Papua New Guinea Oil Palm Research Association Inc.

The OPRAtive Word

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Dimehypo™ (*Thiosultap disodium*); an alternative to Methamidophos for the control of oil palm foliage pests in Papua New Guinea

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Introduction

Methamidophos is currently used for the control of foliage pests of oil palm (particularly sexavae and stick insects) through Targeted Trunk Injection (TTI) in Papua New Guinea (PNG). However, the insecticide is highly toxic (WHO Class 1B) and its use has either been vastly restricted or banned in many parts of the world. World wide ban of the insecticide is imminent. There has been therefore a need to determine an alternative insecticide for use.

Two different concentrations of Dimehypo (18% (3.6g ai) Soluble liquid (SL) and 25% (5g ai) SL) were evaluated against Methamidophos (60% SL) to see if the insecticide can be used as an alternative. Dimehypo is a moderately hazardous insecticide (WHO Class II) with *Thiosultap disodium* as an active ingredient. It is systemic and has broad spectrum action. It kills insects by affecting the digestive system as a stomach poison.

Dimehypo is also cheaper than Methamidophos. The unit price in 2016 is K6.90 per litre compared to Methamidophos which is K17.50 per litre.

Methodology

Effectiveness of the insecticide (Dimehypo) was measured recording mortality, feeding activity and the number of eggs oviposited. The same treatment protocol as used for Methamidophos application (Targeted Trunk Injection) was used

Plate 1. Bioassay feeding assessment set up of sexavae in insect feeding cages.

for Dimehypo application. Leaflets were collected and bioassay feeding was done in insect feeding cages kept in larger outdoor cages to measure the different parameters. Sexavae (*Segestes decoratus*) were used as test insects.

It was critical that possible accumulation of chemical residue in Crude Palm Oil (CPO) was assessed. CPO was extracted using press extraction method and sent to Intertek Food Services GmbH in Bremen, Germany for analysis.

Results

Effects on insects

Although there was faster kill by 10ml (6g ai) Methamidophos with 50% mortality after 4 and total mortality after 9 days after

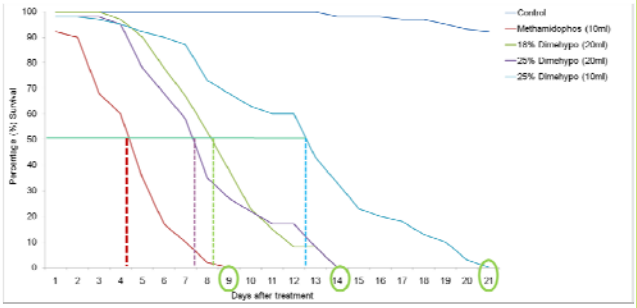

Figure 1. Mortality of sexavae over time after treatment.

treatment. Total mortality was still attained in Dimehypo treatments , but with delay (Fig. 1).
Within the Dimehypo treatments, 20ml of both 18% SL and 25% SL killed faster than 10ml of 25% SL.

Marked reduction in feeding and frass production was also observed in all Dimehypo treatments compared to Control (**T1**) and Methamidophos (**T5**) treatments (Fig. 2). With the reduced feeding, the insects turned weak and looked droopy hanging

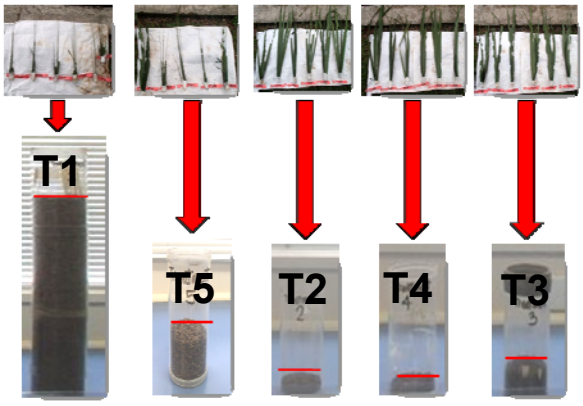

Figure 2. Feeding levels and amount of frass dropped among the treatments.

loose on the palm leaflets and sides of the feeding cages, as compared to the insects in the control and Methamidophos treatments where they congregated neatly on the underside of the palm leaflets and the corners of the feeding cages.

