

PROFUME® UPDATE: POST-HARVEST COMMERCIAL ACCEPTANCE AND PERFORMANCE IN THE US

Robert Williams, Dow AgroSciences LLC, Atascadero, CA
Ellen Thoms*, Dow AgroSciences LLC, Gainesville, FL

This presentation is an updated summary of research findings previously reported at this conference. It includes commercial fumigation data with ProFume® gas fumigant (99.8% sulfuryl fluoride [SF], Dow AgroSciences, Indianapolis) collected from mills, processing plants and commodity facilities in North America between January 2004 and August 2008. The presentation also includes an update on the use of ProFume in commercial fumigation chambers with fresh dates in southern California.

ProFume was first registered in the U.S. for post-harvest fumigation of cereal grains and dried fruit and tree nuts in January 2004. In July 2005, U.S. registration for fumigation of food processing plants was approved. By summer 2008, ProFume was known to be used in approximately 375 U.S. commercial fumigations at over 185 different mill, processing plant and commodity facilities. The number of ProFume fumigations has increased each year. Due to a high level of customer satisfaction with ProFume performance, the number of repeat fumigations is also increasing each year. About one-third of all commercial job locations have received from 2-7 fumigations at that location. These data indicate a significant commercial acceptance of ProFume as a post-harvest fumigant alternative to methyl bromide (MB).

The Fumiguide™ Program for ProFume gas fumigant must be used by the fumigator to calculate pest and temperature-dependent ProFume introduction doses and Concentration x Time (CT) dosages. For each monitored area within a fumigated structure, the Fumiguide can calculate real-time and final CT accumulated dosages and gas retention (half-loss time or HLT). Combined Fumiguide data representing over 60% of all the known 375 commercial fumigations revealed that the average fumigated volume of mill, processing plant and storage warehouses to date was nearly 31,149 m³ (1,100 Mcf). Average accumulated CT was 624 g-h/m³ (oz-h/Mcf) achieved with an average 38.4 g/m³ (2.4 lb SF/Mcf). The corresponding average commodity structure was over 9,911 m³ (350,000 ft³) in volume with an average of 24.0 g/m³ (1.5 lb/Mcf) used to achieve an average of 814 g-h/m³ accumulated CT.

Dow AgroSciences continues to work with post-harvest processors to document commercial suitability of ProFume for fumigating commodities. As a follow-up to the initial commercial fumigation trials in fresh dates reported at this conference last year, product bins full of dates and stacked in the same 142 m³ (5 Mcf) commercial fumigation chamber used in previous trials were exposed to ProFume for 15.6 hours at 21° C (70° F) in April 2008. All-life-stage culture

bioassays of dried fruit beetle (*Carpophilus hemipterus*) buried about 30 cm (1 ft) deep in separate bins in the stacks showed 100% control in three of the four culture replicates exposed to a range of 536-636 g-h/m³ (oz-h/Mcf) and 98.5% control in the fourth replicate exposed to 598 g-h/m³. These results are more favorable in both performance and subsequent economics than previous findings. Following necessary repairs to the fumigation chamber to again provide the 35-h HLT observed in the first set of trials in 2006, the same average 582 g-h/m³ observed in this trial would be achieved with an equivalent of 32 g/m³ (2.0 lb/Mcf). This would be an arguably cost-effective 1.5X the historically standard MB dose of 21 g/m³ (1.3-lb/Mcf) that could provide nearly 100% control of all life stages of dried fruit beetle infesting fresh dates.

Technical benefits of ProFume over MB were again demonstrated in the date trial. Buffer zone requirements of the California Department of Pesticide Registration were considerably smaller than those required for MB. Introduction of ProFume was completed in a third of the time typically necessary for MB. Fumigant equilibrium was again achieved within 15 minutes of completing ProFume introduction, compared to 1.5 hours needed for MB in previous trials. Aeration of ProFume was accomplished in 2 hours, compared to 4 hours required for MB in previous trials. Clearing the chamber of ProFume using a hand-held, continuously running, real-time clearing device was easy and accurate, compared to the necessarily more time-consuming multiple point air sampling with single-use gas detection tubes for MB. The entire aeration, clearing and bin removal process was about 1.5-hour faster with ProFume than previously documented for MB.

Overall, ProFume continues to demonstrate flexibility in exposure time, dosage rates and aeration procedures to safely meet site-specific needs of the customer. These experiences support ProFume as a technically viable and efficacious alternative to methyl bromide for a variety of market needs.