OPTIMIZING FUMIGATION EFFICIENCY WITH PROFUME* GAS FUMIGANT

Robert E. Williams
Dow AgroSciences LLC, Moorpark, CA (USA)

Dow AgroSciences continues to research, develop and promote "Precision Fumigation" techniques as we prepare to introduce ProFume gas fumigant (99.8% sulfuryl fluoride) as a methyl bromide alternative for food processing industry, post-harvest insect control. Through cooperative efforts with government and university researchers, food commodity groups and commercial fumigators in Europe and the US, 26 empty mill fumigation trials have been conducted since 1996.

The focus of these trials has been to investigate precision fumigation techniques to "optimize fumigant use by maximizing efficiency and minimizing risk". Precision fumigation is achieved by integrating into the fumigation management plan all factors affecting pest population control, such as pest biology, temperature, exposure time, and enhanced sealing techniques to improve gas retention. Long-term availability of all fumigants will depend on our ability to use them wisely and efficiently.

Monitoring area-specific gas concentrations within the fumigated structure, using a Fumiscope™ (Key Chemical Co., Clearwater, FL), provides the fumigator the ability to identify area-specific and overall gas Half-Loss Times (HLT) and confirm targeted gas Concentration x Time (CT) dosage accumulations. Also, fumigant re-introduction needs can be determined to achieve the target CT. A low CT at any location may result in pest population control failures, unless additional fumigant is introduced to offset these differences.

Case studies of the 26 thoroughly monitored ProFume mill fumigations have shown that CT varied within the fumigated structures by an average of about 39%, with a range of about 3% to 114%. This corresponds to about 80% to 120% of the targeted CTs for these structures. Improved air circulation strategies with thoughtfully placed fans and ducts, based on prior experience and good monitoring records of previous fumigations of a given structure, can help achieve target dosages and subsequent pest population control.

Among the 26 mill fumigations, two mills were fumigated more than once to identify fumigation efficiency procedures. In one trial site, enhanced fumigation techniques over 5 annual fumigations decreased the percent CT variation across

---

* Trademark of Dow AgroSciences LLC.
ProFume is not available for sale. EPA registration is pending.

areas of the structure from about 27% to 3%. Gas retention was nearly doubled, from 8.4 to 16.7 hours HLT, and the equivalent saving in gas costs was about 20%.

At a second site over 3 annual fumigations, the percent variation in CT across areas of the structure was decreased from about 114% in the first year to 20% in the third year. Gas retention was increased from 7.5 to 8.9 hours HLT and the equivalent gas saving was about 8%. These improvements were possible due to maintenance of good fumigation setup and monitoring records, which allowed for evaluation of modifications in subsequent fumigations.

In conclusion:

- Dow AgroSciences continues to research, develop and promote "Precision Fumigation" techniques to "optimize fumigant use by maximizing efficiency and minimizing risk".

- Well-planned gas concentration monitoring provides the ability to better manage CT dosage accumulation and subsequent pest population control across the fumigated structure.

- Enhancements in air circulation strategies, along with enhancements in sealing techniques, can help achieve targeted dosages and subsequent pest population control; greater gas retention provides gas cost savings.

- Thorough preplanning followed by critical review of past fumigation experience are the keys to continuous fumigation process improvement yielding cost savings and enhanced safety.