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Improvement of traditional insecticidal formulations

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Abstract
Traditional Insecticidal Formulations (TIF) evolved from the experiences of farmers found to possess practical utility in solving some of the farmer's plat protection problems under their conditions. The present study was undertaken in three TIF that was taken from Tamil Nadu helped to improve their quality through scientifically.

Keywords: traditional insecticidal formulations**,** indigenous technical knowledge, improvement of ITK

Introduction
It is well recognized that the introduction of standardized technological packages has contributed a lot to the development of crop enterprises. It is observed that only a limited number of technologies generated by the National Agricultural Research System are being adopted by farmers, which indicates that the farmers are still in touch with their Indigenous Technical Knowledge (ITK). In this situation, it is relevant to identify, preserve, and improve their quality and these traditional insecticidal formulations were order to sustain the productivity of organic farming and protect the ecosystem. It will also help to develop alternatives to ecologically damaging agricultural practices, which will lead to sustainability in the long run. With this backup, a study was undertaken to scientifically improve the quality of traditional insecticidal formulations of Tamil Nadu.

Materials and Methods
Culture of insects
Brinjal Fruit and shoot borer
Infested fruits of brinjal collected from our university field at Annamalainagar were used to initiate the culture. The infested fruits were kept in a plastic container (30 cm dia × 15 cm ht) containing a layer of sand. Every day healthy pupae adhering to the infested fruit were collected and treated with 0.1 % of sodium hypochlorite before placing them inside the adult rearing cage (45 × 45 × 68cm). Upon the emergence of moths, they were sexed out (male: female, 1:1) and adults were transferred to a small plastic container. A cotton ball soaked in 20 percent honey solution along with few drops of multivitamin syrup was provided for adult feeding. The top of the container was covered with muslin cloth for oviposition. Each day, the muslin cloth containing eggs were removed and replaced with new cloth along with fresh feeding syrup for adult moths. The muslin cloth containing eggs were kept for incubation for hatching. Then the hatched larvae were exposed to fresh young fruits. Whenever needed fresh fruits were supplied. The third instar was used for the bioassay.

Red spider mite
Infected bhendi leaves were collected from the field in and around Annamalainagar and examined under the Stereomicroscope for the preferences of two-spotted red spider mite (*T. urticae*). Then the selected leaves were placed upside down on water-soaked sponge in a plastic tray (42×30×9). Moisture was maintained by adding a few drops of water as needed. Fresh leaves were supplemented daily and after few hours old ones were removed. The temperature and humidity maintained were 27± 2oC and 70±5%. For bioassay, adults were separated from the culture by dislodging over a white sheet and used.

Pink hibiscus mealy bug
Cotton (cultivar RCH 659) was raised in the cement pots (1′ dia.), filled with the mixture of farmyard manure and soil at 1:1 ratio, @ two plants/pot. After 20 days, gravid females collected from cotton fields from srikazhi were inoculated on potted plants @ 10/plant and wrapped with mylar cage each separately. The females were removed from the plants after ten days of exposure. Then the crawlers hatched from the egg sac were reared continuously and whenever needed fresh plants were supplied. For bioassay nymphs were used.

Bio assay of insects
Brinjal Fruit and shoot borer
Pieces of above mention host plant fruits and stems were dipped with a respective concentration of each IIF. Then the pieces were air-dried placed into a glass vial (50 ml capacity) and infected with the respective pest at 1/ piece and covered glass with gada cloth. Three times were replicated for each treatment and observed mortality was recorded once in 24 h up to 7 days. Control was maintained and population reduction was workout over control.

Red spider mite and Pink hibiscus mealybug
Seedlings (10 days old) of above mention host plants grown in mud pots (1/2') were sprayed with a respective concentration of each IIF. Then the seedlings were infected with the respective pest at 10/ plant and placed in a netted cage (2.5'×2.5'×2.5') and mentioned under controlled condition 25±2°C temperatures and 70±5% relative humidity. Each treatment was replicated three times and observation on mortality was recorded once in 24 h up to 7 days. Control was maintained and population reduction was workout over control.

