Available online at www.elixirpublishers.com (Elixir International Journal)

Applied Botany

Elixir Appl. Botany 87 (2015) 35755-35757

ISSN: 2229-712X

Mosquito repellant activity of *Cucumis Melo* L

Sonwalkar R.P[1,*], Ahire Y.R[2], Deokule S.S[2] and Kadam P.S[3]

[1]JJT University, Rajashtan, India.

[2]University of Pune, Pune, M.S., India.

[3]Department of Botany, Prof. Ramkrishna More College, Akurdi, Pune, M.S. India.

ARTICLE INFO

Article history:

Received: 3 December 2012;

Received in revised form:

04 October 2015;

Accepted: 09 October 2015;

Keywords

Cucumis melo,

Petroleum ether extracts,

Culex quinquefasciatus,

larvicides.

ABSTRACT

Cucumis melo L. is monoecious climber, commonly growing weed, belonging to family cucurbitaceae. Whole plant of C. melo is medicinally important. Plant pacifies vitiated dysentery, diarrhoeic diseases, flatulene, skin diseases, antivenin and general debility. Dispending medicinally uses, our study have been found that this weeds has mosquito repellent activities. To determine repellant activities petroleum ether fruit extract of C. melo was used against the larvae of Culex quinquefasciatus. The Larval mortality was observed after 24h exposure and highest larval mortality was found in petroleum ether fruit extract of C. melo.

Introduction

Mosquitoes are the most important single group of insects in terms of public health importance, which transmit a number of diseases, such as malaria, filarasis, dengue, Japanese encephalitis, etc. causing millions of deaths every year. Aedes aegypti, a vector of dengue is widely distributed in the tropical and subtropical zones. Dengue fever incidence has increased fourfold since 1970 and nearly half the world population is now at risk. In 1990, almost 30% of the world population, 1.5 billion people, lived in regions where the estimated risk of dengue transmission was greater than 50% (Hales et al. 2002). Anopheles stephensi is the major malaria vectors in India. With an annual incidence of 300-500 million; malaria is still one of the most important communicable diseases. Currently about 40% of the world's population lives in areas where malaria is endemic (Wernsdorfer and Wernsdorfer 2003). Culex quinquefasciatus a vector of lymphatic filariasis and its widely distributed tropical diseases with around 120 million people infected worldwide and 44 million people have common chronic manifestation (Bernhard et al. 2003). Use of chemical agent however results in environmental degradation in addition to accumulation of toxicants as residual deposits in non-target species.

Mosquitoes may be nature's most effective bioterrorist because they transmit some of the world's most life threatening and debilitating parasitic and viral diseases including malaria (Anopheles) Filariasis (Culex, Manosonia and some Anopheles sp.) and dengue and chickungunya fever (principally Aedes aegypti) (Jebanesan 2007). Most people dislike mosquitoes and are aware of the diseases and discomfort that they cause. Chemical controls are typically very effective against mosquitoes. However if the same chemicals are used against many generations of mosquitoes over a large area, the mosquitoes have genes that make them less sensitive to the toxin (Lawler and Lanzaro 2005). Mosquito borne diseases have an economic impact, including loss in commercial and labor outputs, particularly in countries with tropical and subtropical climates; however, no part of the world is free from vector-borne diseases (Fradin and Day 2002).

Botanicals offer an advantage over synthetic pesticides as they are less toxic, less prone to the development of resistance and easily biodegradable. Some of the plant species may possesses substances with a wide range of activities like anti-feedant, anti-oviposition, repellent and growth regulating activity (Schmutterer1990). Beerenbaum(1989) envisaged over 20,000 species of North America plant especially belonging to Rutaceae, Solanaceae, Verbinaceae, and Cucurbitaceae as having potential insecticidal activity. Various active principle have been localized in different plant which caused deleterious effect on the development stages of mosquito. In general, the solanaceous and cucurbitaceous plants are reported to contain the secondary metabolites such as solanin, cucurbitacin, and luffin which may cause the mortality of the mosquitoes (Renugadevi and Thangaraj 2006).

