SESSION 3: INFLUENCE OF CA AND/ OR FUMIGATION ON QUALITY PRESERVATION OF STORED PRODUCTS

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Rapporteur's Report

Although nine papers were offered in this session, it was disappointing that only four of these were presented at the conference.

The first paper, presented by Shlomo Navarro, described collaborative investigations conducted by the Department of Stored Products in Israel and the National Post Harvest Institute for Research and Extension in the Philippines. The main project objective was to design an affordable, user-friendly system, which did not rely on the use of pesticides, for the farm storage of paddy in the Philippines. The Volcani Cube, a flexible, gastight structure previously developed for use in Israel, was evaluated, using 10- and 20-t structures, for suitability for storing paddy under tropical conditions in the Philippines. It was concluded that paddy spoilage during storage, caused by wetness due to condensation, could be prevented by using an insulating layer of rice hulls to reduce temperature gradients. Under Philippine conditions, bulk or bagged paddy could be stored for 4 months without reduction in seed viability or in milling recovery, and yellowing was not affected. The cost of the structure was not addressed during the presentation but was subsequently questioned. There was an indication that this was likely to be substantial, and cost could be a significant factor in the potential for adoption of the structure by farmers in the Philippines.

The second paper, given by Boris Yakobson of the Kimron Veterinary Institute in Israel, dealt with a topic rather different from those usually presented at the conference. B. Yakobson presented the results of an investigation into control of the greater wax moth *Galleria mellonella*, which damages beeswax and combs, using CO_2 as a replacement for the chemical control methods formerly employed. It was found that effective control of all developmental stages of the moth could be achieved using a 60% concentration of CO_2 maintained for 100 h. It was reported that this method of control has now been in use for 5 years and is considered to have many advantages, including its being environmentally friendly and safe to apply and its enabling honey to be produced without chemical residues.

Some attempt to use the hermetic principle of grain storage had been traditionally practiced in Cyprus for many years, and in the third session paper a description of four methods formerly employed was jointly presented by the Ministry of Education and Culture, Nicosia, and the Cyprus Grain Commission. Eleni Papedemetriou described four traditional grain storage methods, one an underground structure and the others, including an oven and a clay pot, for storing grain above ground. The use of fire before loading

grain in the underground store and in the oven was an attempt to both control any residual insect infestation and reduce the r.h. One other grain-storage technique employed a thick-walled bag that was buried under a layer of straw. Andreas Varnava, in providing some scientific explanations for the use of these traditional storage techniques, concluded that the underground store and the oven had probably provided some degree of airtightness, but clay pots, because they were opened very frequently, offered little if any opportunity for hermetic control of insects. Although the storage of grain within straw resulted in some modification of the surrounding air, there was insufficient evidence to suggest that the method provided effective control of insects. It was concluded that none of the traditional methods described provided truly hermetic conditions for grain storage.

The final paper of the session described investigations, conducted in Cyprus over 7 years, into the storage of barley under PVC liners. The programme was carried out by the Cyprus Grain Commission and, in presenting the results of investigations, A. Varnava acknowledged the collaboration of the Israel Department of Stored Products. Trials evaluated the storage of bulk barley loaded on concrete platforms and covered with PVC sheeting. The effect of using a polythene base sheet, on which the grain was loaded, was investigated. In some trials, the platform storage technique was evaluated over a 3-year period. Although the use of a base sheet was found to be beneficial in influencing CO_2/O_2 concentrations, it did not affect overall grain losses. Storage of barley using the platform technique resulted in germination being retained at levels in excess of 94% and, although grain that was visibly damaged by mould growth contained mycotoxins, sound grain remained toxin free. Costs using the platform technique were shown to be reduced when the period of storage increased. Substantial losses of grain were sustained in Cyprus during the period 1992–1995 because of rain damage, and it was clear that, had the Cyprus Grain Commission been using the platform storage technique routinely during this period, grain losses would have been much reduced. It was concluded from investigations into platform storage that, for dry barley under Cyprus conditions, the technique was very cost-effective and also gave good protection against rain, birds and rodents. Conference delegates had the opportunity to learn more about the platform storage method and to see it in operation during a field excursion in Nicosia.

The general conclusion from the session presentations was that techniques employing CO_2 and controlled atmospheres were being widely researched and developed to a degree where, in some instances, they were suitable for introduction into routine storage practice. The benefits to be derived from such introductions were effective techniques for pest control purposes which were both user and environmentally friendly.