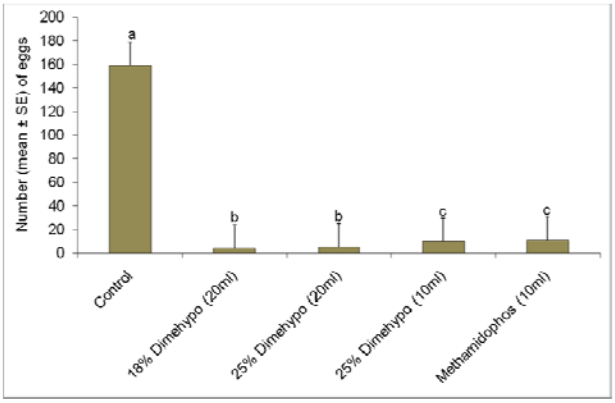

Figure 3. The number of eggs laid by sexavae during the bioassay assessment period.

The number of eggs laid, was significantly reduced for 20ml of both 18% SL and 25% SL Dimehypo compared to 10ml of 25% SL Dimehypo, 10ml Methamidophos and the Control (Fig. 3).

Residuals analysis

No Dimehypo (*Thiosultap disodium)* residues were detected in any of the samples at the quantification threshold of <0.01 mg/kg for the CPO samples analysed in Germany.

Cost of chemical

The purchasing cost of Dimehypo is much cheaper than Methamidophos (less than half the cost ion 2016) as projected in the table below (Table 1).

Table 1. Estimate chemical costs for one hectare block with Methamidophos and Dimehypo.

Chemical	Concentration	Cost/L (PGK)	Quantity/palm	Cost/palm	Cost/ha- PGK (120 palms)
Methamidophos	60% SC	17.50	10ml	0.18	21.60
Dimehypo	18% SC	6.90	10ml	0.07	8.40

Discussion

The results showed that Methamidophos was still more effective than Dimehypo in terms of faster kill, but the later did attain total kill although the effect was delayed by 1 week for the 20ml volume (both 18% SL [3.6g ai] and 25% SL [5g ai]) and by two weeks for the 10ml volume (2.5g ai) applications respectively. Between the two volumes (10 and 20mls) of 25% SL Dimehypo, the lower volume (10ml) is more economical to use although the mortality may be delayed. Whilst the insects survived longer in Dimehypo treatments, the immediate reduction in feeding after the ingestion of the insecticide would ensure further damage to the palms is prevented. In addition, the droopiness would make them become more vulnerable to predators like rats and insectivorous birds.

The lower cost would mean cost saving for the industry when treating with Dimehypo. For instance, in 2016, treatment of a 4ha smallholder block with Methamidophos would be cost K86.40 for the insecticide alone, but when treated with Dimehypo, it would cost K33.60. resulting in a saving of K52.80 per 4ha block.

The absence of detectable residues of Dimehypo at the CPO stage in the wider scale-refinement can curtail concerns of the persistence of any residues in PKO as well as the other products obtained through the later stages of the refinement processes. The study by Yeoh & Chong (2009) also showed similar results for Acephate, Methamidophos and Monocrotophos treated palms, where no detectable levels of the three insecticides were found in the final palm oil products after refining.

Dimehypo Registration

Permit for the importation and distribution of the product in the country has been issued by the PNG Conservation and Environment Protection Authority (CEPA) to local chemical supplier. Under the permit, the product will be labeled as "Dimehypo (disultap)" and used. Its use in areas where large quantities are applied will be closely monitored. It's application on oil palm will only be through Targeted Trunk Injection (TTI) and applied only with authorization from PNGOPRA (ISO 14001 requirement).

Reference

Yeoh, C. B., & Chong, C. L. (2009). Acephate, methamidophos and monocrotophos residues in a laboratory-scale oil refining process. *European Journal of Lipid Technology* , 11 (6): 593-598.

Authority to undertake palm Treatment (TTI)—an important reminder:

Plantations or OPIC considering whether to undertake TTI with Dimehypo are reminded that this is not permitted by the PNG Conservation and Environment Protection Authority (CEPA) without written authority from PNGOPRA (Head of Entomology). Permission is granted by the possession of a signed Pest Recommendation Form. Treatment teams are expected to receive regular training in operational and Health and safety procedures, and medical checks done before handling the insecticide.

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