



Marketing, consumer perceptions and regulations

In this issue we feature five scientific papers looking at various aspects of marketing, consumer perceptions and regulations, all which of can have a major effect on potato growing operations.



In the first paper (Jemison), a 2-year survey of 275 consumers in Maine, USA, investigated potato characteristics that influence fresh potato purchase. Skin quality and place of origin were the most important characteristics, with many participants expressing interest in buying locally grown potatoes. When tubers were cut in half, flesh colour was also considered an important characteristic, with yellow-fleshed varieties with white and purple skins being more popular than yellow-fleshed, red-skinned varieties.

The second paper (Sulzer) presents the results of some market research studies in German supermarkets. The research examined the ways that potatoes were presented and packaged, and found that improving the overall presentation and offering potatoes in carry-home bags increased sales of all potatoes by 20%. An important finding was that young consumers were willing to pay more for potatoes with the new packaging.

The third paper (Ooraikul), which is actually a book chapter, investigates product design processes using potato industry examples. It is particularly important for the company that has developed the product concept to be involved in the whole process towards launching the product, even if it is just a small or medium-sized organisation. In this situation, some aspects of the process may need to be done by another organisation, so ultimate decision making should be clearly defined.

A very important part of product marketing is considering issues of sustainability. The fourth paper (Yakovleva) investigated potato supply chains in the UK, using a sustainability assessment model that looked at implications for the economy, society and the environment. All stages of the chain, including agricultural production, food processing, food wholesaling, food retailing and food catering, are considered and the implications of the application of this model are discussed.

Another aspect of sustainable agricultural production is the use of crop protection chemicals, and many consumers are demanding food that has low levels of

Praying for their potatoes

Alejandro Argumedo is a plant scientist and social activist with Association Andes in Peru. Argumedo says climate change is bringing late blight, threatening not just farmers in the highlands of Peru ... but Peru's whole native culture. "Potato is not just food. Potato is also spirituality; it's culture," Argumedo says. "There are songs, dances, ceremonies. So this is a potato land ... a culture of potato." Potatoes originated in Peru. They fed the Inca Empire. There is a potato god. Potatoes have cultural symbolism. "Potatoes are like living beings," Argumedo says. "People treat them like that. They are members of the family for farmers." As they say here, soup without potatoes is like life without love.

pesticides. Local, national and international regulatory organisations have placed many restrictions on the use of chemicals, and in some cases have banned the use of some pesticide groups. The fifth paper (Bernard) reviews the use of chemicals for crop protection since the middle of 18th century, and voices concern about the recent sharp decrease in the number and diversity of active ingredients. It is felt that this is a major threat for agriculture, because integrated control techniques require a range of mechanical, biological and chemical tools to control weeds, pests and diseases.

Factors influencing consumer preference of fresh potato varieties in Maine. Jemison et al. (2008) *American Journal of Potato Research* 85: 140-149.

Smarter presentation for higher turnover. Sulzer (2008) *Kartoffelbau* 59: 148-150.

From basic research to marketable product – success and failure of instant baked potatoes. Ooraikul (2008) In: *Case studies in food product development*. Woodhead Publishing Ltd, Cambridge, UK. Pp. 163-184.

Measuring the sustainability of the food supply chain: a case study of the UK. Yakovleva (2007) *Journal of Environmental Policy and Planning* 9: 75-100.

The use of chemicals for crop protection and sustainability. Bernard (2007) *OCL-Oleagineux, Corps Gras, Lipides* 14: 332-344.



***Rhizoctonia solani*, the cause of black scurf and stem canker**

► **Salicylic acid induces resistance in potatoes against *Rhizoctonia solani*, the cause of black scurf and stem canker.** Under greenhouse conditions salicylic acid was applied either to leaves or as a soil drench to potatoes (cv. Atlantic) with or without *R. solani* inoculation. Salicylic acid treatments increased plant canopy height and potato tuber weights, and reduced black scurf disease severity in stems compared to controls. These results indicate that salicylic acid has potential application for the management of black scurf disease. *Al-Mughrabi (2008) International Journal of Biological Chemistry 2: 14–25.*

► **Biocontrol of *Rhizoctonia solani* in native potato (*Solanum phureja*) plants using native *Pseudomonas fluorescens*.** This study demonstrated the potential of six *Pseudomonas fluorescens* strains to reduce disease symptoms produced by *R. solani* in native potatoes in Columbia. In addition, all strains induced growth of the potato, although there were differences between strains in their capacity to colonise the potato crops. *Bautista et al. (2007) Acta Biologica Colombiana 12: 19–32.*

