Int. Pharm. Sciencia, 1, 98-106.

Umachigi SP, Kumar GS, Jayaveera KN, Kishore DVK, Ashok-Kumar CK, Dhanpal R .2007. Antimicrobial, wound healing and antioxidant activities of Anthocephalus cadamba. African J Tradit Complement Altern Med 4: 481-487.

Varma J, dubey NK,.1998. Prospectives of botanical and microbial products as pesticides of tomorrow. Current science online.

Vogel A.I.1978. Text book of practical organic chemistry. The English language book society and longmann.London.1368

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