

Because modern transportation can move food to other side of globe in 10% of its value, the essence of food security would be balanced with environmental quality in a region. Plant pathologists, who typically work in a regional level, are challenged to reduce regional uncertainty while protecting environment. These in countries extensively participating in a globalized economy should have a greater role in protecting sustainability and environment quality than in food security. Secondly, a globalized economy means that local farmers have to compete globally and globalized agricultural companies are to influence on local farms. Small farms will be replaced by large farms because of profitability. Large farms prefer simplified measures/products and are clients of giant multinational corporations, which are a major force in a globalized economy. Products or technologies from multinational corporations are increasingly vital to our disease management at all levels. This points us to more collaborative research between plant pathologists in public and private sectors.

Plenary Session 2-Can We Improve Global Food Security (ISPP Task Force)

Adequate nutrition for all by 2050

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“One cannot build peace on empty stomachs”: “It is time that the tide of the battle against hunger was changed for the better – but ebb tide could soon set in if we become complacent.” The authors of these statements are John Boyd Orr and Norman Borlaug, respectively, both Nobel Peace Prize Laureates. Complacency did indeed set in during the last 3 - 4 decades of the 20th century. There were stirrings in the early part of this century but it was the price spikes in food commodities in 2008 and 2011 which really set the alarm bells ringing. These were largely socio-economic and political phenomena and, no doubt, will be addressed by the last speaker in this session. As plant pathologists, our attention may be more directly concerned with the next two speakers. There is no doubt that the physical environment, whether it be soil, water or climate has profound effects on plant disease. Moreover, we should be prepared for changes in incidence and severity of plant diseases which may be wrought by climate change. Plant pathogens cause tremendous losses of food crops and have been major reasons for famine. But how much loss do they cause? The ISPP has formed a Subject Matter Committee to find answers to this question. Another difficult question is, “What is food insecurity?” Estimates of the food required to feed the world’s population of over 9 billion in 2050 are around 70% greater

than today’s supply. How are we to achieve this with relatively little arable land left for expansion? These are some of the questions which will be examined in this session and on Wednesday evening.

Physical limitations and challenges for food security:

A story of China

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China's grain output was 590 million tonnes in 2012, with the ninth consecutive year of growth. It has achieved the goal in maintaining a high level of self-sufficiency in grains so far. China has 20 percent of the global population, with only 8.0 percent of the world's arable land and 6.5 percent of water reserves. However, China is going to consume more grains in the coming years, which means the country has to increase its annual grain output continuously as China tries to maintain as much self-sufficiency in grains as possible. To achieve the goal, the world's most populous nation and second-largest economy has to find ways to overcome the physical limitations, such as limited potential for qualified cropland expansion, heavily dependent on chemical fertilizer application, water scarcity and uneven distribution, climate change and environmental stresses. Sustainable agricultural techniques are essential for achieving the goal of food security.

Managing the biological environment to promote and sustain crop productivity and quality

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Global crop production needs to double by 2050 to meet projected demands from rising populations, diet shifts and biofuel consumption. However, predicted crop yields are not increasing sufficiently (2.4% p.a.) to meet this demand. Therefore, production must increase through more efficient use of current arable land, to prevent further land from being cleared that otherwise provides vital services to the earth and its people (including biodiversity and carbon emissions). Significant improvements in crop productivity and crop quality can be achieved through improved management of critical diseases of crops that are pivotal to food security and income generation. The biological environment is a complex domain characterised by dynamic interactions

between crops and beneficial and antagonistic organisms. These interactions are influenced by the physical environment and human interventions influence emerging diseases and their movement, and this must be respected if diseases are to be sustainably managed. A crop healthcare system for developing countries will be presented that encompasses national responsibility, regional cooperation and harnesses global excellence; in terms of what is known and which methods are available. The aim is control crop diseases in a pre-emptive and cost efficient manner compared to the current scenario of belatedly combating fully blown epidemics. Components of the crop healthcare system are risk assessment; including predicted impacts on food and feed value chains, targeted surveillance, fit-for-purpose diagnostics, control intervention packages, extension mechanisms; that are endowed with refinement from practical feedback, enabling policy environments and application of research to address knowledge gaps. Specific examples will be presented for viruses of cassava, viral and bacterial diseases of banana, stem rust of wheat, viral disease complex of maize and potato blight. Finally, the link between disease control and improved crop quality, consumer health and safe trade will be demonstrated through biological control interventions for aflatoxin in Africa.

Can we improve global food security? The economic, sociological and political environment

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To ensure global food security for a growing population remains a major challenge. This is especially true against the background of increasing food prices partly due to growing income levels and consequently changing demand patterns in the developing world. At the same time, climate change combined with the occurrence of more frequent and extreme natural disasters, and reduced water availability increase the vulnerability of rural farm households, thus negatively affecting agricultural production. Given the multifaceted dimensions of poverty and food insecurity, no simple solution can be found. Promoting productivity of farming and increasing the efficiency of the food system are effective measures contributing to rural development in developing countries. The latter enhances the opportunities of farmers to participate in domestic staple food and high-value agricultural export markets. Information and communication technologies and innovations as well as an improved access to finance and other inputs are known to promote this development by reducing transaction costs and leading to increased investments in the farming sector. Policy reforms in agriculture and beyond help setting price incentives to farmers, promoting good

governance, and changing consumers' awareness with respect to food waste and resource use inefficiencies related to human diets. The reduction of agricultural taxation which is traditionally given in many developing countries, and the reduction of distorting subsidies in many OECD countries remain important. What is new, in this context, is the increasing links with other sectors. Thus, on the one hand the linkages between energy and agricultural policies increase due to the trend towards green growth and bioenergy. On the other hand, the monetization of natural resources and speculation link the agricultural market with financial markets. This calls for further research since additional pressure is put on the global food system.

Achieving global food security

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Hunger and malnutrition are not only caused by food shortage and - scarcity but also by a lack of access to adequate, safe, nutritious food supplies. Food security is complex and its drivers are interdependent. Global drivers in food security link into availability, affordability, quality and safety of food. Addressing chronic food shortages through improved agricultural technologies shift the emphasis from food security to nutritional security. However, an adequate food supply does not guarantee nutritional security. Further, food security diminishes when food systems are stressed. While food systems reflect the continuum from production to consumption, it also involves a much broader consideration than productivity and production. The right to food is also a human right that is recognized under international law. The right of all human beings to feed themselves in dignity includes two aspects related to the production and purchasing of food. To produce own food, resources are required that include land, seeds, water etc. To "buy food" money and market access is required. The "right to food" therefore requires governments to provide an enabling environment in which people can use their full potential to produce or procure adequate food for themselves and their families. Food sovereignty on the other hand confronts head-on the notion that food, unlike other fundamental human rights, should be left purely to market forces. It brings to the fore issues around the environment, technology, economies, governance and human rights. It highlights some of the most controversial and challenging issues of our time: climate change and biodiversity, biotechnology, biofuel, water supplies, human migration, population growth and hunger. This presentation contextualises some of these challenges and provides some potential solutions.