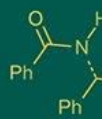


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Evaluation of *Chloroxylon swietenia* extracts on feeding performance of red sander defoliator

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Abstract

The present study evaluated the antifeedant potential of *Chloroxylon swietenia* leaf extracts at different concentrations against the red sander defoliator under laboratory conditions. Feeding parameters such as leaf feed consumed, leaf feed uneaten, and fecal pellets excreted were recorded and compared with untreated control and standard checks (Neem-based formulation and Profenophos). The results revealed a concentration-dependent reduction in feeding activity. Maximum antifeedant effect was observed at lower consumption levels in Profenophos (0.05%) followed by Neem (0.5%) and *C. swietenia* at 1.0% concentration. Significant differences were observed among treatments for all parameters studied, indicating the potential of *C. swietenia* as a botanical antifeedant.

Keywords: *Chloroxylon swietenia*, antifeedant activity, red sander defoliator, botanical insecticide, feeding deterrence

Introduction

Red sander (*Pterocarpus santalinus* L.) is an economically important forest species prone to defoliation by various insect pests, particularly defoliators that cause severe foliage damage and growth loss. Excessive reliance on synthetic insecticides for pest management has resulted in environmental pollution, pest resistance, and negative impacts on non-target organisms. Consequently, the use of botanicals as eco-friendly pest management tools has gained considerable attention.

Plant-derived extracts possess antifeedant, repellent, and growth-inhibitory properties against a wide range of insect pests. *Chloroxylon swietenia*, a medicinally important forest tree, is known to contain bioactive secondary metabolites with insecticidal potential. However, systematic studies on its antifeedant activity against red sander defoliators are limited. Hence, the present investigation was undertaken to assess the relative feeding potentiality of red sander defoliator when exposed to different concentrations of *C. swietenia* leaf extracts under laboratory conditions.

Materials and Methods

Preparation of Plant Extracts

Leaves and bark of *Chloroxylon swietenia* were collected, shade-dried, and powdered (Fig. 1). The extracts were prepared and diluted to obtain concentrations of 0.25, 0.50, 0.75, and 1.00 percent. Neem-based formulation (Nimbecidine 0.5%) and Profenophos (0.05%) were used as standard checks, while untreated leaves served as control.

Test Insect

Larvae of red sander defoliator were collected from the field and reared under laboratory conditions. Uniformly aged and sized larvae were used for bioassay experiments.

Feeding Bioassay

Fresh red sander leaves were treated with respective concentrations of *C. swietenia* extract, air-dried, and offered to larvae. Observations were recorded on:

- Average weight of leaf feed eaten (g)
- Average weight of leaf feed uneaten (g)
- Average weight of fecal pellets excreted (g)

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Each treatment was replicated adequately. Data were subjected to statistical analysis, and critical difference (C.D.) values were calculated to determine significance.



Fig 1: Collection of plant and bark samples for bioassay.

Results and Discussion

The feeding response of the red sander defoliator varied significantly among the treatments of *Chloroxylon swietenia* extracts, standard checks, and the untreated control (Fig2). A progressive decline in leaf consumption was observed with increasing concentration of *C. swietenia* extract, indicating a clear dose-dependent antifeedant effect. Similar concentration-dependent feeding deterrence has been widely reported for plant-derived extracts due to the presence of bioactive secondary metabolites that interfere with insect gustatory receptors and feeding behavior (Koul, 2008; Isman, 2006) [2, 1].

No significant difference in leaf feed consumption was observed between the untreated control and the 0.25% concentration, nor between the 0.25% and 0.50% concentrations, suggesting that lower concentrations of *C. swietenia* were insufficient to elicit strong feeding deterrence. However, higher concentrations (0.75% and 1.0%) significantly reduced feeding, which may be attributed to increased availability of deterrent compounds

such as limonoids, alkaloids, and phenolics, known to cause feeding inhibition in lepidopteran larvae (Senthil-Nathan, 2013) [5].

