POWDER FORMULATION OF *Metarhizium anisopliae* FOR CONTROL OF *Oryctes rhinoceros*

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The rhinoceros beetle, *Oryctes rhinoceros*, is a major pest of oil palm in Malaysia. The adults attack all stages of the palm, but damage is lethal to young replants. Repeated attacks by the beetle could kill or predispose the palms to secondary attacks by other beetles. Between 1990 to 1995, the beetle attacked 45 610 ha of young palms at the rate of 9120 ha yr^{-1} (Norman and Basri, 1997).

The natural pathogen of the beetle, *Metarhizium anisopliae* var. *major*, was effective in controlling the pest (Ramle *et al.*, 1999b). Laboratory tests showed that the fungus killed 100% larvae within 12 days of treatment. The time required to kill 50% (LT_{50}) larvae was between 8.9 and 9.1 days. The fungus is safe to the pollinating weevil (Ramle *et al.*, 1999a). In the field, application of spore suspensions by drenching and broadcasting substrate containing spores was effective in controlling the beetle, especially the third instar larva (Ramle *et al.*, 1999b). The larval population in treated plots was reduced by 80% as early as three months after application. Besides the larvae, the other stages of the beetle were also infected (*Figure 1*).

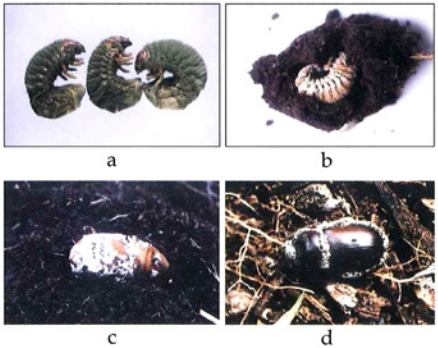

Figure 1. Different stages of O. rhinoceros *infected by* M. anisopliae:
a. larvae, b.prepupa, c. pupa and d. adult.

POWDER FORMULATION

The fungus is formulated in a powder form. The processes involved in the production of the formulation are shown in *Figure 2*. This formulation is meant for control of the larvae of the beetle (*Figure 3*). The product is mixed with water to make spore suspensions and applied by drenching on breeding materials such as decaying oil palm trunks or fronds, sawdust and empty fruit bunches.

PERFORMANCE OF THE FORMULATION

The effectiveness of the formulation was tested against the third instar larva in the laboratory. The formulation was mixed with water to make a spore solution. Drenching of the solution at a high concentration of 10^9 spores ml^{-1} was more effective than at a low concentration of 8.2^9 spores ml^{-1} (*Figure 4*).

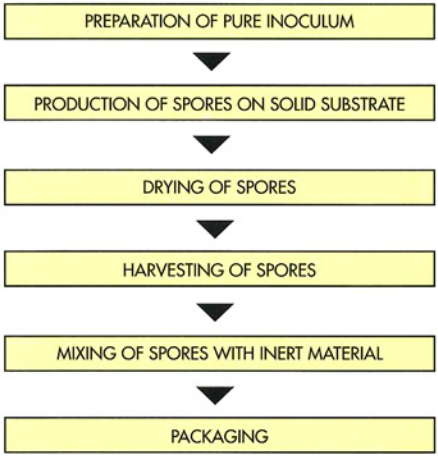

Figure 2. The processes involved in the production of the powder formulation.

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Figure 3. Powder formulation of M. anisopliae.

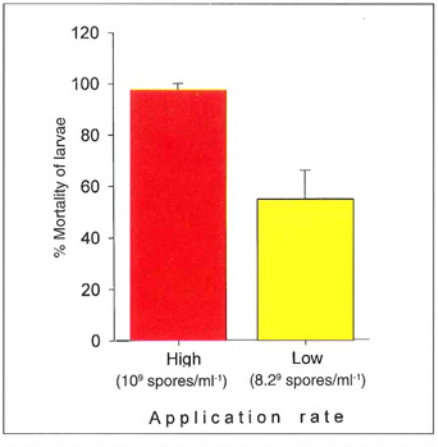

Figure 4. The effectiveness of the powder formulation against larvae of the rhinoceros beetle.

ADVANTAGES OF THE FORMULATION

- Environmentally friendly, safe to operators and non-target organisms;
- Effective in reducing the larval population of rhinoceros beetles;
- Easy to apply in the field;
- Long lasting residue in the field (up to three months); and
- Reduced cost of pest management.

REFERENCES

NORMAN KAMARUDIN and MOHD BASRI WAHID (1997). Status of rhinoceros beetles, *Oryctes rhinoceros* (Coleoptera: Scarabaeidae). *PORIM Occasional Paper No. 35:* 30pp.

RAMLE MOSLIM; MOHD BASRI WAHID; NORMAN KAMARUDIN and SITI RAMLAH AHMAD ALI (1999a). Pathogenicity of four isolates of *Metarhizium anisopliae* on rhinoceros beetles, *Oryctes rhinoceros* and pollinating weevil, *Elaeidobius kamerunicus* and its DNA profiles revealed by RAPD-PCR. *Proceedings of the 1999 PORIM International Palm Oil Conference – Emerging Technologies and Opportunities in the Next Millennium.* PORIM. p. 207-219.

RAMLE MOSLIM; MOHD BASRI WAHID; NORMAN KAMARUDIN; MUKESH SHARMA and SITI RAMLAH AHMAD ALI (1999b). Impact of *Metarhizium anisopliae* (Deuteromycotina: Hyphomycetes) applied by wet and dried inoculum on oil palm rhinoceros beetles, *Oryctes rhinoceros* (Coleoptera: Scarabaeidae). *Journal of Oil Palm Research, 11 (2):* 25 – 40.

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