Preparation of Traditional Insecticidal Formulations

The materials and method of preparations of formulations details were motioned Tables 1 and 2.

Table 1: Preparation techniques of Indigenous Insecticidal Formulations

S. no	Products	Ingredients of the product	Pests to be controlled	Preparation Technique
	Herbal insect repellent 1	Notchi leaf – 300g Neem leaf – 200g Tamarind leaf - 100g Cow's urine - 3L	Brinjal Fruit and shoot borer (*Leucinodes orbonalis*)	Leaf pastes, prepared individually using electric mixer grinder by sprinkling water, were placed in an aluminium vessel (10L capacity) and added with Cow's urine (one week old) or water. Then the content was heated for 20-25 minutes under low flame firewood stove. Before cooling, the temperature of the content was noted and the volume was made up to mentioned level. The cooled content was filtered through muslin cloth and used by diluting with 100 L of water.
	Herbal insect repellent 2	*Azadirachita indica* leaf -500g *Vitex negundo* leaf - 500g *Aristolochia bracteolate* - 500g *Calotropis gigantea* Flower - 500g *Coccinia grandis* leaf - 500g Cow's urine - 5L	Red spider mite (*Tetranychus urticae*) - Bhendi	-do-
	Neem oil +Chilli Powder	Neem oil - 300ml Chilli powder - 100g Soap oil - 50ml Water – 3L	Pink hibiscus mealybug (*Maconellicoccus hirsutus*) - Mestha	The Powder and oils were mixed toughly and added water and diluted with 100 L of water.

Table 2: Preparation techniques of Improved Indigenous Insecticidal Formulations

S. no	Products	Ingredients of the product	Pests to be controlled	Preparation Technique
1	Herbal insect repellent 1	*Vitex negundo* leaf – 600g *Azadirachita indica* leaf -400g *Tamarindus indica* leaf – 200g Cow's urine -3L	Brinjal Fruit and shoot borer (*Leucinodes orbonalis*)	The ingredients quantities were changed from earlier and preparation techniques followed by same.
2	Herbal insect repellent 2	*Azadirachita indica* leaf -500g *Vitex negundo* leaf - 500g *Aristolochia bracteolate* - 500g *Calotropis gigantea* Flower - 500g *Coccinia grandis* leaf - 500g Cow's urine - 5L	Red spider mite (*Tetranychus urticae*) - Bhendi	Leaf pastes, prepared individually using electric mixer grinder by sprinkling water, were placed in a mud pot (10L capacity) and added with Cow's urine and covered open of the pot. Then the pot was kept into 3 feet depth of the compost pit and close the pit for allow fermenting at 15 days. The fermented content was filtered through muslin cloth
3	Oil spray +Chilli Powder	Neem oil - 100ml Soap oil - 100ml Chilli powder - 300g Agristic 400L – 50ml Water - 1L	Pink hibiscus mealybug (*Maconellicoccus hirsutus*) - Mestha	20g mizilla dissolved in 50 ml of solvent (Acetone) was taken in beaker I (100 ml capacity). In beaker II, water and emulsifier mixture was taken. In beaker III, Neem oil was taken. All the ingredients containing in beaker I and Beaker III were mixed into beaker II.

