Summary of Discussions Preharvest and Postharvest Losses

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The lead paper by H. R. Shuyler, R. H. Gonzalez, W. I. Moller, J. Faure and E. Reusse entitled "Pre- and Postharvest Losses of Tropical Roots and Tubers and Their Reduction" was presented by H. A. Al-Jibouri.[1] The prepared abstract was:

"Pre- and postharvest loss of tropical root and tuber crops is reviewed. Causes of loss in the preharvest period include numerous diseases and insect pests. In general, losses are not considered to be as severe as for other tropical crops although investigation of the problem, comparatively, has not been extensive. Losses due to weeds are poorly known. Current loss control approaches emphasize cultural practices and plant breeding in particular.

"In addition to diseases and insects, postharvest losses are related to processing and marketing, where physiological deterioration frequently occurs. Reduction of postharvest loss centres currently around cultural practices. Chemical controls are not widely used in pre- or postharvest loss reduction.

"Conclusions concerning necessary action to further reduce pre- and postharvest losses in the next 5–10 years include the need for wider use of improved cultural practices. Emphasis first on cassava losses is recommended, then on sweet potatoes, and yams. Priority in reduction loss work should be for the subsistence grower. These suggestions lead to a need for extensive training to strengthen extension activities.

"Cultural practices recommended for the preharvest period include crop rotation and improved mass selection for propagation. Integrated pest management should be possible in some cases with biological control as an important component. Plant breeding research is a continuing need. Further reduction of postharvest losses requires wider use of the best cultural practices in storage; improvements in processing and marketing should also be attainable. Storage and processing losses can be further reduced through applied research."

A synthesis of the discussion follows:

Thurston discussed the importance of plant diseases as limiting factors in food production. The following summary covers the major considerations:

More than 160 bacteria, 250 viruses, and 8000 fungi are known to cause plant disease in addition to mycoplasma-like organisms and viroids which have recently been added to the list. Some include nematodes as disease-producing agents. There are many classic cases of catastrophic plant diseases in history which have wiped out entire crops, often resulting in widespread famine and human disease. Examples are the late blight epidemic of the 1840s in Ireland, coffee rust which last century wiped out coffee in Ceylon, and in 1970 was introduced into Brazil where it has caused great economic loss. As recently as 1942 an epidemic due to brown leaf spot caused the failure of the rice crop in West Bengal and an estimated 2 million people died. Many other examples can be cited, but fortunately the great majority of plant diseases are not catastrophic. Estimates of losses due to plant disease vary widely and much of the information is simply not believed by administrators, the public, and politicians. Most figures found for losses in tropical (developing) countries are double those found for the temperate countries of North America and Europe.

[1]The complete text of this paper is available on request from the Cassava Information Centre, CIAT, Cali, Colombia.

Table 1. The importance of an integrated approach to increasing effective or utilizable production of root crops.

	Model	Potatoes	Sweet potatoes	Cassava	Yams	Aroids	Misc.	Total
A. Present situation (millions metric tons)								
1. World production (FAO 1974)	100	294	134	105	19	4	3	560
2. 25% postharvest losses (Coursey and Booth 1972)	25	73	34	26	5	1	1	140
3. "Utilized Production"	75 (100–25%)	220	101	79	14	3	3	420
B. Possible "Utilizable Production" following research and development (millions metric tons)								
4. Following 5% increase in production	78.75 (105–25%)	231	106	83	15	3	3	441
5. Following 5% reduction in postharvest losses	80 (100–20%)	235	107	84	15	3	3	448
6. Following 5% increase in production and 5% reduction in postharvest losses	84 (105–20%)	247	113	88	16	4	3	470

In addition to the direct losses that occur from plant diseases, the threat of introducing diseases into new areas — countries or continents — is perhaps greater today than at any time. Increased movement of plants from country to country and continent to continent has been highly beneficial to man, but it has resulted in increased movement of diseases around the world. The threat of introducing new diseases is perhaps greatest in tropical areas. Examples of diseases that could move from continent to continent are the Asian downy mildews of maize, the Asia bacterial diseases of rice, African cassava mosaic, moko disease of bananas, lethal yellowing and red ring of coconut, and soybean rust.

Traditional agriculture in large areas of the developing world is giving way to modern agriculture which includes many new inputs. These additional inputs paradoxically and unfortunately often have the potential to increase disease problems. The new high-yielding varieties of wheat and rice involve a relatively small range of genotypes most of which have many common genes such as those for dwarfing. New races of a pathogen or a now-obscure disease or insect pest might have the potential in a given year, with optimal weather conditions, to cause widespread and serious losses. No one, least of all the breeders and plant protectionists of the international centres in developing countries where the high-yielding varieties are grown, would dispute this possibility. However, they are aware of these dangers and have extensive activities to monitor changes in pests and pathogens to reduce the chances of potential disasters. A worldwide cooperative effort to monitor the world movement of pathogens, perhaps including other pests, should be established.

All plant protectionists, entomologists, plant pathologists, nematologists, and weed scientists should work together to develop pest management systems. The problems that the world faces in crop protection are too challenging not to work together to solve them.

Thurston concluded by quoting the following:

"Recent surveys by the UN's Food and Agriculture Organization confirm the startling fact that even today more than one-third of the potential annual world harvest is destroyed by weeds, plant diseases, insects, and other pests. The financial

loss in 1975 was estimated at over 75 billion dollars which was equivalent to the total value of the world's grain harvest together with that of the world's potato crop."

Lozano discussed the environmental factors related to disease development in temperate and tropical zones. He emphasized the following factors: the greater availability of susceptible host material and the existence of a continuous favourable environment for the development of the diseases which jointly result in more frequent incidence of ephiphytotics in tropical zones.

Booth stressed the importance of postharvest losses, including those of quality, and the need for a multidisciplinary approach to their reduction. The possible magnitude of these losses is illustrated in Table 1.

Rankine suggested a few approaches for the accurate assessments of crop losses, for example, the determination of the cost of control measures. He also pointed out the need to consider the interest of the following four broad sectors: the industry as a whole, the individual producers, the handlers and processors, etc., and the consumers.

The subsequent open discussion centred around the very real problem of technology transfer in root and tuber crop production systems.