Session 8. Potential threats to conventional fumigation

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Rapporteur's Report

The session attracted considerable attention, apparently due to the interest in the effect of regulations on fumigants and also due to concerns over insect resistance.

The first paper in this session, entitled "Potential Threat to Conventional Fumigation from Regulatory Legislation in European Communities", was presented by Dr. Zlatko Korunic of Korunic Corporation of Plant Protection in Croatia. He reviewed the Council Directive of July 1991 that was adopted by the Council of European Communities. Due to public concern about the environment, pesticide safety, and residues in food, the European governments are offering this program of pesticide review and harmonization of differences in old regulations, as well as development of strict new regulations. Methyl bromide, phosphine, and hydrogen cyanide are necessary fumigants but data need to be updated (e.g., toxicology and air emissions) and work standards require improvement. Yet specifics are not available, and no other actions are expected until the United States Environmental Protection Agency (EPA) has finished new regulations.

Dr. James Sargent of Great Lakes Chemical Corporation (USA) focused his presentation on methyl bromide and ozone depletion, but remarked that considerable regulatory activity affecting fumigants has taken place over the last few years and will be forthcoming in the next few months. By recent amendments to the United States clean air act, methyl bromide would be considered an ozone depleting substance, and industrial production, however small compared to natural production, must end by the year 2,000. However, there are considerable uncertainties and contradictions regarding "ozone depletion" so the exact outcome is still unknown. The complete loss of methyl bromide as a fumigant would certainly impose severe environmental and human costs, while ozone measurements were predicted to remain essentially unaffected.

Mr. John Giler of the Federal Grain Inspection Service of the United States Department of Agriculture, reviewed the history and details of the "Federal Grain Inspection Service Fumigation Policy and Procedures". Currently, in-transit use of aluminum phosphide on ships (at a dosage of $1.6 g/m^3$), is the only method tested and thus the only method described in their handbook. Considering the development of resistance by insects to phosphine, and the devlopment of improved fumigant application methods, additional work on the use of CO_2/PH_3 mixtures is being undertaken.

Dr. Ezra Donahaye and Miriam Rindner of the Volcani Center in Israel authored a paper on "The specificity of resistance imparted to a strain of *Tribolium castaneum* (Herbst) selected for resistance to hypoxia, and a strain selected for resistance to hypercarbia". Dr. Donahaye presented data to show that strains of red flour beetle resistant to either low-oxygen concentration or to high-carbon dioxide content were susceptible to the other modified atmosphere under the conditions tested, and also susceptible to phosphine and methyl bromide. In general, longer exposure times will apparently be necessary in order to achieve mortality should stored grain insects become tolerant to high-CO_2 or low-O_2 concentration atmospheres.

In general, the papers presented at the session, and discussions that occurred in and out of the meeting room, seemed to point to the following:

1. It appears that insects are capable of developing biological mechanisms to adapt to any preventative or control measure .
2. Toxic gases for use in stored-grain insect control are under considerable and interestingly diverse regulatory pressure.
3. Regulatory measures are becoming unrealistically burdensome and probably will affect the availability and quality of stored-grain and other commodities.
4. Current and future challenges for practical stored-product protection are increasing for both research scientists and extension specialists.
5. Obstacles in the application of effective prevention and control strategies appear to be principally related to problems of human behavior, economics, and politics, rather than science.