On behalf of the organizing committee of the 7th IWCSPP, I have the pleasure of summarizing the activities of the past six days. This summary is only a preliminary and brief one as it was not possible for me to attend all the sessions and workshops.

1. The 7th IWCSPP is coming to a successful end. This could not have been achieved without the valuable support from Dr. J. L. Zettler, Chairman of the Permanent Committee, and from the Ministry of Science and Technology of the People's Republic of China, the China Association for Science and Technology, the State Bureau for the Affairs of Foreign Experts, the former Ministry of Internal Trade, the State Administration of Grain Reserves, the Chinese Cereals and Oils Association, the Administration of Animals and Plants Quarantine, and the China Zhonggu Cereals & Oils Group Co as well as the 400 participants from 48 countries.

The conference has achieved its desired objectives, i.e., to exchange information on research achievements, to discuss issues of mutual interest, and to promote cooperation and friendship between scientists from different countries.

The selection of China as the venue for the 7th IWCSPP has provided a unique opportunity for the Chinese experts and scholars to know more about the experiences of other countries. This will provide a valuable impetus to China's stored-product protection research, and will go down in history as a grand event in the development of China's grain storage science.

Being held at the turn of the century, the 7th IWCSPP is of great significance as it provides an opportunity to put forward a comprehensive plan for the new century-to improve protection and utilization of human food resources, to protect and enhance the environment, to improve the quality of life, and to explore the basic theoretical issues and key practical technology that needed to be identified and addressed for stored-product protection.

The conference has been successful in the following respects:

1. Although many countries in the world, especially those in the Southeast Asia, are experiencing financial difficulties, experts and scholars from many countries have overcome the problems and attended the conference. The warm support and participation of everyone has ensured the success of this conference.

2. China is a developing country and this year had the biggest floods of the century. Despite this, the various Chinese departments have given their attention and support to the conference and provided opportunities for many Chinese experts and scholars to attend the conference.

3. The conference has completed all tasks on schedule.

- The conference theme has been addressed with detailed consideration of the prospects for development of stored-product protection technology into the 21st century and descriptions of the main research achievement in grain storage in China.
- The papers of the twelve sessions have been presented orally and as posters as scheduled. The requirement for all papers to be presented as posters has been successful and gave all participants immediate access to the research data. The five workshops attracted great interest and have provided valuable guidance for the future research work.
- The exhibition held in association with the conference displayed relevant research achievements and identified opportunities for their utilization and commercial exploitation.

4. The conference has provided opportunities for world experts and scholars to exchange information and establish friendly relations. The cooperation of all participants ensured the success of the conference.

On behalf of the Organizing Committee of 7th IWCSPP, I would like to take this opportunity to extend my sincere gratitude to Dr. J. L. Zettler, Chairman of the Permanent Committee, Dr. B. R. Champ, Chairman of the Organizing Committee of the 6th IWCSPP, and to other members of the Permanent Committee who put forward many suggestions for the conference.

With reference to the content of papers in the conference, there has been less interest in basic studies on stored-grain pests and fungi than on applied technology such as control of and maintenance of grain quality. In applied research, there is more attention to fumigants and protectants than mycology and rodent control. With chemical control, the problems of resistance and residues are becoming more serious, and research on non-chemical control has received increasing attention. With developments in electronics and biotechnology, there have been notable achievements in
the application of computers in information transfer and stored grain technology generally and in genetic engineering for stored-product pest control. In addition, the importance of quarantine has been emphasized and quarantine treatments strengthened.

In summary, it has been shown that it is necessary in solving problems of practical technology for attention to be paid to the economic, social and ecological benefits that accrue from research achievements.

3 Important research achievements reported in the conference

In view of methyl bromide being classed as an ozone-depleting substance and being banned by 2001, at least in the USA, and the continuing spread of phosphine resistance in stored grain insects, especially in tropical areas, much research has been focused on development of alternative methods of pest control. The basic principle of low concentrations and long exposure periods for phosphine has resulted in development of various formulations and methods of application that have been used effectively in practice.

Some old fumigants such as carbon disulphide and carbon tetrachloride have been re-evaluated and sulphuryl fluoride, carbonyl sulphide, methyl iodide and ozone have been demonstrated as potential partial substitutes for methyl bromide.

From the current studies, on the one hand we should acknowledge that fumigation is an endangered technology, and on the other hand, it is evident that the technology will not be lost if there is a continuing and consolidated support internationally for its use rationally.

Research on grain protectants has confirmed the use of mixtures such as an organophosphorus insecticide in combination with a pyrethroid as effective treatments and has verified that there was no cross-resistance between organophosphorus insecticides and deltamethrin. The occurrence in Brazil of a strain of Rhizopertha domitacea highly resistant to deltamethrin has warned of the great care needed both in research and practice. The development of micro-capsule and granular formulations of grain protectants for prolonging effectiveness and lowering residues has great potential. The use of diatomaceous earth has been highlighted as a protectant free of chemical residues that is worthy of further development for widespread use.

