

Preliminary Test on Insecticidal Effect of Physic Nut (*Jatropha curcas* Linn.) Extract Against the Eggplant Mealy Bug (*Ferrisia virgata*)

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Abstract

The toxicity of different concentrations of *Jatropha curcas* Linn. extracts were evaluated -against the eggplant mealy bug, *Ferrisia virgata*. One hundred percent (100%) mortality of *F. virgata* was attained 54 hours after application in all treatments with *J. curcas*. A mixture of 2 ml extract plus 50 ml distilled water showed significantly highest insect mortality 6, 12, and 18 h after treatment. Changes in color from whitish to yellowish and eventually to dark brown; shrinkage of the body; and straightening of the legs were some of the observable postmortem characteristics of mealy bugs after treatment with the extracts.

Keywords: *Jatropha curcas*, *Ferrisia virgata*, botanical insecticide

Introduction

One of the major problems besetting farmers is the presence of insect pests that can cause considerable damage to farm produce. The excessive use of chemicals to control pests has led to some notable problems in farmer/consumer health as well as degradation of environment. Man has since then been on the lookout for ecologically sound pest control strategies. One such strategy is the utilization of plants with pesticidal properties.

The Philippines is endowed with many plants the extracts of which could be made as substitute for commercial pesticides. Many plants in the country have insecticidal properties (Solsoloy et al., 1996). As potential pesticides, these are selective and biodegradable in nature. Many of these extracts could lessen or defer the infestation of particular insect pests.

One potential source of such desirable pesticidal material is the physic nut or the purging nut tree, *Jatropha curcas* Linn. (Plate 1). It is a species classified under the Euphorbiaceae family. It is locally known as “kasla” in Bisaya; “tawa-tawa” in Ilocano; or “tubang-bakod”, “taba-taba tangantangan-tuba”, “tirisol”, “tuba” in Tagalog. It is common in the Philippines in thickets and hedges along roadsides.



Plate 1. *Jatropha curcas* (from de Padua and Pancho, 1989)

J. curcas is a glabrous, erect, branched shrub that grows 2 to 5 m high. It has cylindric green and stout branches. Its leaves are somewhat three- or five-lobed, about 10 to 18 cm long, acuminate, with a cordate base and long petioles (Plate 1). The flowers are greenish or greenish-white and are cymes 7 to 8 mm in diameter. Its capsules are at first fleshy, then becoming dry, each of 2 or 3 cocci, 3 to 4 cm long (de Padua and Pancho, 1989).

The oil from seeds is ordinarily used as purgative while the crushed bark is used for treating fractured bones and pain in the abdomen (Solsoloy, 1992). The leaf decoction is a cough remedy. Fresh juice from the stem is applied to wounds, ulcers, shallow cuts and also for scabies and ringworm (de Padua and Pancho, 1989).

On the other hand, eggplant is a solanaceous vegetable crop that adds variety to the food prepared by Filipinos. Little attention has been given to this crop.

In the Philippines, the most destructive insect pests that attack the eggplant are the stem borers, leafhopper, spotted ladybird, flea hoppers and the mealy bug. This study aimed to determine the insecticidal effect of extracts of *J. curcas* seeds on eggplant mealybugs (*Ferrisia virgata*).

Materials and Methods

One-half kilogram of fully mature yellow to black seeds of *J. curcas* were collected, dehulled and dried for about three days. The seeds were ground in a blender and then soaked in 400 ml of triple-distilled water for ten minutes with constant stirring. The product was yellowish which turned white when added with water. The suspension was filtered using cheesecloth and the crude extract stored at room temperature.

The third nymphal stage of eggplant mealy bugs used in the study was obtained by allowing several female adults to oviposit on host plants. A total of twenty-one-month-old potted eggplants were used with twenty-five immature insects artificially introduced on the plants. Each potted eggplant was covered with nylon sheer to avoid further infestation. Insects were sprayed with the various treatments using a hand sprayer after a week of their introduction to the host plant. The treatments were as follows:

T ₁	distilled water
T ₂	2ml crude extract: 5 ml distilled water
T ₃	3ml crude extract: 5 ml distilled water
T ₄	4ml crude extract: 5 ml distilled water
T ₅	5ml crude extract: 5 ml distilled water

The experiment was arranged using the completely randomized design with four replications. Means among treatments were compared using Duncan's Multiple Range Test (DMRT) at 5% -level of significance.

