Herbal Plants for Insect Pest Management

S.S. Jangam, P.S. Chaudhari, S.V.Chaudhari, and K.G. Baheti

Abstract—The present study focused on developing effective ant repellent from herbal plant extracts. In present research work, plant extracts such as Cucumber, Ginger, Garlic, Lemon, Mentha, Neem & Eucalyptus have been tested for their ant repellant as well as insecticidal activity. The extracts of mentioned plants were prepared by grinding with water. The aqueous Extracts were sprayed on almond plant leaves whiteflies to check their insecticidal activity. The aqueous extracts were treated individually as well as in different combination against whiteflies and ants (15) at dose levels of 1%, 5%, 10%. Observations were made at 5 min of time of intervals for total period of 15 min. Highest % repellency was recorded in cucumber-mint (100%) , lemon-garlic (100%), garlic-mint (100%) & all plant mixture (100%) extracts at 10 % concentration. The aqueous extracts combination of Neem + Eucalyptous as 10+10, 20+20, 50+50 & 100 + 100 were tested on colonies of white flies on almond plant. The minimum % repellency was shown by lemon-mint (67%) extracts. As the dose increases, the repellant effect also increased. The use of such plant extracts can control the population of serious pests like aphids and mealybugs in an environmental friendly way.

Index Terms—Herbal plant extracts, Neem, Cucmber, Garlic, Lemon, Mentha, Insect repellent property, Insect pest Management,

1. Introduction

The insecticidal properties of number of plants have been discovered long ago. Botanical plant extracts are environmentally less harmful than synthetic pesticides to control pests. They possess one or more useful properties such as biodegradability, broad spectrum of activity & ability to reduce insect resistance. Synergistic effect due to mixing of different plant species plays a key role to control pests. High cost of chemical insecticide leads to search alternative source for pest management.

In present research work, plant extracts such as Garlic *Alium sativum* L, Mentha *Mentha piperita*, L. Cucumber *Cucumis sativus* L, Lemon *Citrus limonum* (L.) Burm.f., Ginger *Zingiber officinale* Roscoe, Neem *Azadirachta indica* A. Juss; & Eucalyptus *Eucalyptus globules* L. have been tested for their ant repellant as well as insecticidal activity.

Therefore objective of present work is –

- To eliminate toxic effect occurs due to repeated use of synthetic chemical insecticides.
- Use of natural herbal plant extracts for insect control.
- To develop new rationale & ecofriendly botanical formulation.

2. Materials and Methods

Extracts from plants viz. ginger (rhizome), mint (leaves), Garlic (bulb), & cucumber (fruit), neem (leaves), eucalyptus (leaves) were prepared by grinding the above mentioned part of plant in distilled water. Extracts obtained were centrifuged for 5 min & supernatant was collected. Extracts were sprayed on almond plant leaves whiteflies (number 10) to check their insecticidal activity.

3. RESULTS

The Statistical data of % Insecticidal Effect on white flies of Plant Extract Neem + Eucalyptous is shown in table no.2. At 10% concentration the insecticidal activity for 5minutes was 60% it is more than 50%. It was 100% for same timing, when concentration increased the 100 death was observed for 100% concentration mixture for neem + eucalyptous. It was found to be increased with respect to time. It was higher than α Cypermethrin Fig. 1). Data of % ant repellency values of herbal plant extracts of lemon, garlic, mint, cucumber in concentration 1 to 10 % at 5 min intervals (Table1), Data of % ant repellency values of herbal plant extract mixture of Ginger + Mint, Cucumber + Mint, Garlic+ Lemon, Lemon + Mint, all plant extracts in concentration 1 to 10 % at 5 min interval (Table 2) were tested. Highest % repellency was recorded in cucumber-mint (100%), lemon-garlic (100%), garlic-mint (100%) & all plant mixture (100%) extracts at 10 % concentration. The minimum % repellency was shown by lemon-mint (67%) extracts. As the dose increases, the repellant effect also increased. The plant extract mixtures cucumber-mint (100%), lemon-garlic (100%), garlic-mint (100%) & all plant mixture (100%) extracts at 10 % concentration showed least t-value (Fig.2); indicate high effectiveness and promising ant repellent.