Physiological disorders affecting potato processing

► **Internal heat necrosis of potato – A review.** There are a number of names to describe a group of disorders that are generally termed “internal necrosis”, including internal rust spot, internal browning, physiological internal necrosis, internal brown fleck, chocolate spot, internal brown spot and internal heat necrosis. Actual symptoms will vary with cultivar and the environment, with Russet Burbank, Atlantic and Yukon Gold being particularly susceptible. The disorder is characterised by brownish-red necrotic patches of tissue that typically occur along and/or inside the vascular ring. The frequency and severity of the disorder tend to increase with high day and night temperatures early in the growing season, combined with low rainfall. Calcium has been shown to ameliorate expression of the disorder, but there has been little research into other biotic and abiotic factors, such as biochemistry

and genetics. This review paper summarises previous research on internal heat necrosis and outlines potential new areas of investigation. *Yencho et al. (2008) American Journal of Potato Research 85: 69–76.*

► **An acoustic impact method to detect hollow heart of potato tubers.** This paper describes an acoustic sorting system that could detect hollow heart in potato tubers cv. Spunta. When tubers impacted on a steel plate, solid potato tubers emitted higher magnitude sounds than hollow tubers, and this could be detected with a microphone. Digital signal processing hardware and material handling equipment was used to separate the potatoes, with approximately 98% classification accuracy. *Elbatawi (2008) Biosystems Engineering 100: 206–213.*

► **Effect of soil type and nutrient management on potato after-cooking darkening.** After-cooking darkening is an undesirable trait of potatoes and is caused by oxidation of a chlorogenic acid-iron compound during cooking. This darkening effect is cultivar-dependent and varies with climatic conditions. This paper describes three experiments investigating the effects of soil type, management practices and storage on after-cooking darkening susceptibility. In general, the darkening was reduced when climatic conditions and management practices were favourable for crop growth. For example, after-cooking darkening increased with N deficiency. However, these effects were small relative to the changes in after-cooking darkening due to cultivar and storage duration. *Wang-Pruski et al. (2007) American Journal of Potato Research 84: 291–299.*

Agronomy – Irrigation and Crop Rotation

► **Effect of drip tape placement depth and irrigation level on yield of potato.** Subsurface drip irrigation enables the application of the small amounts of water to the soil through the drippers placed below the soil surface. A key variable is installation depth of the drip lateral, which involves consideration of soil structure and texture and root development pattern of the crop. This paper describes a 3-year experiment with var. Kufri Anand potatoes on a sandy loam soil at irrigation levels of 60, 80 and 100% of crop evapotranspiration and five manual placement depths (0, 5, 10, 15 and 20 cm). When tape was placed on the surface or at 5 cm, there was considerable upward movement and consequent loss of irrigation water. However, with tape placed at 10, 15 and 20 cm, the soil surface remained relatively dry. Maximum yields were recorded for placements at 10 or 15 cm. The highest benefit:cost ratio was found with 10 cm placement because of the higher costs for

the installation of drip tape at greater depths. *Neelam & Rajput (2007) Agricultural Water Management 88: 209–223.*

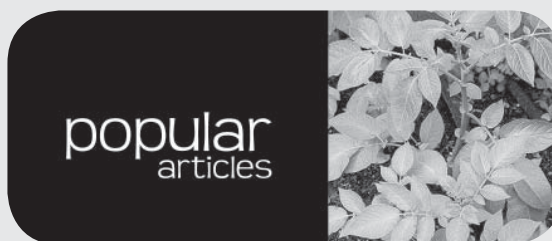
► **Bacterial pathogens recovered from vegetables irrigated by wastewater in Mexico.**

The microbiological quality of 50 vegetable samples, including potatoes, was measured after irrigation with untreated waste water in Morocco. There were high levels of enterococci, faecal coliforms and total coliforms, but coagulase-positive *Staphylococcus aureus* was not detected in any samples. It was concluded that these vegetables pose a serious health risk to consumers. *Ibenyassine et al. (2007) Journal of Environmental Health 69: 47–51.*

► **Optimal crop rotation of Idaho potatoes.** To counteract increasing price and production risks, Idaho potato growers have shortened their crop rotations. This paper describes an analysis of the effects of shortening the crop rotation on expected revenues. Land constraints due to equipment, labour and capital efficiency altered optimal rotations, but where there were no such constraints, a Potatoes-Wheat-Wheat-Potatoes rotation was the best. Longer rotation cycles generated the highest expected revenue/ha. Other conclusions from this modelling exercise were that the open market generated higher expected revenue than contracts, but that producers could counteract some of the lower returns from contracts by lowering production risk by using longer rotation cycles. *Myers et al. (2008) American Journal of Potato Research 85: 183–197.*

Patent

► **Method for preserving potato.** This patent describes a method for storing potatoes at room temperature that suppresses sprouting, requires no special storage equipment and is safe. It involves bringing the surface skin of the potatoes into contact with hot water at 60–100°C for 7–100 seconds. *Sato et al. (2008) Tokyo University of Agriculture, Japan, Patent Number JP2008000117-A.*



Integrated Pest Management and Pesticide Resistance Guidelines

Available from the internet (<http://www.potatoes.com/Research-IPM.cfm>) are four documents outlining Integrated Pest Management and Pesticide Resistance Guidelines for the Pacific North West of the USA. They are: Integrated Pest Management of insects and mites in Idaho, Oregon and Washington potatoes; Fungicide Resistance Management; Herbicide Resistance Management; and Insecticide Resistance Management. The IPM guidelines, in particular, are very comprehensive, giving good descriptions of the pests and how to control them.

