

# Update on the Commercial Acceptance of ProFume® Gas Fumigant

Ed Hosoda

Cardinal Professional Products

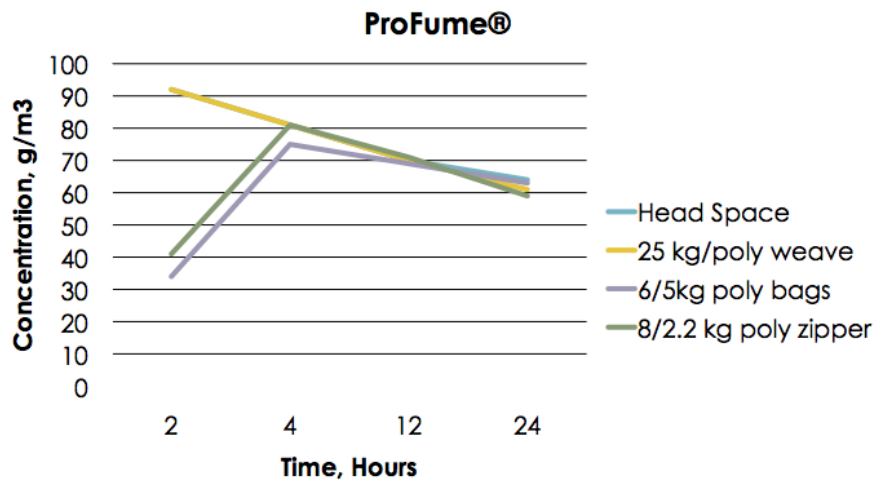
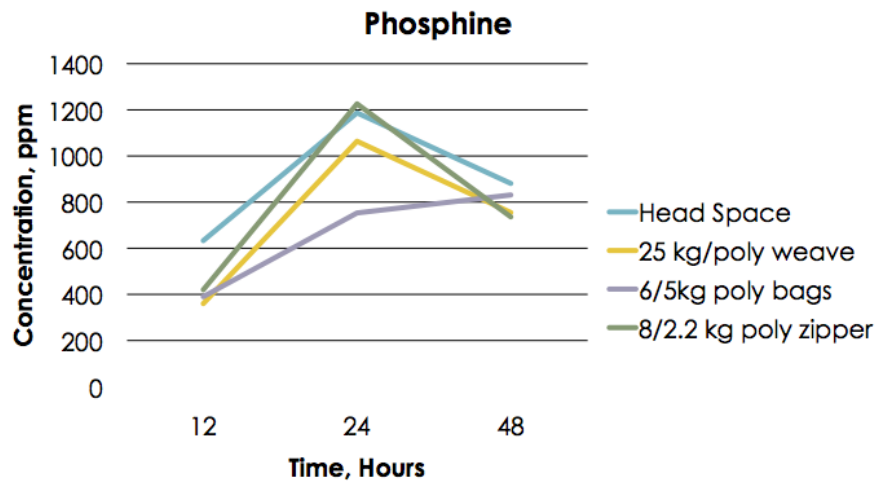
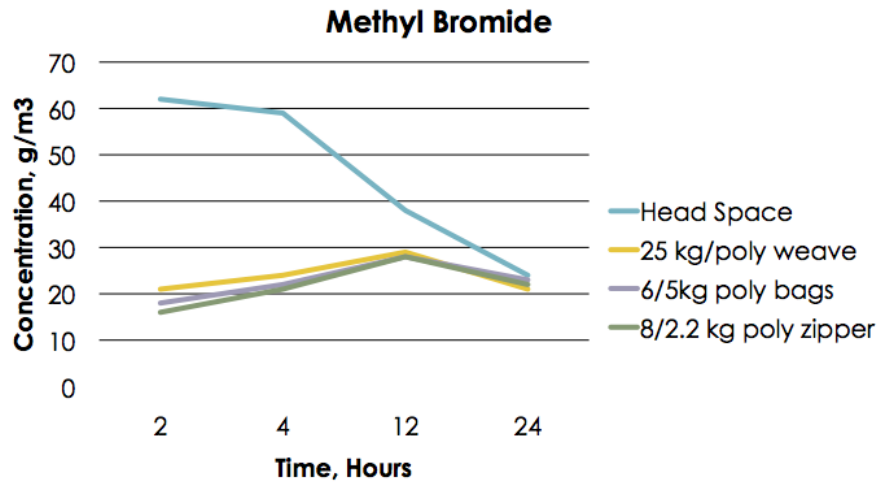
As the amount of available “Critical Use” methyl bromide continues to decline in the post-harvest marketplace, we are finding that sulfuryl fluoride (ProFume® Gas Fumigant) is successfully replacing methyl bromide for many different applications. Many flour and rice mills have made the transition to ProFume® over the last several years, and have found that by carefully monitoring the use and application of ProFume®, along with evaluating insect bioassays, we have come to the conclusion that ProFume® can be a viable alternative to methyl bromide. California tree nut processors have contracted with independent laboratories to evaluate control of various stored product insects. These labs have performed intense studies on egg control (specifically Navel orangeworm, Codling moth, Red & Confused flour beetle, and Indian meal moth) utilizing varying doses of sulfuryl fluoride under vacuum and atmospheric conditions. As a result of these studies, the industry has been able to prescribe specific doses that will provide excellent control, comparable or superior to the typical doses of methyl bromide used in the past. The rice industry has struggled over the past several years with a seeming “tolerance” of Lesser grain borer (*Rhyzopertha dominica*) to phosphine fumigants, with fumigant applicators often performing multiple applications to rice storage facilities without controlling this insect. We have found that ProFume® easily controls Lesser grain borer at fairly low doses in the field.