4. Discussion

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In present study the Neem and Eucalyptous plant extracts in 100% concentration when tasted against white flies in the form of spray on almond leaves shows 100% activity with LC 95%. As concentration increased the repellent or insecticidal activity also increased in proportion with time increase. Anita Singh et al.2012 reported repulsion of aphids and mealy bugs under laboratory condition for three plants extracts namely, *A. indica*,

Table 1: Data of % ant repellency values of herbal plant extract mixture at 5 min interval.

Table 1: Data of % ant repellency values of herbal plant extract mixture at 5 min interval.

Treatment (Concentration)	No. of Ants	% Ant Repellency values at 5 min. of intervals.		
		5 min.	10 min.	15 min.
Ginger + Mint (1%)	15	11	11	43
Ginger + Mint (5 %)	15	11	25	67
Ginger + Mint (10 %)	15	11	25	100
Cucumber + Mint (1 %)	15	11	43	67
Cucumber + Mint (5%)	15	11	67	67
Cucumber + Mint (10 %)	15	25	43	100
Cucumber + Lemon (1%)	15	11	25	43
Cucumber + Lemon (5 %)	15	25	43	67
Cucumber + Lemon (10 %)	15	43	43	88
Garlic+ Lemon (1%)	15	11	25	43
Garlic+ Lemon (5 %)	15	11	43	100
Garlic+ Lemon (10 %)	15	11	43	100
Lemon + Mint (1%)	15	11	11	25
Lemon + Mint (5%)	15	11	25	43
Lemon + Mint (10%)	15	25	43	67
All plant Extract (1%)	15	25	43	67
All plant Extract (5%)	15	43	67	88
All plant Extract (10%)	15	67	100	100
Control	15	00	00	00
Sugar	15	00	00	00
α Cyperomethrin (1%)	15	100	00	00

A. Juss, *E.globules* L. and *O. basilicum*.L. Repellency was recorded by methanol leaf extract in the following order *A. indica* > *E. globules* > *O. basilicum as* against aphids and mealybugs. After 24 h of release of aphids and mealy bugs, the highest repellency was recorded in the case of *A. indica A. Juss* leaf extract (99.0 and 97.0%) followed by *E.globules* L. leaf extract (96.0 and 93.0%).The repellent property of the mint, cucumber, ginger and lemon extracts under discussion resulted to the effect of scent or active compound of these herbal extracts. The scent of these may interephere the pheromone or queen substance released by queen which is species specific. The queen substance released through last abdominal segment is handed over from one ant to another also the scent of food may also be blocked by these plant extracts. Herbal repellents tested against mosquitoes and aphids and many other insects but not much work has been reported by entomologist for ants. The affected food material by ants generally kept in sun or it is cleaned but if peels of cucumber, cloves of garlic, leaves of mints if kept in contact with invasion area by ants repel the ants.

Table 2: Statistical data of % Insecticidal Effect of Plant Extract on white flies.

Treatment	Total no. of Insect	% Insectisidal Effect at 5 Min interval			± SE	t-value	Confidence Limit (LC 95 %)	
		5 Min	10 Min	15 Min			Lower	Upper
Control	10	00	00	00	00	00	00	00
NE + EU (10% +10%)	10	60	70	80	4.77	-2.94	45.15	94.84
NE + EU (20% +20%)	10	80	90	100	5.77	0.51	65.15	114.84
NE 50% + EU (50% +50%)	10	90	100	-	5.00	-4.09	31.47	158.53
NE + EU (100% +100%)	10	100	-	-	00	-9.28	100	100
α Cypermethrin 1%	10	100	-	-	00	-9.28	100	100

All herbal extracts selected for the studies were reported to show repellent activity in more than one insect. Highest % repellency was recorded in cucumber-mint (100%), lemon-garlic (100%), garlic-mint (100%) & all plant mixture (100%) extracts at 10 % concentration. Ants dislike catnip, geranium, hyssop, lavender, sage, southernwood, spearmint and tansy. Placing any of these herbs at doorways will help prevent ants from entering [1]. Cinnamon, mint, chili pepper, black pepper, cayenne pepper, cloves or garlic –these were report to work as ant repellents. Many plants – including the ones listed – give off a strong scent to repel ants and other insects in the wild, and it works just as well in home [2]. Cucumber/Citrus Peels leaving in the areas shows ant activity.