Result and Discussion

In Herbal extract 1 and improved Herbal extract 1, the maximum difference (16.6%) showed that 11 % concentration. Minimum difference 10.7 % reported that 7% concentration. 13 to 15 per cent difference noted that 5, 9, 3 and 1% concentrations. In Herbal extract 2 and improved Herbal extract 2, the highest (25.78 and 25.57) amount of different noted that 9 and 11% concentrations.16.66 % differences recorded that 7% concentration. 13 – 14 % differences reported that 3, 5 and 1% concentrations. In Neem oil + chilli powder superior difference (26%) noted that 11% concentration. 25 % differences reported that 5 and 7% concentrations. 1, 3 and 9% concentrations were recorded that likewise 16.09, 20.92 and 22.09% of reduced the population Table 3. [1] reported that *Vitex* leaf extract at 5% concentration showed good efficacy against the hoppers and leaf folder under laboratory conditions. Combination of cow urine with NSKE and *Vitex* reduced the shoot fly

infestation in sorghum [5]. Methanol based extract of leaves of *Cleistanthus collinus* tested as adulticides against red flour beetles (*Tribolium castaneum*) act as natural insecticides [7]. Ethanolic extract of *Acorus calamus* rhizome showed higher insecticidal and genotoxic activity against the maggots and adult flies of *Drosophila melanogaster*. 1% formulation of 50 ml neem oil, proved to be most effective bio pesticide formulation against papaya mealy bug (*Paracoccus marginatus*) and cowpea aphid (*Aphis craccivora*) [8, 3] reported that extent of incidence of muga silkworm disease was 6.4 percent in ITK hybridized improved technology against 14.4 percent in existing improved technology package. Besides, average yield of 70 cocoon per dfl and ERR 62.2 percent was significantly higher in ITK hybridized improved technology as compared to the yield of 56 cocoons per dfl and ERR 51.7 percent in improved technology package [7]. reported that aqueous crude leaf extracts of tobacco have control potential against house fly and may be an effective economic alternative to conventional synthetic insecticides. Yellow Oleander (*Thevetia peruviana*) aqueous leaf extracts against 50 % mortality of *Holotrichia serrata* (Fab.) adults [9] highest larval mortality was observed in ethyl acetate fraction (4.1, 4.1, 17.4, 42.2, 55.6 and 84.5) of leaf extract of *Catharanthus roseus* against *Helicoverpa armigera* [5]. *Moringa oleifera* extract had larvicidal activity on *Anopheles gambiae* with minimal adverse behavioural effects on *Poecilia reticulate* [4]. All the three products will be studied for their mode of action and research might be oriented towards improving the commercial formulation and keeping quality in future.

Table 3: Differences between Traditional Insecticidal Formulations & Improved Traditional Insecticidal Formulations

Treatment No.	Concentration (%)	*Cumulative population reduction over control					
		Traditional Insecticidal Formulations			Improved Traditional Insecticidal Formulations		
		Herbal Extract 1	Herbal Extract 2	Neem oil +Chilli powder	Herbal Extract 1	Herbal Extract 2	Neem oil +Chilli powder
T_1	1	21.44 (33.72) [a]	20.99 (33.02) [a]	21.89 (31.76) [a]	36.77 (41.91) [a]	35.01 (41.62) [a]	37.98 (44.92) [a]
T_2	3	24.84 (24.88) [a]	26.44 (22.34) [a]	24.08 (22.64) [a]	39.44 (29.49) [a]	39.33 (29.93) [a]	45.00 (29.79) [a]
T_3	5	32.11 (2.02) [b]	32.99 (2.02) [b]	29.55 (2.02) [b]	45.45 (2.02) [b]	46.44 (2.02) [b]	55.39 (2.02) [b]
T_4	7	46.33 (2.02) [b]	39.33 (2.02) [b]	35.99 (2.02) [b]	57.03 (2.02) [b]	55.99 (2.02) [b]	61.11 (2.02) [b]
T_5	9	51.22 (2.02) [b]	42.44 (2.02) [b]	43.00 (2.02) [b]	65.43 (2.02) [b]	68.22 (2.02) [b]	65.09 (2.02) [b]
T_6	11	58.33 (2.02) [b]	49.44 (2.02) [b]	50.99 (2.02) [b]	74.93 (2.02) [b]	75.01 (2.02) [b]	76.99 (2.02) [b]
Control		-	-	-	-	-	-
CD value (0.05)		16.55	14.58	14.68	19.55	19.83	19.87

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