

THE WORLD POTATO CONGRESS

A view from two British participants, Donald MacKerron and George Mackay, both of the Scottish Crop Research Institute at Invergowrie

Introduction

September 2000 saw the Fourth World Potato Congress (WPC) being held in Amsterdam in The Netherlands. It was a large event by the standards of the potato world with over 600 registered participants. Importantly, the Congress included a trade and technology show as well as lecture sessions from the Monday morning until the Wednesday lunchtime. The WPC was not intended as a scientific event, but to bridge the gap between science and everyday practice in the field. It was also scheduled to allow participants to attend the Potato Manifestation 2000, a big commercial exhibition that was held 100 km away in Emmeloord over Wednesday to Friday.

The WPC provided an excellent opportunity for 'potato people' to meet and talk and to see what the major commercial players in the industry had to offer. The value of the invited lecture sessions was more mixed – some were entertaining, some were instructive, but others were quite poor. Few imparted new information. This is perhaps an important distinction between the WPC and conferences run by other bodies such as the European Association for Potato Research where such talks are a small part of the whole and most contributions are from workers leading new developments and keen to explain these.

In the mornings there were plenary sessions; on the Monday, the development of a global potato industry then, on the Tuesday, strategies for research into late blight, breeding, and crop protection, and on developments in harvesting and in the starch industry.

Each afternoon, there were four parallel sessions. On the Monday we attended a session on pests and a workshop on Genetically Modified Organisms (GMOs). Other themes were Food Safety and Fresh Potatoes & Processing. On the Tuesday we attended sessions on Agronomy and on Breeding, missing a session on Seed Potato Production and a Workshop on *Phytophthora*.

Colorado beetle

Colorado Beetle is a very significant pest of the potato crop and, at present, in climatically suitable areas (all of Europe except the UK and Scandinavia), it is only controlled by chemical means. In Central and Eastern Europe it can cause losses of 20–30% yield, especially in early and second-early potatoes that are not protected chemically. It is seen to be less of a problem in Western Europe where chemical insecticides are used routinely. Were the pest to become established in the UK, in our present climate, it could thrive as far north

The **Scottish Crop Research Institute (SCRI)** was formed in 1981 by the merger of the Scottish Plant Breeding Station (SPBS) and the Scottish Horticultural Research Institute. SCRI has continued the SPBS tradition of producing new varieties with high levels of natural resistance combined with good agronomic qualities (SPBS produced all the Pentland series of potatoes). Now, new varieties are released in partnership with commercial organisations. The core work of the Institute is funded by the Scottish Executive, and concentrates on fundamental studies on potatoes, barley and soft fruit. SCRI is the designated UK Centre of Excellence for work on potatoes. Studies include the physiological understanding of such processes as tuberisation, carbohydrate metabolism and partitioning, and nitrogen utilisation, as well as the development of sensitive diagnostic tools for the detection of pathogens. A major emphasis is put into genomics.

as York. The adults hibernate and will survive very cold winters, so it is the cool summers that limit the spread of the pest in northern parts of Europe, where there may be only one generation formed in a summer season.

Tuber moth

A second insect pest of the potato that we are spared in the UK is the tuber moth (*Phthorimaea operculella*). This is a problem in the Mediterranean countries that produce potatoes, particularly in those such as Morocco where, in the coastal region, potatoes may be grown all year round. Other hosts are tomato, aubergine, tobacco and sugar beet. As a consequence of a regular supply of hosts and warm to high temperatures, there can be many generations of the tuber moth in a single year and its incidence can build to very serious levels. The pest causes 'mining' of leaves and erosion of stems but the larvae burrowing in the tubers cause the most important form of damage. Where traditional stores are used, without chilling, there can be total loss of harvested tubers. Pheromone traps are used in stores and in the field to monitor the level of attack by the pest. Both contact and systemic insecticides are useful, but chemical control alone is insufficient. Agronomic or management practices are also required, including resistant cultivars, deep planting, early harvest, and adequate irrigation to avoid soil cracking. *Bacillus thuringiensis* and a granulosus virus are being tested for biological control and a parasitoid (*Capidosoma* sp.) is being used experimentally in Egypt and Tunisia. Powdered insecticides are used on tubers that are being stored for seed, but seed tubers can go for consumption by people.

Nematodes

In contrast to our freedom in the UK from some of the serious insect pests of the potato, we do face serious threats to production from soil-borne organisms, including the species of potato cyst nematode (PCN). The use of cultivars with resistance to *Globodera rostochiensis* has led to a rising problem with a second species *Globodera pallida* against which there is, as yet, no full resistance. Control of these pests requires combining the intelligent use of partial resistant cultivars and careful rotation with improved soil sampling to target the use of nematicides or soil fumigants. Careful soil sampling and selection of the correct cultivars was reported to be central to the control of root-knot nematodes, also.

