Session 6: Application methodology of CA/fumigation (including storage sealing techniques)

Christoph REICHMUTH
Federal Biological Research Centre for Agriculture and Forestry, Institute for Stored Product Protection, Königin-Luise-Straße 19, W-14195 Berlin 33, Germany

Rapporteur's report:

In the 6th session, 5 papers were presented by scientists from the UK, the Russian Federation, Ukraine, France, Taiwan, and the People's Republic of China. All speakers stressed the point that the development and introduction of new techniques into practice requires a large investment before there is any profit.

The advantage of using gas generating systems was shown for the application of controlled or modified atmospheres in grain bins.

Field trials were reported from the UK which point in the direction of automatically operating nitrogen generating systems or burner-gas generators. These are becoming more and more convenient to install, and they maintain a stable modified atmosphere within the grain store or silo bin for prolonged periods at a composition that is lethal to all stages of insect pests present. In addition, the microflora is inhibited from growing during that time. The influence of gas-tightness, and fluctuating wind and temperature, on the uniformity of distribution of carbon dioxide was clearly pointed out. This can presumably be avoided by measuring the important physical factors, and regulating pressure and gas-flow accordingly. Total running costs were described as being in the range of about £0.5/tonne grain.

In-transit shipboard fumigation is an established effective insect control technique in the international long-distance grain trade. As in other fields of fumigation, worker safety is at present a very important issue regarding the future use of this inexpensive pest control method. An international team of scientists introduced a further modification into practice, which enables a surface disinfestation treatment of the ship hold together with a test for gas-tightness, prior to actual fumigation. It was shown that thorough sealing precludes gas-losses during the voyage, thereby also preventing diffusion or convection into the working area and the living quarters of the ship. The efficacy of the control measure is also ensured.

Modifications in the use of classical fumigants such as phosphine (from cylinders together with CO_2 in the UK), and methyl bromide (recirculation in grain bins in the People's Republic of China), as well as the first step towards application of CO_2 in grain bins in Taiwan, have demonstrated impressively that there is now an obvious world-wide awareness of the need to minimize hazards towards workers and the ambient, in stored-grain pest control treatments. This public demand, together with the necessity to protect

stored-products from quality decay, pest damage and loss, have directed many countries towards new technical approaches.

It can be seen from the presentations in this conference, that intensive research, extension work, and publications on the use of gases has rendered pest control safer and more effective world-wide.

Such a meeting cannot cover comprehensively all important new developments and subjects. Some techniques that were not mentioned but deserve more attention are:

Bulk grain fumigations with phosphine, applied at the surface layer together with carbon dioxide for a limited time period to enhance the distribution of the phosphine to the bottom of the silo (first published by Carmi, in Israel).

Treatment of high-value stored-products such as spices, with carbon dioxide under high-pressure in autoclaves, to control arthropod pests within minutes, or 2-3 hours (first published by Stahl and co-workers).

High degree of gas-tight sealing of entire premises and bag-stacks prior to fumigation, to enable reduction in the initial dosage.

Introduction of standardised pressure testing to determine the quality of sealing, and to conform with minimum gas-tightness requirements prior to fumigation according to different specific circumstances such as proximity to residential neighbourhoods, absence of gas exchange in the ambient due to inversion weather, strong wind or other factors (first published by Banks and coworkers).

In view of the lack of funding for the simultaneous development in different laboratories of the many new methods of stored-product pest control, the question arises as to whether new developments such as the CO_2-generator needed to be carried out in at least four countries (US, UK, Australia and Israel), that not only have a common language but are also in close scientific contact. One wonders why no better form of international cooperation exists that would economise much needed funds while researching new fields? Is it the law of private enterprise and competition in action? Certainly we are far too accustomed to this element of so-called progress over the past 150 years. The conference in Rio de Janeiro has (again) clearly shown, that we have to think more in global terms and cooperate across national borders in order to identify and detect good and sound technical solutions for stored-product management, prevention of losses and pest control, and thereby contribute to saving the planet for the future of our race.