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Effective Plant Crude-Extracts on the Tick *(Boophilus Microplus)* I. Larvicidal Action

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ABSTRACT

Forty four species of plants were extracted with ethanol. The larvaes of the tick *(Boophilus microplus)* were left to contact with the coating of 1.14 mg/cm^2 of crude-extract in bottle. Five crude-extracts of these plants having larvicidal action (90-100% mortality rate) are as follow; *Acanthus ebracteatus* Vahl., *Acrorus calamus* L., *Annona squamosa* L., *Luffa acutangula* Roxb., and *Stemona collinsae* Craib. The insecticidal action of these crude-extracts on the adult tick is being test.

INTRODUCTION

The tick *(Boophilus microplus)* is the most important external parasites of livestock animals, especially on its role as vectors and potential reservoirs of infectious diseases. The tick of livestock animals is the vector to transmit protozoan diseases (eg. babesiasis and anaplasmosis) and to transmit the infectious diseases (eg. tick-borne fever and brucellosis). The heavy infestration of ticks cause direct losses such as loss of weight gain, anemia and skin diseases. The farmer usually use such chemical insecticides as chlorinated hydrocarbon and organophosphorus compounds to control the tick. These chemicals are normally toxic, full of residue and being imported products. Therefore, the insecticides derived from the plants are in great demand, since they are low in mammalian toxicity, water solubility, and producing non-residual effects. The aim of this investigation is to search the natural plants which can be used as insecticide to the tick. The present work was to screen for the effective crude-extract of some plants on the larvaes of the tick.

MATERIALS AND METHODS

The plant parts of 0.5-1 kg. were cut and ground into small pieces and immersed in 95% ethanol for at least three days, and re-extracted 2-3 times. The extracted ethanol of each plant was evaporated at 40°C by vacuum rotary evaporator. One mililiter of 10% crude-extracted substance in 95% ethanol was made the thin film coating inside the 60 cc. glass bottle (1.14 mg/cm^2) by tube rolling machine and kept in the refrigerator for bioassay. In the control bottles contained 95% ethanol and evaporated until dry.

The bioassay of fifty two crude-extracts from forty-four plant species was carried out. The larvaes of the tick were left to contact with thin film of plant extract in the bottle for 15-30

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min. and then changed into the new bottle (240 cc.). The mortality counts of the larvaes were made at 24 hr. after treatment. The experiment was replicated for 3-7 tests. The Abbott's formula (Abbott, 1952) was used for calculation the larvicidal effect.

RESULTS AND DISCUSSION

The results from bioassay on the larvae of the tick *(Boophilus microplus),* indicated some crude-extract of plants having larvicidal action. The larvicidal crude-extract of plants caused 90-100% mortality of larvae after contact with 1.14 mg/cm^2 of crude-extract, as follows (Table 1); *Acanthus ebracteatus Vahl., Acrorus calamus* L., *Annona Squamosa* L., *Luffa acutangula* Roxb., and *Stemona collinsae* Craib.

Some of these effective plants have been investigated for the larvicidal and insecticidal activity, but their insecticidal bioassay was carried on the other insects. The extracts of the rhizomes of *Acrorus calamus* showed toxicity to the *Musca nebulo* and *Culex fatigans* (Dixit, *et al.,* 1956) and also to *Musca domestica* and *Aedes aegypti* (Anonymous, 1975), but it had low toxicity to fruit fly (Areekul, *et al.,* 1987). The ethanol extract of this plant also had larvicidal effect on tick larvae (Table 1). The larvicidal action of ethanol extract of *Andrographis paniculata* Wall. ex Nees has low larvicidal action (Table 1), but its aqueous extracts can kill 85% internal parasite, *Depetalonema reconditum* of the dog (Dutta and Sukul, 1982). The extract from seeds of *Annona squamosa* L. has insecticidal activity to kill *Musca nebulo* and *Tribolium castaneum* (Mukerjea and Govind, 1960), human head-lice (Puapatanakul, 1980) and *Nepholettix virescens* (Mariappan, and Saxena, 1983). This study revealed that the ethanol extracts of seeds from *Annona squamosa* contained more larvicidal activity than that from the leaves (Table 1). The crude-extract of *Calotropis gigantea* R.Br. and *Calotropis procera* R.Br. showed low larvicidal action on tick larvae. The insecticidal growth inhibitor and antifeedant of the extract from *Calotropis* species has been reported (Anonymous, 1975).

The two plants, *Cleome viscosa* L. and *Gynandropsis gynandra* Briquet showed similarly low larvicide property on the tick larvae (Table 1). The extract from seeds of *Gynandropsis gynandra* Briquet has been used for killing human head-lice (Anonymous, 1975). The *Melia azedarach* L. is always confuse with Indian neem tree, *Azadirachta indica,* which showed low larvicidal effect on tick larvae. The flower and seed extracts of this specie were externally used for killing head-lice and skin diseases, respectively (Watt and Breyer-Brandwijk, 1962). The two *Jatropha spp., Jatropha gossypifolia* L. and *Jatropha curcas* L. contained low toxicity to tick larvae as also to fruit fly (Areekul, *et al.,* 1987). The crude-extract from seeds of the *Luffa acutangula* Roxb. showed larvicidal activity (Table 1). It may contain the same insecticidal substances as reported previously (Anonymous, 1975). The ethanol-extract of *Stemona collinsae* Craib had strong larvicidal action on tick larvae as it is toxic to human head-lice (Phanurai *et al.,* 1981).