Results and Discussion

Mortality of mealy bugs. There was a significant effect of the different concentrations of extract on the mortality of *F. virgata* at all the evaluation periods after application (Table 1).

Table 1. Percentage of mortality of *Ferrisia virgata* as affected by treatment

CONCENTRATION (ml crude extract : 5 ml water)	MORTALITY (%)								
	Time after application (h)								
	6	12	18	24	30	36	42	48	54
0	0 ^c	0 ^d	0 ^d	0 ^c	0 ^c	0 ^c	0 ^c	0 ^c	0 ^b
1	21 ^d	37 ^c	54 ^c	67 ^b	80 ^a	89 ^a	95 ^a	100 ^a	100 ^a
2	35 ^a	51 ^a	72 ^a	84 ^a	89 ^a	93 ^a	95 ^a	100 ^a	100 ^a
3	34 ^b	43 ^{bc}	52 ^b	61 ^b	65 ^b	68 ^{ab}	70 ^b	89 ^b	100 ^a
4	28 ^c	45 ^{ab}	57 ^b	68 ^b	81 ^a	86 ^a	89 ^{ab}	100 ^a	100 ^a
C. V. (%)	25.70	14.07	8.70	16.95	14.50	17.15	18.20	7.30	0.00

Means with common letters within a column are not significantly different at 5% level using DMRT.

Six (6) hours after spraying, the treatment consisting of 2 ml crude extract: 5 ml of distilled water significantly gave the highest mortality of 35% followed by plants sprayed with 3 ml, 4 ml and 1 ml of crude extract, respectively. Zero percent mortality was observed in untreated plants. At 12 h after spraying, the different concentrations of crude extracts consistently gave significantly high mortality of mealy bugs compared to the untreated insects. The treatments consisting of either 2- or 4-ml extract: 5 ml distilled water exhibited the highest mortality at 51 and 45% -respectively, as assessed 12 hours after treatment.

At subsequent periods of evaluation after the twelfth hour from application (i.e., 18 h, 24 h,), mealy bugs sprayed with 2 ml extract: 5 ml distilled water significantly exhibited the highest mortality rates of 72 and 84%, respectively.

The treatment with 4 ml extract gave similar mortality as 1 and 2 ml at 30 h after treatment. The mortality of *F. virgata* given the four *J. curcas* treatments was similar at 36 h.

After 54 h from spraying, all *J. curcas* treatments gave 100% mortality with all the untreated insects alive.

Based on these preliminary results, the extracts of *J. curcas* appear to have insecticidal effect on eggplant mealy bugs. The mortality of the insects increased with time regardless of the initial concentration of the extract, Solsoloy (1992) also observed insecticidal action of *J. curcas* on cotton bollworm and cotton flower weevil.

Gas chromatographic analysis of the active principle of the crude oil conducted by Solsoloy (1992) showed the presence of fatty acids like palmitic acid, palmitoleic, stearic, linoleic and oleic acids. Its mode of insecticidal action has been attributed to the conjugation of these fatty acids.

Postmortem changes of mealy bugs. There was destruction of body parts observed in the dead immature mealybugs such as shrinkage of the body, straightening of the legs, deformation of antennae and disarrangement of fine hair-like filaments. Most rapid effect was observed in plants sprayed with 4 ml extract: 5 ml distilled water.

Change in color was noted. Some insects changed from whitish to dark brown while others were brownish. The state of being immobile, when transferred or inoculated to another corner for about thirty minutes was noted prior to the insect being considered dead. Prior to the death of the insect, the trembling motion of the antennae, as well as the straightening of the legs and filaments were observed.

Conclusions and Recommendation

Various concentrations of extracts of *Jatropha curcas* were evaluated for the control of *Ferrisia virgata*, a destructive pest of eggplant. All treatments containing extracts exhibited mortality 54 h from treatment. A mixture of 2 ml of extract: 5 ml

of distilled water consistently gave significantly highest mortality up to 18 h from application.

Furthermore, the mortality rate of the insect increased with time. After 54h of exposure, the mortality of insects reached 100%, while the untreated insects were still active.

Changes in color, shrinkage of the body, straightening of the legs were some of the postmortem characteristics of mealybugs due to the toxicity of *J. curcas* extracts.

The use of *Jatropha curcas* extracts therefore appears to control *F. virgata*. Studies to further verify this effect is recommended.

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