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SUSTAINABLE APPLICATION OF ETHANOL LEAVES EXTRACTS OF SOME INDIGENOUS PLANTSS ON THE FIRE ANT,SOLENOPSIS GEMINATA (HYMENOPTERA: FORMICIDAE)

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ABSTRACT: The laboratory experimental evaluation based on the leaves of commonly occurring plants like *Azadirachta indica* (Neem), *Ipomoea carnea* (Beshram), *Vitex negundo* (Nirgudi), *Tridax procumbens* (Kambarmodi) *and Pongamia glabra* (Karanj) showing toxicity and repellent activities against an agriculture pest, fire ant, *Solenopsis geminata*. Administrations of these locally available plant leaves using ethanol provided basis for the development of new synthetic insecticides for the control of red fire ant. The highest mortality rate and repellent activity was noted at 30%ethanolic plant leaves extract of *Vitex negundo* (Nirgudi) among the plants used for experiments. The result indicated the potential of ethanolic plant leaves extracts to control the commonly occurred agriculture pests, fire ant, *Solenopsis geminata* appeared with the increase in mortality rate with the increasing concentration of plant leaves extract of Vitex negundo (Nirgudi), as compared with the commercial bioformulation, Boric powder(Check-I) and Lindane (Check-II). The evaluation of experimental data also revealed that all the experimental plants species synthesizes numerous volatiles compounds known to exhibit toxic, insecticidal and repellent properties to the insect pests which also inhibit the activity of total Protein, carbohydrate and Lipid concentration of midgut of Solenopsis geminata.

Key words: - *Solenopsis geminata*, Ethanol leaves extract, toxicity, bioformulation.

INTRODUCTION:

The fire ants specifically feed on germinating seeds and seedlings of corn, sorghum and other field or cover crops, particularly during dry conditions in the spring, sometimes causing stand loss. Fire ants also have been reported to feed on young watermelon, cucumber and sunflower plants, and have damaged peanut and soybean plantings. Fire ant mounds can cause problems in areas where soybeans are not planted on raised beds or rows, because mounds along the rows can be tall enough to interfere with harvesting equipment. During dry periods, the fire ants can chew irrigation tubing, as has been reported in vegetable crops. The rapidly rising human population and sustainable development cause global warming on the earth which effects on insect pests population. Some of the insect in addition not only damages the crops but spreads the dangerous diseases and harmful to human health. The heavy usage of pesticides created a great concern especially in case of household control of pests left higher level of insecticide residues. These chemical insecticides find in above maximum residue limits in the samples of milk, cattle drinking water, fodder, feed collected from cattle colony (Parveen and Masud, 1992). Awareness regarding the food safety has increased the demand for organically produced food, which necessitates evaluating the performance of plant-based pesticides as safer alternatives to conventional insecticides (Faheem Akbar etal., 2010). *Azadirachta indica* (Neem), *Ipomoea carnea* (Beshram/sadafuli),Vitex negundo (Nirgudi), *Tridax procumbens* (Kambarmodi) and *Pongamia glabra* (Karanj) are plants having diverse pest control properties. Many plants, like Neem, Sadafuli, Nirgudi, Kambarmodi and Karanj have the alkaloids, phenolics, glycosides and tannins types of chemical defensive compounds when mixed with ethanolic groups effects on the insect feeding and unpalatable to the insects (Amritraj and William, 1999). However, these compounds act as the

toxins and repellent to kill the insect pests. These ethanolic formulations being as a safer alternative to the synthetic insecticides as an environment friendly product. Whereas the application of these herbal pesticides is limited due to the instability which needs its application at short time intervals (Kadu et al., 2010).

DISCUSSION:

The conventional insecticides have not only distressed the agro-ecosystem but also cause the chronic pesticide poisoning like disorder of immune functions, peripheral neuropathies and allergic reactions, principally of skin, which ultimately led to cancer risk (UNEP, 1993). Scientists and environmental toxicologists have investigated different groups of insecticides including Boric powder, BHC, Endosulfan and Lindane to control the agriculture pests so far, for their toxic end points which involved different health related problems such as cardiovascular disorders and hypertension, (Chandra et.al., 1992). As a vital part of Integrated Pest Management (IPM) high percent of all poisoning cases occur due to use of pesticides in developing countries causing harmful effects on human health (Soomro et al., 2008) and the non-target organisms and ultimately pollute the environment (UNDP, 2001) While the plant based pesticides are degradable and safe for human being biorational (low risk) insecticide with residues under MRLs it could also be a remarkable tool for managing the control of different agriculture pests (USDA, 2002).The herbal pesticides particularly, the plant leaves extracts with alcoholic groups affects adversely on the insect development and reproduction resulting into permanent control of the pest (Cutler, 1985; Faheem Akbar et.al., 2010). From the result analysisthe higher % mortality rate revealed after 24 hour infollowing order of Azadirachta indica (Neem),Pongamia glabra (Karanj), Tridax procumbens (Kambarmodi),Ipomoea carnea (Beshram or sadabahar) and Vitex negundo (Nirgudi)(Pande et al., 1983; 1987) as the agriculture pesticides against household insect pest, fire ant, Solenopsis geminata. The above plants contains the alkaloids, phenolics, glycosides and tannins types of chemical defensive compounds when mixed with alcoholic groups becomes unpalatable to the insects and effects on the insect feeding (Amritraj and William, 1999). The herbal methanol formulations being as a safer alternative to the synthetic insecticides act as eco-friendly products. Plant leaves extracts contain compounds that show ovicidal, repellent, antifeedant, sterilization and toxic effects in insects (Nawrot and Harmatha, 1994; Isman, 2006). The toxicity may be by contact, ingestion or through fumigant action. specific compounds isolated from plant leaves extracts/essential oils were tested for fumigant activity. Tests have also been carried out with pure compounds obtained from commercial sources (Lee et al., 2003a) or synthesized in the laboratory (Peterson et al., 2000; Park et al., 2004). As a vital part of Integrated Pest Management (IPM) high percent of all poisoning cases occur due to use of pesticides in developing countries causing harmful effects on human health (Soomro et al., 2008) and the non-target organisms and ultimately pollute the environment (UNDP, 2001) While the plant based pesticides are degradable and safe for human being biorational (low risk) insecticide with residues under MRLs it could also be a remarkable tool for managing the control of different agriculture pests (USDA, 2002). The present study is the first time to show the sustainable successful applications of different easily available plants leaves extract to control certain ant species as the household insect pests.