Cucumber and citrus peels are toxic to the types of fungi that ants feed on, and therefore avoided by the ants [2]. Cinamon sticks, garlic, fresh cloves reported repellent activity for ants. While garlic cloves aren't as aromatically pleasing as cinnamon sticks, they work really well. While garlic cloves aren't as aromatically pleasing as cinnamon sticks, they work really well [3]. A cinnamon stick, coffee grinds, chili pepper, paprika, cloves, or

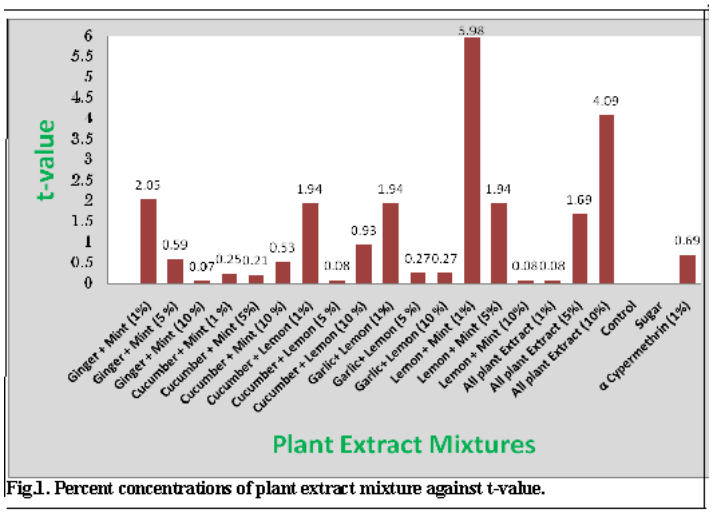

Fig.1. Percent concentrations of plant extract mixture against t-value.

dried peppermint leaves near the openings will repel ants. The juice of a lemon at the entry spot and leave the peel there repeals the ants. Planting mint around the foundation of the house will also keep ants away. Place cloves of garlic around indoor and outdoor ant pathways [4]. The plant extract of A. indica A. Juss which is globally accepted as good green insecticides having bio-active alkaloid, Azadirachtin and other tetranortriterpenoids compounds responsible for the repellen-

cy[8]. Neem products were reported to reduce the infestation of

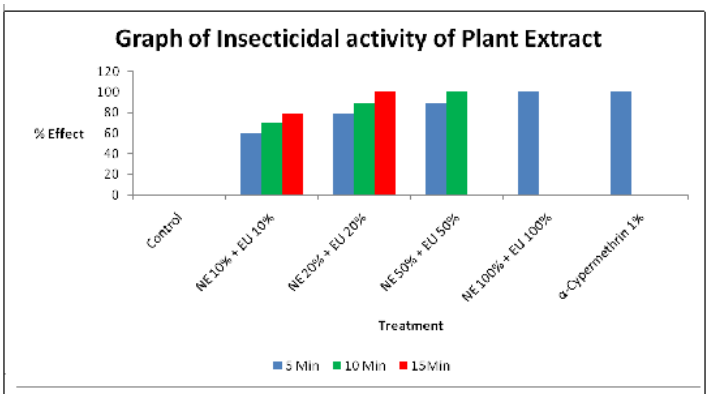

Fig. 2. Insectidal activities of plant extract Neem + Eucalyptus for white flies on almond leaves.

various insect pests in tea [12], okra [6 & 7] and cowpea [10]. Saikia et al. (2000) reported that leaf (10 to 50%) and seed kernel (5%) extracts of neem caused significant mortality of the bean aphid. The treatment of neem leaf and kernel extract along with cow urine against *Lipaphis erysimi* (Kalt) the mustard aphid leads to the reduction in incidence of this aphids and increase in the yield of mustard [9].

5. Conclusion

From statistical analysis, plant extract mixtures cucumber-mint (100%) , lemon-garlic (100%), garlic-mint (100%) & all plant mixture (100%) extracts at 10 % concentration showing least t-value was found to be highly effective and promising ant repellent. Neem-eucalyptus (100%) with least t-value and greater LC 95% value reveals highly significant insecticidal activity. All the results were compared with standard alpha cyperomethrin (1%). The result of this investigation shows that botanical mixtures of neem & eucalyptus act as promising insecticidal agents. They could provide valuable alternatives to the synthetic insecticides in management of almond leaves pest. Further studies are required to test their insecticidal activity on other crop damaging insects

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