Papers on biological control of pests covered a range of applications. Research on the utilization of pathogenic microorganisms has given particular emphasis to the separation of highly toxic strains of Bacillus thuringiensis and the type of insecticidal crystalline gene.

In considering maintenance of stored-product quality by physical methods, many papers concentrated on drying and cooling of grain. Good results have been achieved in developing mathematical models for mechanical ventilation and high temperature drying. A rapid and low cost fumigated bed for drying damp grain has been developed and is being used widely in Southeast Asia.

The use of computers networked with trapping sensors for monitoring the distribution of infestations in grain stacks and the growth and decline of insect populations was described. Considerable progress has been made in deriving a dynamic model describing these events.

The sessions on stored product quality and postharvest technology management were well supported. There is an increasing requirement for the capacity to deliver cereals with proven end-use quality and authors have stressed the need for rapid detection of specific quality criteria for optimal processing and to conform with new specifications related to consumer health. Methods have been developed and could replace current standard methods but there remain some limitations for the general use in grain trade. To maintain optimal quality in stored grain, some authors have included practical measures in their studies on quality change and indices of quality. Furthermore, papers included in the storage engineering session have proved that the condition of storage structures greatly influences insect infestation, Aspergillus flavus infection and subsequent aflatoxin synthesis in stored wheat and maize.

For this reason, measures to achieve gastightness in storage design and to improve existing stores have been proposed.

The quarantine session concerned identification of quarantine pests using multi-media expert systems, risk analyses, strategies and methodologies particularly against larger grain borer Prostephanus truncatus.

In the growth area of information transfer and computer technology, decision support systems have been developed that can be used for training farmers and grain managers. Many companies, industry associations and government organizations now provide extensive information through the Internet. The rapid and widespread transfer of information will accelerate the adoption of advanced technologies and improve the quality of research.

The participants showed great interest in the workshops. Each had undergone careful planning which was of great benefit to participants. It is not necessary to mention workshops linked with sessions again here. The workshop on 'What went wrong? Common errors in stored-product research' was a continuation of 'Minimum standards for key research topics' of the last conference and, undoubtedly, it will continue to play a practical role in improving the quality of research.

4 Opinions and suggestions on the future of stored-product protection work

The object of the stored-product protection working conference is not only to exchange research achievements, but to discuss how to promote stored-product protection.

The Organizing Committee feel that the theme of the...
conference ‘Stored-product Protection into the New Century – Common Approaches and Coordination’ should be the common aim of storage researchers everywhere in the world. Man is now moving into a new century – an era of knowledge and economics. We believe that many more achievements will be made in stored-product protection in the new century with information network systems, scientific management and availability of modern equipment.

4.1 Based on the summary of research achievements and beneficial experiences of stored-product protection in the 20th century, we cautiously put forward research aims for the future. We consider that the general goal for the 21st century is to reduce losses, prevent contamination, reduce costs, improve quality control, maintain nutrition and improve benefits to man generally. ‘Three low, three high’ policy (low loss, low contamination, low cost, high quality, high nutrition, high benefit) is necessary for protecting food resources and the ecological environment and for improving the quality of life.

4.2 Based on the above research aims for the future, we consider that the key research directions should be:

4.2.1 Basic research must be given a priority, especially biology and ecology of stored-product pests, and studies on storage fungi and mycotoxins.

4.2.2 Applied research priority should be given to the following areas:

- Non-chemical pest control technology, including controlled atmospheres, biological control and physical control.
- Utilization of computers in storage management, control of insects and mould, information transfer, control systems for grain drying, aeration, and cooling.
- Development of technology that prevents moulds including fungicides, hygroscopic agents and fresheners, as well as improvement of aeration facilities for lowering temperature and moisture.

4.3 The following measures are also important in effectively carrying out work on stored-product protection:

- Combining technology with economics. Importance should be attached not only to solving practical problems through scientific technology, but also to social, economic and ecological benefits.
- Promoting scientific research and technology to decision makers. It is essential to gain support from persons who manage technology and make policy decisions for government.
- Integrating pre-harvest and post-harvest technology.
- Combining scientific research with technological training.
- Collaboration between developed and developing countries. In this context, scientists from Australia and Europe have provided appropriate examples.

5. Other suggestions:

- Research on information transfer and adoption of technology is a bridge between research achievements and their practical application. It is an important component of stored-product protection science, and we suggest it still be included as a topic of discussion in the next conference.
- As it is necessary for scientific research to gain support from governments and commercial enterprises, we suggest that senior personnel who are concerned with managing technology and making policy decisions in both government and industry in representative countries should be invited to the conference.

Ladies and Gentlemen:

This conference has now finished and on behalf of the organizing committee, I pass the meeting to the President of the Permanent Committee – Dr. Larry Zettler. In the closing of the 7th IWCSPP, at this turn of the century, let us all wish the science of stored-product protection constant prosperity!

Thank you!