# Characterization of Delayed Toxicity in Fast-Acting Fire Ant Baits

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Speed of efficacy and the response profiles of fire ant baits that claim to control red imported fire ant, *Solenopsis invicta*, colonies faster than the typical 2-4 week time period were examined. Large laboratory colonies of *S. invicta*, containing approximately 38,000 workers, 42 ml of brood, and 1 queen, were given access to fast-acting fire ant baits containing either 0.045% indoxacarb (Advion) or 0.015% spinosad (Ortho Fire Ant Killer), a standard bait with 0.73% hydramethylnon (Siege-Pro), and a control of 30% once-refined soybean oil on pregeled defatted corn grit. Colonies were either not starved or starved for 5 days, and there were five replicate colonies per starvation regime and treatment.

In general, effects of baits were more pronounced in the starved colonies. Starved colonies exposed to the indoxacarb bait had 100% worker mortality and all queens were dead within 3 days, while non-starved colonies reached the same level of control in 6 days. The standard bait containing hydramethylnon had 100% of the queens die within 9 days and 83% worker death when colonies were starved. In contrast, colonies that were not starved had 60% queen mortality and a maximum of 36% worker reduction. Colonies exposed to spinosad over both starvation regimes had a maximum worker reduction of 35% and one queen dead after 18 days, while control colonies grew larger without any queens dying.

The mortality response profile of *S. invicta* workers from a 24 hour exposure to the baits showed that only hydramethylnon nearly met the traditional delayed toxicity criteria, as defined by Stinger et al. (1964), of <15 % mortality at 24 hours after initial access to toxicant and ≥90% mortality by 14 days. Spinosad killed 96% of the workers and indoxacarb killed 57% within 24 hours. However, the response profile for indoxacarb revealed virtually no symptoms of toxicity for at least 8 hours before an abrupt, rapid increase in mortality which reached 100% in 48 hours. This contrasted with spinosad which caused very rapid mortality that started within 4 hours and by 48 hours had 99% mortality. Given the consistent and rapid laboratory colony death with the indoxacarb bait, Stringer's delayed toxicity criteria perhaps should be modified to include toxicants that provide delays of at least 8 hours before the onset of symptoms of toxicity. A shorter delayed toxicity criterion could facilitate the development of fast-acting fire ant baits.

## References Cited

Stringer, C.E., Jr., C.S. Lofgren, and F.J. Bartlett. 1964. Imported fire ant bait studies: Evaluation of toxicants. J. Econ. Entomol. 57: 941-945.

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