SULFURYL FLUORIDE FOR THE CONTROL OF PHOSPHINE-RESISTANT INSECTS

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SUMMARY

A field experiment was conducted in eight 13.6-MT steel bins containing 6.8 MT each of wheat to assess efficacy of sulfuryl fluoride (SF) control phosphine-resistant and susceptible *Rhyzopertha dominica* (F.) and *Tribolium castaneum* (Herbst). Approximately 400 adults of each type of beetle were added to each bin. Additionally, muslin bags containing immature stages and adults, with their respective diets, were also placed in bins. Four bins were fumigated with SF and four bins were untreated controls. The SF dosages in treated bins ranged from 1,196–1,467 mg-h/liter. Mortality of adults in each bag was assessed 5 d post-fumigation. Diet minus adults from each bag were incubated in a jar, and number of adults counted after 8 wk.

Insect damaged kernels (IDK) were assessed pre-fumigation and up to 6 wk post-fumigation. No significant change occurred in number of IDK of wheat in SF-treated bins. A significant increase in IDK occurred in wheat in untreated bins.

In trier samples from SF-treated bins, *R. dominica* numbers declined from 24 pre-fumigation to 0 at 3 and 6 wk post-fumigation; *T. castaneum* numbers were very low and were unchanged. In the trier samples for untreated bins, *R. dominica* numbers were not significantly different for the three sampling periods and *T. castaneum* numbers increased significantly 3 and 6 wk post-fumigation. In WBII traps from SF-treated bins, numbers *R. dominica* and *T. castaneum* declined from 25 and 33, respectively, pre-fumigation to 0 or near 0 at 3 and 6 wk post-fumigation. In WBII traps from untreated bins, the mean numbers of *R. dominica* and *T. castaneum* increased significantly from 1 wk pre-fumigation to 3 wk and 6 wk post-fumigation.

Mortality of adults in each muslin bag was assessed 5 d post-fumigation. Diet minus adults from each bag were incubated in a jar, and number of adults counted after 8 wk. Mortalities of resistant and susceptible adult *R. dominica*, and adult and large larvae of *T. castaneum* in SF-treated bags was 100%, but was very low in untreated bags. For all four types of beetles, adult numbers in jars associated with SF-treated bins were 0 or near 0, compared to large numbers of adult beetles found in jars associated with untreated bins. Results show SF is effective against all life stages of highly phosphine-resistant *R. dominica* and *T. castaneum*, and can be used for phosphine resistance management.