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BROAD-SPECTRUM HERBAL FUMIGANT FORMULATION FOR THE MANAGEMENT OF STORED GRAIN PESTS

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ABSTRACT

During pesticidal evaluation of the secondary metabolites of five different *Eucalyptus* spp., the essential oil of *Eucalyptus cameldunsis* (Labill) was found to be the strongest toxicant against the post harvest stored product pests, viz., *Aspergillus flavus*, *Penicillium italicum* (fungal pests), *Rhizopertha dominica*, *Tribolium castaneum* and *Trogoderma granarium* (insect pests). The oil as a contact toxicant killed all the test organisms in just 5 minutes, however, as a fumigant, at 10% concentration, it required 4 hrs to kill all insects and heavy doses of fungal inocula. The oil's toxicity was thermostable up to 100°C and did not disappear even after 60 months of storage, the maximum unit taken into consideration. Moreover, the oil did not show any phytotoxic effect on stored food grain up to 50% concentration. Besides, it is also reported as harmless to human health. The oil was tested in vivo in the form of herbal fumigant formulation at 10% concentration and experiments were performed in cotton bags, gunny bags and polythene bags. The excellent results obtained from gunny bags prompted us to perform the experiment at farmers' level, too. Therefore, two types of fumigant formulations were formulated, one in the form of liquid and another in the form of solid- by using some tiller compounds, and two different sets of experiments were performed, one as 'pre-storage experiments' and the other as 'post-storage experiments'. The data were collected from all the four separate experiments from different spot trials and analyzed. The results obtained from the pre-storage experiments with liquid fumigant formulation gave the highest toxic effects as compared to liquid-post-storage, solid-pre-storage and solid-post-storage experiments. On comparing the phytotoxicity, organoleptic tests, pharmacological investigations and cost-benefit analysis of the formulated fumigant with some synthetics, the formulated fumigant was found to be superior. Therefore, after multilocational field trials the formulated fumigant has a potential to be commercialized as a substitute of synthetic grain fumigants.