As we find ways to use ProFume® in commercial applications in the field, we are performing research trials to further evaluate its performance so we can optimize its use, and maximize its performance by using Dow AgroScience’s concept of “Precision Fumigation”. An example of this is a trial we performed on package penetration of three different fumigants, methyl bromide, phosphine, and ProFume®. This trial was performed on three separate sea containers of packaged rice products (8 x 2.2 kg poly bags, 6 x 5 kg poly bags, 25 kg poly weave bags, Figure 1), where we measured gas concentrations in the innermost package of palletized milled rice products. We found that of the three fumigants, ProFume® penetrated each package (to a concentration equivalent to the ambient concentration within the container, i.e., equilibrium state) within four hours, where methyl bromide and phosphine took 24 and 48 hours respectively (Chart 1). This rate of penetration allows for quicker accumulation of CT Product where the target pests reside. Typically, methyl bromide and phosphine fumigations commence aeration at the 24 and 48 hour mark respectively, at a point at which equilibrium has just been attained.

Figure 1



Chart 1



In May, 2010, we performed a trial at a raisin producer’s facility in the Central Valley of California. The purpose of this trial was to determine whether ProFume® can be utilized in a typical raisin “stack” without the requirement of recirculation fans, which will facilitate the application process. It was found that by injecting ProFume through a typical shooting hose at the top of the stack, equilibrium concentrations can be obtained within two to three hours without the use of recirculation fans. Many stacks don’t have access to an electric source, so the requirements of an electric fan for distribution of ProFume Gas Fumigant would be prohibitive. Three stacks were treated, the first with a fan source, and the next two without. Table 1 displays the gas concentration data in Stack 1 at four different locations, plus a monitoring point within a bin full of raisins and utilizing a recirculation fan. Table 2 shows the results of Stack 2 without a recirculation fan. See Figure 2 for pictures of the raisin stacks.

Table 1  
Stack 1  
Fumiscope® Readings (oz/1,000 ft<sup>3</sup>)  
ProFume® Introduction at 3:55 PM with Circulation Fan

Time	4:15 PM	5:00 PM	6:00 PM
East	17 oz	25 oz	23 oz
West	31 oz	27 oz	25 oz
North	21 oz	23 oz	22 oz
South	23 oz	24 oz	22 oz
Inside Raisin Bin	7 oz	11 oz	22 oz

Table 2  
Stack 2  
Fumiscope® Readings (oz/1,000 ft<sup>3</sup>)  
ProFume® Introduction at 3:15 PM without Circulation Fan

Time	4:15 PM	5:30 PM	6:30 PM
East	27 oz	25 oz	22 oz
West	22 oz	23 oz	23 oz
North	45 oz	32 oz	27 oz
South	25 oz	25 oz	24 oz
Inside Raisin Bin	23 oz	24 oz	22 oz

Figure 2



In the last two years, several Canadian flour mills and pasta facilities have been fumigated with ProFume® with comparable results to methyl bromide. The fumigation companies have adapted to using ProFume® even though a considerable amount of labor is required for the entire application process, and monitoring of the fumigant. These companies have quickly realized that this new fumigation process provides them with a means to validate that an efficacious treatment has occurred, and offers a more “professional” service for their customers.



Canadian Pasta Plant



Canadian Flour Mill

In summary, we are finding many ways to utilize ProFume® for treatment of various commodities in a variety of storage structures and processing plants. The flexibility of the CT Product concept allows for users to prescribe exact treatment exposure periods, whether long or short, that meet the needs of their production or shipping schedules. We are also finding that with longer exposure periods, such as treatments in grain storage facilities, or raisin stacks, the cost of the application is competitive with metal phosphide fumigants.