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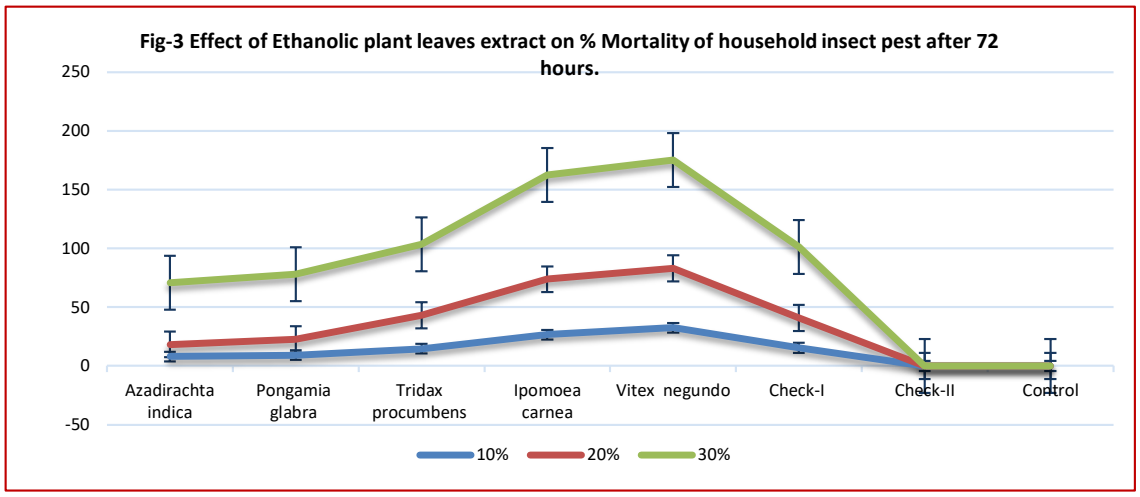
Table1: Effect ofEthanolic plant leaves extract on % Mortality of fire ant, *Solenopsis geminata*after 72 hours.

S. no.	Plant leaves extracts	% Mortality /Hour(72 Hrs.)		
		10%	20%	30%
1.	*Azadirachta indica* (Neem)	7.96	10.41	52.34
2.	*Pongamia glabra* (Karanj)	9.27	13.34	55.56
3.	*Tridax procumbens* (Kambarmodi)	14.67	28.55	60.38
4.	*Ipomoea carnea* (Beshram or sadabahar)	26.56	47.3	88.55
5.	*Vitex negundo* (Nirgudi)	32.55	50.51	92.36
6.	Check-I / Boric powder	15.44	55.42	80.22
7.	Control	0	0	0

(Exp. - Experimental group of ants) **(P< 0.001)**

Table-2: Effect of 30 % Ethanol Leaves Extract on the Biochemical composition of Midgut of the carpenter ant, *Camponotus compressus* after 72 hours (Exp.-Experimental group of ants)



(P< 0.001) Abb.-Experimental-Exp., Control-Con.

S. No.	Leaves Extract of Plants	Biochemical Composition in µg/mg.					
		Protein		**Carbohydrate**		**Lipid**	
		Exp	Con	Exp	Con	Exp	Con
1.	***Pongamia glabra***	4.05 ± 0.55	7.16 ± 0.87	9.52 ± 0.15	12.4 ± 0.006	0.76 ± 0.005	0.84 ± 0.009
2.	***Tridax procumbens***	4.62 ± 0.12	7.11 ± 0.12	7.35 ± 0.02	11.25 ± 0.005	0.622 ± 0.006	0.85 ± 0.005
3.	***Azadirachta indica***	3.83 ± 0.12	7.03± 0.27	6.45 ± 0.18	12.45 ± 0.004	0.54 ± 0.002	0.785 ± 0.003
4.	***Vitex negundo***	3.13 ± 0.11	6.12 ± 0.19	5.15 ± 0.18	11.20 ± 0.004	0.58 ± 0.02	0.735 ± 0.002
5.	***Ipomoea carnea***	2.83 ± 0.11	6.51± 0.14	5.35 ± 0.17	11.15 ± 0.003	0.34 ± 0.12	0.685 ± 0.021

Figure no.-1 : Leaves of Indigenous Plants

Figure no.- 2 : Experimental setup of Glass Container