Free-living nematodes such as *Paratrichodorus* and *Trichodorus* spp. present another threat through transmission of tobacco rattle virus. TRV in potato tubers causes lines and arcs of brown necrotic tissue, a condition called 'spraing.' Spraing can also be caused by the potato mop-top virus (PMTV) which is vectored by another pathogen *Spongospora subterranea*, which causes powdery scab. There are marked differences between cultivars in their susceptibility or insensitivity to each virus. Although the symptoms of spraing are common between the causes, it is important to make a correct diagnosis of the cause in order to select the appropriate control measures.

Of the plenary papers, those most apposite to readers of *Pesticide Outlook* were those delivered by Dr Wanda Collins, deputy director general for research of the International Potato Centre (CIP) and by David Rhodes of Zeneca.

Late blight

Dr Collins reviewed two global approaches to research strategies for potatoes. The CIP-initiated Global Initiative on Late Blight (GILB) is an attempt to forge an alliance between late blight researchers of the developed world and those of less developed countries in order to combat the scourge of late blight, caused by *Phytophthora infestans*. The disease is a global problem and is the single most important biotic constraint on potato production. Currently, it is kept at bay in Europe and North America by routine application of fungicides, which are often not available to subsistence farmers in less developed countries. Moreover, the fungus is able to evolve into new, more virulent forms, some of which are resistant to modern fungicides. This capacity provides a classic instance where integrated pathogen management, combining judicious use of agrochemicals, resistant varieties and good agronomic practices, must be the sustainable way forward. A more recently launched global initiative, tentatively called potato GENE, is an attempt to explore the potential benefits of genetic engineering whilst developing strategies to address public concern by answering some of the questions of risk and safety posed by these technologies.

Future for agrochemicals

The paper by David Rhodes, on 'Crop protection, environment, and food safety' gave a sensitive and carefully

balanced overview of the need for crop protection without referring to any specific products by name. That paper, which is worth reading and which is given in full in the *Proceedings of the WPC* (pp. 215–224), considered the demand for food, public concerns, the role of 'organic' production, chemical controls, and biotechnology. The potato is the fourth most important food crop in the world, consumption is increasing but producers in the developed world are faced with increasingly stringent demands by consumers whose knowledge of agricultural practices is limited and who appear to hanker for the more "natural" systems of yesteryear. The consumers demand and expect quality and unlimited availability at low prices. They are concerned for safety but fail to recognise the extremely important role of crop protection in maintaining productivity, ensuring good quality and keeping prices low. Potatoes are threatened by an extremely long list of diseases and pests. According to Rhodes 41% of potatoes' potential yield is still lost globally due to diseases and pests. This could easily rise to 70% or more without agrochemicals. The conclusion was that the solution to the difficulties in crop protection lies in the more effective use of technology rather than its rejection.

Take-home message

The public perception of technology is paradoxical. Whereas agriculture is a "traditional" industry, pesticides are seen to be unnatural and dangerous and food safety is a major concern. The growth of demand for "organic" produce using only "natural" chemicals is a symptom of this. However, 19th century technology cannot provide the answers to 21st century needs. Successful crop protection products will remain essential to meet the needs of all: consumers, food companies, growers and governments. Safety and environmental responsibility are not incompatible with the considered use of modern technology; nor with quality and low prices, a take-home message with which these authors agree.

Donald MacKerron is a crop physiologist and is Head of the Unit of Vegetation Systems at the SCRI. Over the last 20 years or so he has investigated environmental influences on in the potato crop. These studies led to the development of simulation models of potato growth and yield that have, in turn led to the development of a decision support system for potato growing (MAPP - Management Advisory Package for Potatoes) that was demonstrated at the potato manifestation, Emmeloord.

George Mackay was formerly Head of the Commercial Breeding Department at the SCRI site in Edinburgh (formerly the Scottish Plant Breeding Station), and moved to Dundee to Head the new Crop Genetics Division until 1999. In 1995, he was seconded for a year to the International Potato Centre, Peru, as Director of Genetic Resources. He was Chairman of the Potato Section of EUCARPIA, the European Association for Research on Plant Breeding, until his election as President of EUCARPIA in 1998.

To tie in with the WPC2000, *Pesticide Outlook* is publishing in this and succeeding issues a few articles on crop protection in potatoes.