INSECTICIDAL ACTIVITIES OF ESSENTIAL OIL FROM *Piper betel* AGAINST STORAGE INSECT PESTS

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The insecticidal activity of essential oil extracted from the leaves of *Piper betle* (Linn) was evaluated against the bean weevil (*Callosobruchus maculatus* F.), corn weevil (*Sitophilus zeamais* Motchulsky) and lesser grain borer (*Rhizopertha dominica* F.) involving aged grain assay. The efficacy of treatments was assessed by determining the acute toxicity on adult insects and the extent of preventing or suppressing the production of progenies.

The volatile oil in 30% dust formulation exhibited toxicity against adult *C. maculatus*, *S. zeamais* and *R. dominica* at varying application rates such as 0.2g/100g, 1.75g/100g and 2.0g/100g, respectively. Survival of adult *C. maculatus* was prevented until six months by 52% while the treatment allowed six months protection of corn against *S. zeamais* and *R. dominica*. Although eggs were visible in the treated mungbean, the treatment prevented them to develop further. These results disclosed that the biologically active component of *P. betle* leaf oil may possess ovicidal properties that inhibited development of eggs of *C. maculatus* into larvae thus prevented the emergence of adult stage (figure 1). Meanwhile, the absence of eggs of both *S. zeamais* and *R. dominica* was prominent in treated corn. The treatments were able to inhibit entirely the emergence of progenies (figures 2 and 3). No living progenies were observed in treated samples until six months while progenies were abundant in two control samples, check and untreated. The data revealed that *P. betle* leaf oil is a fecundity-reducing agent to adult *S. zeamais* and *R. dominica.* Likewise, the oil's ovicidal effect can not be discounted.

The results, therefore, suggest that the essential oil from *P. betle* leaves is a promising grain protectant.

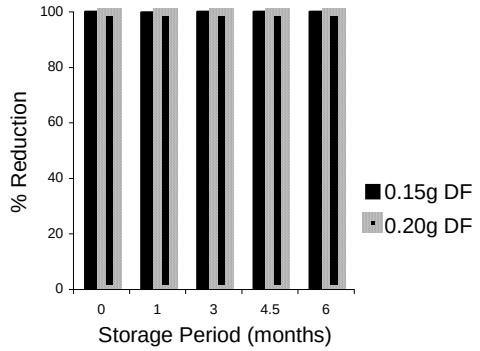

Figure 1. Effect of 30% dust formulated *P. betle* leaf oil on the reduction of F_1 progenies of *C. maculatus.*

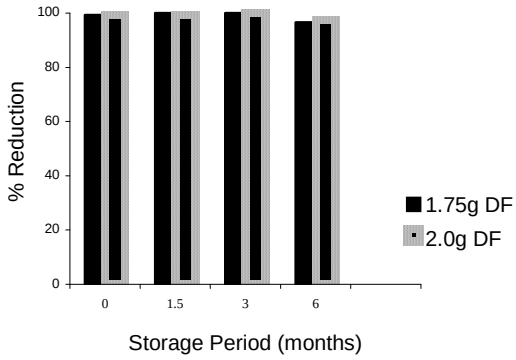

Figure 2. Effect of 30% dust formulated *P. betle* leaf oil on the reduction of F_1 progenies of *S. zeamais.*

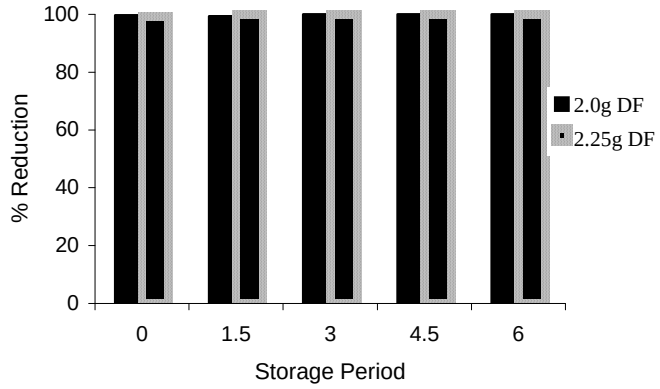

Figure 3. Effect of dust formulated *P. betle* leaf oil on the reduction of F_1 progenies of *R. dominica*

Advantages

1. *P. betle L.* emerged as a promising source of insecticidal compound.
2. Since *betle* leaf oil provided lasting control on both adult populations and progenies of *C. maculatus*, *S. zeamais* and *R. dominica*, it is a good material for grain protection.
3. These findings could result in long-term insect protection and provides a practical alternative to methyl bromide and other chemical pesticides that are being banned for health and environmental reasons.

Recommendations

1. Pursue more studies on the mode of action of *P. betle* oil on stored product insects and efficacy test through field trials
2. Collaborate with other agencies (national/international government or private) to further develop the potential and utilization of *P. betle* leaf oil as grain protectant and for other application.