PROFUME™ FUMIGATION OF RICE MILLS IN CALIFORNIA: EFFECTIVENESS AND USER PERCEPTIONS

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SUMMARY

A US nationwide assessment of flour beetle (*Tribolium* spp.) population dynamics in wheat and rice mills following fumigation was initiated in spring 2005. Population dynamics will be assessed based on at least 16 fumigations. Eight assessments will be done in structures fumigated with ProFume (99.8% sulfuryl fluoride, Dow AgroSciences LLC) and eight with methyl bromide, At this writing, eight mills have been initiated, four ProFume (all rice) and four methyl bromide (one rice and three wheat). Three more mills (1 wheat & 2 rice) are scheduled for fumigations in October, but the fumigant has not yet been decided. Monitoring of insect populations is being done with commercial food-baited traps fitted with *Tribolium* spp. aggregation pheromone lures, beginning at least two weeks prior to the fumigation and extending at least 10 weeks post-fumigation, but longer if possible. For standardization across all sites, 35 commercial traps were placed at each facility, approximately 30 inside the fumigated area and 5 outside along the structure perimeter. Trap placement incorporates the entire facility as best as possible, but with a focus on the most critical site-specific potential infestation areas prone to dust accumulation and infestation patterns. Traps were collected at 2-3 week intervals, placed individually into zip lock bags and shipped to Kansas State University for trap enumeration. Traps were replaced with new ones at the same sampling locations within a mill/facility. Insect counts in traps will be correlated with mill temperature, IPM practices (general sanitation, pest exclusion, fogging, etc.) along with product sampling and insect fragment count data if such ancillary data are available.

The first assessments initiated in this study were four rice facilities in California. Fumigations were conducted on 21 May, 28 May, 11 July and 8 August 2005. All were fumigated with ProFume. These are of particular interest because they represent the first four commercial fumigations with ProFume in California following California state registration approval on 18 May 2005. They also represent the first known US rice facilities with published population dynamics data correlated with structural fumigation. All four facilities continue to be monitored as of this writing, although one may be discontinued soon due to low pre- and post-treatment insect counts.

The first two mills will be discussed here. They both have post-treatment monitoring intervals in excess of 20 weeks during a hot California summer recognized by many pest management professionals in the area as an extremely high flour beetle infestation year, with large populations present outside both mills. The first mill was fumigated for 30 hours at a ProFume dose of about 1.6-lb SF/Mcf for a target dosage of 358 oz-h/Mcf CT.

With “add-gas”, the final ProFume dose was about 1.9-lb/Mcf and a mean dosage of 428 oz-h/Mcf was achieved. Although this exposure period was longer (necessitated by CA specific aeration requirements) than the historical 24-h exposure with methyl bromide conducted twice per year, the shorter aeration interval with ProFume compensated for the difference, and the overall down-time was equivalent for both fumigants. The second mill was fumigated over the Memorial Day weekend for 34 hours (again due to CA specific aeration requirements) at a ProFume dose of about 1.5-lb SF/Mcf for a target 353 oz-h/Mcf CT. With no “add gas” the mean CT achieved was 414 oz-h/Mcf. Another fumigation occurred over the Labor Day weekend, 14 weeks later, per the normal fumigation schedule for this mill. These two fumigations in 2005 were the fifth and sixth consecutive ProFume fumigations at this mill, with previous fumigations over Memorial and Labor Day weekends under experimental California Research Authorizations in 2003 and 2004. Methyl bromide can no longer be used efficiently at this mill due to California buffer zone restrictions.

The same commercial fumigator has conducted six of the seven commercial ProFume fumigations in California to date since registration approval. He was also the fumigator for the four previous fumigations conducted at the second facility under Research Authorizations in 2003 and 2004. To date this fumigator has conducted 10 commercial-scale fumigations with ProFume in California. He has indicated that ProFume requires more set-up time, with the need to use introduction lines to introduce the fumigant from outside the structure rather than his common historical procedure of placing and releasing methyl bromide cylinders inside the structure. He also has indicated that he spends more effort sealing the structure, not because ProFume is more difficult to retain, but because he recognizes the good practice of better sealing due to increasing legal threats of potential buffer zones and economic necessity with higher costs of both ProFume and methyl bromide. Some of his extra sealing efforts are permanent improvements that need not be repeated in subsequent fumigations. He has found that gas retention for ProFume is equivalent to his historical 25-year experience with methyl bromide. He estimates that he has fumigated the first facility at least 25 times, and believes that both ProFume and methyl bromide are equally capable of being confined and that his efforts to better seal the facility for the recent ProFume fumigations would equally benefit methyl bromide retention. He has also observed that ProFume is easier to aerate and clear than methyl bromide and that he can increase exposure time to reduce the amount of ProFume needed, still completing the fumigation in his historical overall fumigation down-time. His overall fumigation costs are equivalent to his historical methyl bromide fumigation costs. In the second mill, he has been able to gradually improve sealing of the structure over his 3-year experience fumigating the mill with ProFume and subsequently reduce the overall amount of ProFume needed, again keeping his fumigation costs equivalent to his overall methyl bromide experience. With his 10-fumigation experiences with ProFume, this fumigator has expressed complete satisfaction with ProFume.

The millers at both of these rice mills have expressed complete satisfaction with ProFume in insect control to date. The miller of the first mill was sufficiently satisfied with the May fumigation to choose ProFume for the fumigation of the company’s second mill in August, 10 weeks later. The miller of the second mill has relied on ProFume for his

fumigation needs for 3 years and considers ProFume with its extra sealing efforts to provide superior insect control that is equal to or better than that of methyl bromide.