In the present study, the fruit of Cucumis melo L. (Family: Cucurbitaceae) was selected in order to find out a new mosquitocidal compound against the mosquito Culex quinquefasciatus Say. Because of bitter taste of the fruits of C. melo, were used to study the larvicidal activity of mosquito Culex quinquefasciatus Say. Culex is a genus of mosquito, and is important in that several species serve as vectors of important diseases, such as West Nile virus, filariasis, Japanese encephalitis, St. Louis encephalitis and avian malaria

Scientific name: Culex quinquefasciatus Say.

Common name: Southern house mosquito

Culex quinquefasciatus (earlier known as Culex fatigans) (Dipteria: Culicidae) is the vector of lymphatic filariasis caused by the nematode Wuchereria bancrofti in the tropics and sub tropics. To produce natural mosquito repellant fruits of C. melo was used to show the mortality activity of Mosquito i.e. Culex quinquefasciatus. This Natural mosquito repellant may be less harmful to non-target organisms. The results of the present study would be useful in promoting research aiming at the

Tele:

E-mail addresses: reshma.sonwalkar143@gmail.com

development of new agent for mosquito control based on bioactive chemical compounds from indigenous plant source.

Materials and Methods

Plant material

The fruit of Cucumis melo L. (Cucurbitaceae). Collected from the Tal. Phaltan, Dist. Satara, State Maharashtra, India and identified from the Botanical Survey of India, Pune, M.S., India.

Mosquito

Eggs of Culex quinquefasciatus collect from the stagnant water of Chinchwadgaon Dist. Pune, M.S., India, and identified from the Zoological Survey of India. Dist. Pune, M.S., India, cultured and maintained in the laboratory of Department of Zoology in Prof. R. M. College, Akurdi, Pune, M.S., India

Preparation of Fruit Extract

The collected fruits are peeled to separate the epicarp and immediately dried under the shade. The dried fruits (500gm) were made into fine powdered mechanically using commercial stainless steel blender and extracted with petroleum ether (1500ml at 60 to 80ºc) in a soxhlet apparatus separately until exhaustion. The extract was concentrated under reduced pressure 22-26 mm Hg at 45°C and the residue obtained was stored at 4°C.

Larvicidal Bioassay

Early fourth stage larvae of C. quinquefasciatus were used for the bioassay test. Experiment was conducted in a glass jar for 24 hrs at (28±2ºC). A total of 30 larvae were exposed in three concentrations at triplicate form of 10 larvae each. This bioassay was divided into three concentrations of 5ml, 10ml and 15ml, of crude extract in glass jar containing water and made the volume upto 500ml in each jar. After 24 hr the numbers of dead larvae and the percentage mortality was reported comparing with the control. The experimental media, in which 100% mortality of larvae occurs alone, were selected for isolation and purification of crude extracts. Among the crude extracts tested for larvicidal activity, petroleum ether fruit extract of C. melo showed maximum activity and it was selected for the purpose of isolation and purification of compounds for further methods.

Statistical Analysis:

Data were analyzed by one-way ANOVA: Duncan Multiple Range Test (DMRT) using SPSS software Data were expressed Mean ± SE (n=3). Values followed by the same letter (a,b,c,d & e) were not significantly different at 5% level.

Results

In the present investigation fruit of C. melo was used to study the mortality of the mosquito C. quinquefasciatus. Larvicidal Bioassay method was used, these extract was divided into two parts i.e. Methonal Fruit Extract (MFE) & Petroleum Ether Fruit Extract (PEFE) was prepared. After 24 hr the numbers of dead larvae and the percentage mortality was reported comparing with the control.

In this method effect of MFE of C. melo against early fourth instar larvae of C. quinquefasciatus was recorded (Table 1). As compare to 5ml, 10ml, 15ml & control, the mortality percentage was greater in 15ml (60%). In control the mortality percentage was nil.

Comparison data was prepared between MFE and PEFE of C. melo. In these comparison data MFE shows mortality percentage (60%) in 15ml as compare to PEFE shows greater mortality percentage in 10ml (78.88%) & 15ml (100%) in both plant fruit extract.

