THE CHALLENGES FOR DEVELOPMENT OF A NEW FUMIGANT FOR USE IN THE POST-HARVEST INDUSTRY

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In 1992, the Montreal Protocol called for the phase out of substances that the treaty identified as having a significant impact on destruction of stratospheric ozone. One of these substances was the widely used fumigant methyl bromide (MB) utilized to aid in crop production as a pre-plant soil fumigant and as a post-harvest fumigant for food commodities and structures for storing, processing and transporting these commodities. With the adoption of the Montreal Protocol, the search for replacements for MB was re-initiated. The search for an alternative fumigant to MB really began more than 60 years ago by the Dow Chemical Company, which manufactured many fumigants including MB. As a result of an active, systematic fumigant discovery program by Dow Chemical throughout the 1950's, sulfuryl fluoride (SF) was identified as the best alternative post-harvest/structural fumigant to MB. SF was developed, registered and marketed by Dow Chemical in the United States since 1961as the structural fumigant called Vikane® gas fumigant.

As Dow Chemical discovered in the 1950's, there are a very finite number of molecules which exist as a gas at a broad range of temperatures and have the necessary attributes to be a post-harvest fumigant. Fumigants other than SF evaluated for post-harvest application are limited by one or more serious shortcomings. Therefore, several progressive food industries in the United States and Europe approached Dow AgroSciences to consider developing SF for food commodity use. Beginning in 1995, Dow AgroSciences formed collaborations with leading stored product researchers, fumigators and food industries around the world to develop SF (ProFume® gas fumigant) as a post-harvest fumigant.

The extensive research database for SF, successful registration review completed in 1993 for Vikane, commercial experience with Vikane, and Dow AgroSciences employee expertise with fumigants enabled the company to determine a high probability of success in developing SF as a post- harvest replacement for MB. Significant investment was still required by Dow AgroSciences to register and commercialize ProFume for the post-harvest market. This included: extensive laboratory and field efficacy trials on stored product pests; development of the comprehensive, Windows-based Fumiguide® for dosage calculation; GLP studies on SF residues in food commodities and atmospheric residues (for worker and bystander safety); verify no effect of SF on food quality and taste; develop confinement (tape-and-seal), introduction, and aeration methods specific to post-harvest industry; verify SF penetration into food commodities; develop new detection equipment suitable for the post-harvest industry; and develop technology transfer training programs for post-harvest fumigators.

A company must be willing to make the significant investment to develop a post-harvest fumigant that meets the many requirements for regulatory and commercial acceptance. To date only one new broad spectrum post-harvest fumigant (ProFume) has been registered globally (17 countries). The significant investment to meet these requirements and risks of failure associated with such an endeavor make it unlikely that another fumigant with the versatility and favorable attributes of ProFume will be discovered and developed for the post-harvest market.