

Evaluation of Toxicity of Root-bark Powder of *Securidaca Longepedunculata* Enhanced with Diatomaceous Earth Fossilshield Against *Callosobruchus Maculatus* (F.) (Coleoptera-Bruchidea)

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Abstract : Storage and preservation of agricultural products remain the only conditions ensuring the almost permanent availability of foodstuffs. However, infestations due to insects and microorganisms often occur. *Callosobruchus maculatus* is a pest that causes a lot of damage to cowpea stocks in the tropics. Several methods are adopted to limit their damage, but the use of synthetic chemical insecticides is the most widespread. Biopesticides in sustainable agriculture respond to several environmental, economic and social concerns while offering innovative opportunities that are ecologically and economically viable for producers, workers, consumers and ecosystems. Our main objective is to evaluate the insecticidal efficacy of binary combinations of Fossilshield with root-bark powder of *Securidaca longepedunculata* against *Callosobruchus maculatus* in stored cowpea *Vigna unguiculata*. Laboratory bioassays were conducted in stored grains to evaluate the toxicity of root-bark powder of *Securidaca longepedunculata* alone or combined with diatomaceous earth Fossil-Shield® against *C. maculatus*. Twenty-hour-old adults of *C. maculatus* were exposed to 50g of cowpea seeds treated with four doses (10, 20, 30, and 40g/kg) of root-bark powder of *S. longepedunculata*, on the one hand, and (0.5, 1, 1.5, and 2 g/kg) on DE and binary combinations on the other hand. 0g/kg corresponded to untreated control. Adult mortality was recorded up to 7 days (d) post-treatment, whereas the number of F1 progeny was assessed after 30 d. Weight loss and germinative ability were conducted after 120 d. All treatments were arranged according to a completely randomized block with four replicates. The combined mixture of *S. longepedunculata* and DE controlled the beetle faster compared to the root-bark powder of *S. longepedunculata* alone. According to the Co-toxicity coefficient, additive effect of binary combinations was recorded at 3-day post-exposure time with the mixture 25% FossilShield + 75% *S. longepedunculata*. A synergistic action was observed after 3-d post-exposure at mixture 50% FossilShield + 50% *S. longepedunculata* and at 1-d and 3-d post-exposure periods at mixture 75% FossilShield + 25% *S. longepedunculata*. The mixture 25% FossilShield + 75% *S. longepedunculata* induced a decreased progeny of 6 times fewer individuals for 4.5 times less weight loss and 2, 9 times more sprouted grains than with root-bark powder of *S. longepedunculata*. The combination of FossilShield + *S. longepedunculata* was more potent than root-bark powder of *S. longepedunculata* alone, although the root-bark powder of *S. longepedunculata* caused significant reduction of F1 adults compared to the control. Combined action of botanical insecticides with FossilShield as a grain protectant in an integrated pest management approach is discussed.

Keywords : diatomaceous earth, cowpea, *callosobruchus maculatus*, *securidaca longepedunculata*, combined action, co-toxicity coefficient

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