The standard checks, Profenophos (0.05%) and Neem-based formulation (Nimbecidine 0.5%), recorded the lowest leaf consumption, confirming their strong antifeedant properties. Neem-based antifeedancy has been extensively documented and is mainly attributed to azadirachtin and related limonoids, which disrupt feeding stimulation and midgut function in insects (Schmutterer, 1990; Isman, 2006) [3, 1]. The comparatively lower consumption recorded in Profenophos treatment is due to its neurotoxic action, leading to rapid feeding cessation (Finney, 1971) [8].

The amount of unconsumed leaf feed increased with increasing extract concentration, with maximum uneaten leaf material observed in Profenophos and Neem treatments. This observation further confirms the feeding deterrent effect of both botanical and chemical treatments. Similar trends of increased leftover foliage in antifeedant-treated insects have been reported earlier for forest and agricultural pests (Pavunraj *et al.*, 2015; Jeyasankar *et al.*, 2012) [6, 4].

Fecal pellet excretion also varied significantly among treatments, showing a gradual increase with increasing concentration of *C. swietenia* extracts. Higher fecal output in treated larvae may indicate impaired digestion, reduced nutrient assimilation, or midgut disruption caused by plant secondary metabolites (Senthil-Nathan, 2013) [5]. The lowest fecal pellet excretion observed in the untreated control reflects normal feeding and digestive efficiency. Similar physiological disruptions affecting fecal output have been reported in lepidopteran larvae exposed to botanical insecticides (Kogan & Goeden, 1970; Prakash *et al.*, 2008) [9, 10].

Overall, the results demonstrate that *Chloroxylon swietenia* extracts exert significant antifeedant effects at higher concentrations, comparable to neem-based formulations. The findings support earlier reports on the potential of forest plant extracts as eco-friendly pest management tools and emphasize their suitability for inclusion in integrated pest management programs (Isman, 2006; Prakash *et al.*, 2008) [1, 10].

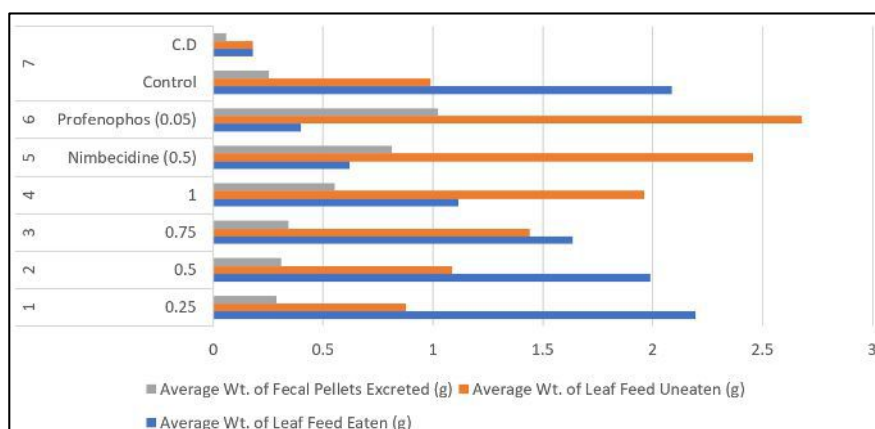


Fig 2: Relative Feeding Potentiality of Red Sander Defoliator at Different Concentrations of *Chloroxylon swietenia*

Conclusion

The present study demonstrated that *Chloroxylon swietenia* leaf extracts possess significant antifeedant activity against red sander defoliator. Feeding deterrence increased with concentration, with 1.0% extract showing pronounced effects comparable to Neem-based formulation. Although

Profenophos exhibited the highest antifeedant activity, *C. swietenia* extracts offer a promising eco-friendly alternative for sustainable pest management in forestry. Further studies on field efficacy and isolation of active compounds are recommended.

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