The crude-extract of *Acanthus ebracteatus* Vahl was not previously reports on larvicidal or insecticidal action, but they showed larvicidal effect on tick larvae (Table 1). Further studies on insecticidal action of this plant are being investigated

CONCLUSION

All of the 44 plant species were screened for larvicidal effect on tick larvae. The ethanol crude-extract from 5 species were found to contain strong larvicidal action. They are common indigenous plants, and will be useful for insecticidal bioassay.

Table 1. Larvicidal effects of plant extracts on larvae of tick; Boophilus microplus.

Scientific Name (and Thai name)	Part of plants	Mortality rate of Tick larvae (%)
Abrus precatorius L. (Ma-glum-taa-nuu)	Seeds	85.72
Abutilon indicum L. Sweet (Klop-jagra-waan, Phan-sii)	Stem & leaves	73.59
Acanthus ebracteatus Vahl. (Ngoeg-plaa-maoo)	Leaves	90.97
Acrorus calamus L. (Waan-num)	Rhizomes	100.00
Andrographis paniculata Wall ex Nees (Fa-ta-laai)	Whole plant	52.50
Annona squamosa L. (Noi-naa)	Seeds Leaves	90.05 87.10
Azima sarmentosa Benth. & Hook (Pung-dooa)	Stem & leaves Roots	74.91 73.58
Bixa orellana L. (Kum-saed)	Seeds Leaves	42.41 84.59
Blumea aurita De. (Saap-laeng-saap-ka)	Stem & leaves	66.62
Blumea balsamifera Dc. (Naad-yai)	Leaves	75.55
Boerhavia erecta L. (Yaa-noid-maew)	Whole plant	80.46
Caesalpinia pulcherrima L. Swartz (Haang-nog-yuung-thai)	Flowers	66.65
Calotropis procera R.Br. (Rug-doog-khaow)	Leaves & branches	72.72
Calotropis gigantea R.Br. (ug-doog-moung)	Leaves & branches	78.50
Cassia fistula L. (Kuun)	Dried fruit meat Fresh fruit meat	74.05 44.76
Cleome viscosa L. (Pak-sean-phee)	Stem & leaves	83.57
Cotus speciosus (Koenig) Smith (Ueang-maai-naa)	Stem & leaves	76.07
Cymbopagon nardus Rendle (Ta-krai-haom)	Whole plant	79.67
Dactyloetenium aegypticum Willd Gramineae (Yaa-pag-kwai)	Whole plant	57.86
Datura metel L. (Lum-poong)	Fruits Leaves	82.05 83.82

Table 1 (Cont.)

Scientific Name (and Thai name)	Part of plants	Mortality rate of Tick larvae (%)
Eupatorium odoratum L. (Saap-souea)	Stem & leaves	67.21
Euphorbia hirta L. (Nam-nom-racha-sii)	Whole plant	77.26
Gynadropsis gynandra Briquet (Pak-sean)	Stem & leaves	63.59
Heliotropium indicum L. (Yaa-nguang-chang)	Stem, leaves & flowers	83.77
Ipomoea pes-caprae Sweet (Pak-bung-ta-lay)	Whole plant	57.08
Jatropha curcas L. (Sa-puu-dam, Sa-puu-khaow)	Stem Leaves	78.22 56.96
Jatropha gossypifolia L. (Sa-puu-daeng)	Stem & leaves	69.65
Lantana camara L., Taxon large-flowered orange (Pha-ga-grong)	Leaves	78.03
Lagascea mollis Cav. (Yaa-gum-ma-yee)	Whole plant	79.71
Luffa acutangula Roxb. (Boab-leeam)	Seeds	90.51
Luffa cylendrica L. Roem. (Boab-glom)	Fruits	64.98
Melia azedarach L. (Leean)	Fresh fruits	59.64
Murraya paniculata L. Jack (Gaew)	Leaves & branches	71.40
Ocimum sanctum L. Var. Nirsutum baek (Gra-prao-khon)	Stem & leaves	88.94
Pedelanthus telhymaloides Point (Sa-yaeg)	Stem & leaves	86.22
Plumeria rubra L. (Lun-tom-daeng)	Stem & leaves	72.42
Portulaca oleracea L. (Pak-beay-yai)	Whole plant	78.91
Schefflera leucantha Vig. (Ha-nu-maan-pra-sarn-guy)	Leaves & branches	64.22
Stachytarpheta Jamaisensis L. Vahl (Phan-nguu-kheaw)	Stem & leaves	83.15
Stemona collinsae Craib (Non-taai-yaak)	Rhizomes	97.60

Table 1 (Cont.)

Scientific Name (and Thai name)	Part of plants	Mortality rate of Tick larvae (%)
Tabebuia pentaphylla Hemsl. (chom-puu-phan-tip)	Leaves	84.30
Tinospora crispa Miers ex Hook f. & Thoms (Boa-ra-pet)	Stem & leaves	4.96
Tridax procumbens L. (Teen-tug-gae-suphanburi)	Whole plant	53.71
Wedlia trilobata L. Hitchc. (Gra-dum-tong-luey)	Whole plant	88.20

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