Potato: international food security and export growth potential

Potato is among the top four food crops in the world. It is a key part of basic food security in many regions, particularly in small-holder systems. With greater disposable incomes in Asia and the westernisation of diets, there has been a dramatic increase in demand for potato in non-traditional areas.

Western Australia is in a unique position in terms of potato production and export:
- The state has a highly organised production system
- We have excellent proximity to the growing markets of Asia, and
- We are free from many diseases that plague potato production in other areas, including the eastern states of Australia.

Potato Research WA (PRWA) is a collaboration between Murdoch University and the WA potato industry. The aim is to facilitate high quality translational research with practical industry benefit.

Research activities
We are developing a broad research portfolio that embraces new varieties, agronomy, crop protection, product quality, logistics and market development. Current research includes molecular biology, disease diagnostics, physiology of heat tolerance, and farming systems.

Starch quality
Potato starch is naturally very readily digestible. This can result in a rapid increase in blood sugar soon after ingestion, depending on the method of food preparation and the composition of the meal. It also means that there is less 'resistant' starch passing through to the bowel. Given the widespread consumption of potato, making potatoes with starch that is digested more slowly could have significant health benefits for society through potential reductions in the development of diabetes and bowel cancer.

The roles of various genes involved in starch synthesis are well known. In a collaborative project involving Murdoch, HZPC (an international potato breeding company from the Netherlands) and the WA potato industry we are using new molecular techniques to alter the expression of key genes to develop potatoes with less readily digestible starch and more resistant starch. Our aim is to develop a product that is completely free of GM and has health benefit for consumers in Australia and around the world.

Heat tolerance
Potato is adapted to mild climates. Climate change and geographical changes in the centres of production of potato means that crops are frequently being exposed to more heat stress. This can lead to dramatically reduced yields and quality. Current research is shedding new light on the many ways
in which potato plants respond to high temperatures. Photosynthesis, carbohydrate use, organ initiation, growth and development are all altered. The deeper understanding of the crop’s response is presenting new ideas for how crops can be best managed during a period of excessive temperatures. Successful application will improve the market acceptability of potatoes grown over the hot summer months in WA and improve food security in the warmer regions of the world where potato is now being grown.

**Virus testing**
Potatoes are vegetatively propagated: small potatoes harvest from one crop are used to plant the next. A particular problem with this is that a disease in the parent crop can be transferred to the daughter crop. In this way potatoes can ‘accumulate’ disease. Viruses are a particular problem. Researchers at Murdoch have developed a molecular based test that can detect five viruses that are key problems in WA. The test is faster, cheaper and more sensitive than methods currently being used. Using this test on ‘seed’ potatoes (those used for planting the next crop) will dramatic reduce the level of virus diseases in the State’s industry and so reduce crop losses. Developing similar tests that can screen for diseases that present barriers for the export of potatoes will be an important tool for the development of export markets in Asia and the Middle East.

**The future**
The potato research program at Murdoch is continuing to develop in close consultation with the industry. It will deliver important benefits for a WA industry with significant potential for export growth. At the same time the research is making an important contribution to improved understanding of one of the world’s most important food crops.

**More information**
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