Discussion and Conclusion

MFE fruit extract showed moderate larvicidal effects however the highest larval mortality was found in PEFE. Among the crude extracts tested, the PEFE showed 100% larval mortality at 15 ml. The physical and spectral data were in agreement with those of the values reported in the literature (Roberts et al. 2006; Leon et al. 2004; Sun et al. 1994; Dilika et al. 2000). The PEFE of C. melo may have potential to develop as natural larvicidal agent. In this context, the highly bioactive compounds of C. melo which is being grown widely in most areas of India, offer an opportunity for developing alternatives to rather expansive and environmentally hazardous organic insecticide. This plant can be used as natural mosquito repellent, which may be useful in the household to kill mosquitoes, mice, etc.

Table 1: Effect of C. melo fruit extract against early fourth instar larvae C. quinquefasciatus

Sr. No.	Extract concentration in 500ml vol. of water	Petroleum ether Fruit Extract (PEFE)		Methanol Fruit Extract (MFE)	
		Mortality of Larvae Mean ± SE	% Mortality	Mortality of Larvae Mean ± SE	% Mortality
1.	5ml	3.3±0.02a	33.33%	0.60±0.02a	6.66%
2.	10ml	7.8±0.04b	78.88%	3.00±0.03b	30%
3.	15ml	10±0.02b	100%	6.00±0.02a	60%
4.	Control	Nil	Nil	Nil	Nil

Data were analyzed by one-way ANOVA: Duncan Multiple Range Test (DMRT) using SPSS software Data of mortality were expressed by Mean ± SE (n=3). Values followed by the same letter (a,b,c,d & e) were not significantly different at 5% level.

References

Beerenbaum M.R. 1989. North American Ethanobotanicals as a source of novel plant based insecticides. ACS sym ser.387: 11-24.

Bernhard L., Bernhard P. and Magnussen P. 2003. Management of Patients with Lymphoedema Caused by Filariasis in North-eastern Tanzania: alternative approaches. Physiotheraphy 89: 743-749.

Dilika F., Bremenr P.D. and Meyer J.J.M. 2000. Antibacterial activity of Linoleic and Oleic acid isolated from Helichrysum pedunculatum: A plant used during circumcision rites. Fitoterapia 71(4): 450-452.

Fradin M.S. and Day J.F. 2002. Comparative efficacy of insect repellents against mosquitoes bites. N.Engl. J. Med. 347: 13-18.

Hales S., Wet N.D., Maindonald J. and Woodward A. 2002. Potential effect of population and climate changes on global distribution of dengue fever: an empirical model. The Lancet. 360: 830-834.

Jebanesan A. 2007. Herbal mosquito repellents in defeating the public enemy, the mosquito: a real challenge. Loyola, 129-157.

Lawler S.P. and Lanzaro G.C. 2005. Managing mosquitoes on the farm. Regents of the University of California, Division of Agriculture and Natural Resources, 1-19.

Leon L., Garrido-Varo A. and Downey G. 2004. Parent and harvest year effect on near-infrared reflectants spectroscopic analysis of Olive (Olea europaea L.) fruit traits. J. Agric. Food Chem. 52(16):4957-4962.

Renugadevi A. and Thangaraj T.2006. Mosquitocidal effect of the extract against the yellow fever mosquito. Aedes aegypti L. Indian J Environ Ecoplan 12 (2):389-394

Roberts C.A., Ren C., Beuselinck P.R., Benedict H.R. and Bileyeu K. 2006. Fatty acid profiling of Soybean cotyledons by near-infrared spectroscopy. Appl. Spectrosc. 60(11):1328-1333.

Schmutterer H. 1990. Properties and potential of natural pesticides from the neem tree Azadirachta indica. Annu Rev. Entomol 35: 197-271.

Sun Y.F., Xiao Y.Q. and Liu X.H. 1994. Chemicals constituents of Notopterygium incisium Ting. III. Chemical Constituents isolated and identified from petroleum ether extracts of N. incisium Ting. Zhongguo Zhoung Yao Za Zhi. 19(2): 99-100

Wernsdorfer G. and Wernsdorfer W. H. 2003. Malaria at the turn from the 2nd to the 3rd millennium. Wien. Klin.Wochenschr 115(3): 2-9.

Wink M. 1993. Production and application of pytochemical from an agricultural perspective. In: Van Beek TA, Breteler H (eds) Phytochemistry and agriculture. Clerendon, Oxford. 171-213