

Piper betle Lin. Oil as Botanical Treatment to Control Mango Pulp Weevil
(*Sterno frigidus*)

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The potential of *Piper betle* Lin oil as protectant against *Sterno frigidus*, the mango pulp weevil, an exotic pest infesting Philippine mango produced in Palawan was evaluated. Mangoes produced in the province of Palawan are characterized with a sweet, fine and thick flesh. However, these mangoes are quarantined since the late 1980 due to the infestation of this insect pest. Thus, this research was conducted to determine the efficacy of *P. betle* oil against the mango pulp weevil and establish the minimum effective dose that gives complete mortality to the said insect pest.

In vitro study was conducted in Palawan, the biggest island province in the Philippines. Series of acute toxicity tests were undertaken to determine the minimum effective dose that would exhibit complete mortality to the adult insect. The oil was formulated with a botanical based adjuvant and water to come up with several concentrations. The mixtures were applied topically at the abdomen of the weevil at a rate of five microliter per insect. Ten insects were used per replicate and each treatment had three replications. Mortality was recorded several hours after treatment. Untreated insects, insects treated with adjuvant and water served as control one and two, respectively. Percent mortality was determined and corrected for natural mortality. LC₅₀ and LC₉₉ were likewise established.

Results showed that the efficacy of *P. betle* oil against adult mango pulp weevil depended on the length of exposure period and concentration as indicated in Table 1. At least 24 hours of exposure was needed to achieve complete mortality of mango pulp weevil against *P. betle* oil at a concentration of 30%. This means that the 30% *P. betle* oil applied at 5ul per insect exhibited 100% mortality to mango pulp weevil 24 hours after treatment. On the other hand, complete mortality was also observed when mango pulp weevils were exposed for 36 hours at *P. betle* oil's concentration of 15%. These data manifested that there is direct correlation between exposure time and concentration with insect response. The longer the exposure period and the higher the concentration, higher mortality of insects was achieved. Moreover, the LC₅₀ and LC₉₉ were established at concentrations of 17.8% and 34%, respectively. The results indicate that *P. betle* oil has great potential to be developed as a novel insecticide against mango pulp weevil. The fact that betel leaf is a harmless natural product which has been used by humans

for years makes it a very promising compound against the mango pulp weevil. Also, considering that this material is a natural product, environment safety is not compromised thus will make it a viable alternative for methyl bromide.

Table 1. Corrected mortality of adult *S. frigidus* at different concentrations of *P. betle* oil applied topically at 5ul/insect.

Dosage of <i>P. betle</i> Oil (%)	Exposure Period (hours)			
	12	24	36	48
2.5	0	0	0	0
5	0	0	0	10.33
10	0	0	0	60
15	0	20.33	100	
20	20.33	70	100	
25	20.33	90.33	100	
30	30.67	100		

Table 2. Toxicity of *P. betle* oil to adult *S. frigidus*.

Equation of regression line	LC ₅₀ (%) (fiducial limits; 95% C. L.)	LC ₉₉ (%) (fiducial limits; 95% C. L..)	Degrees of Freedom	Probability (%)
Y=10.7885-8.4814	17.77 (16.50-18.95)	29.19 (26.04-35.38)	4	87