Snippets from www.potatonews.com

Listed below is a small selection of the articles that are posted on the Global Potato News website. Please visit the site for further details or follow the links that are indicated.

► **United Kingdom: New fungicide option for potato blight control.** The product Shinkon (amisulbrom) has been approved in the UK for protection against foliar and tuber blight. Trials carried out by the Scottish Agricultural College indicated that amisulbrom-treated plots had 0.2% incidence of foliar blight compared with 0.5% for mancozeb, 0.1% for cyazofamid and 0.9% cymoxanil + mancozeb, whereas untreated plots were almost completely killed by foliar blight. Tuber blight incidence for the four fungicide treatments was 0.3% (amisulbrom), 9.2% (mancozeb), 0.8% (cyazofamid) and 6% (cymoxanil +mancozeb). Growers will be allowed up to six applications per crop, but the product cannot make up more than 50% of the total blight spray programme. For more details see <http://www.fwi.co.uk/Articles/2008/03/03/109633/new-fungicide-option-for-potato-blight-control.html>. *March 2008: News Headlines.*

► **New small scale ethanol plants provide highly efficient waste to ethanol production.** A USA company called Diversified Ethanol has recently developed new innovative technologies for ethanol production that reduce water use by up to 85% and use existing liquid waste products as feedstock in the conversion process. One of the techniques separates solids from the water used in processing, meaning that the water can be theoretically infinitely recycled.



The techniques also allow the use of by-products from processing operations rather than energetically-expensive dedicated crops such as maize. By using small-scale ethanol production units, the ethanol can be used locally and does not have to be trucked from large production facilities. It is envisaged the units will be used for a range of by-products across the USA – from citrus in Florida to wood chips in the Northwest to potato waste in Idaho. *March 2008: Press Release.*

► **Disinfecting potato tubers using steam treatments.** Research carried out in Israel has found that the steam treatment of potato tubers reduced the incidence of pathogens from 26–59% in untreated controls to 1–3%. The steam treatments were applied to tubers in a commercial packing house using a nozzle system that was fitted to a conveyor belt and attached to a diesel-powered steamer. At 120 days after planting the daughter tubers of steam- or organic mercury-treated tubers had 3–4% incidence of seed-borne pathogens compared with 26–31% in the untreated controls. Steam treatment was slightly more effective against pathogens that were exclusively seed-borne than those that were both seed- and soil-borne. More details are available at http://article.pubs.nrc-cnrc.gc.ca/ppv/RPViewDoc?_handler_=HandleInitialGet&journal=tjppp&volume=24&articleFile=k01-054.pdf. *March 2008: Feature Articles.*

► **New research to help fight against blackleg of potato.** Scientists at the University of Cambridge have identified a gene in *Erwinia carotovora*, the bacterium that causes blackleg, that when inactivated abolishes the ability of the pathogen to break down the plant's cell walls. Not only will the finding allow the development of new strategies for preventing rots in potatoes but it has opened up new targets for developing pesticides. Blackleg is one of the key diseases in the British potato industry and is a particular concern in warm and wet growing conditions. Most varieties of potato have no natural resistance to soft rot diseases and there are no pesticides that effectively control blackleg, so the research is particularly important. *March 2008: Feature Articles.*

► **Antioxidants give potatoes a market edge.** According to Dr Michele Korschuh, a research scientist with Alberta Agriculture, Food and Rural Development in Canada, the antioxidant lutein could provide an incentive for price premiums in potatoes (http://www.fruitandveggie.com/index.php?option=com_content&task=view&id=1094). Lutein is known to help slow the onset of age-related macular degeneration, an eye disease that affects a large proportion of the

population over the age of 55. Only 3–6 mg/day is required to help prevent the damage, and leafy greens such as broccoli are regarded as good sources of lutein (whose name comes from the Latin word for “yellow”). In a series of trials on five fresh market and five processing potato varieties, lutein stability and availability were measured. Over all varieties, lutein concentrations after cooking averaged 60 µg/100 g fresh weight, with Satina and Agria having particularly high levels. In contrast to many vitamins it appeared that cooking boosted lutein availability. Thus, it was concluded that potatoes could contribute a significant portion of the daily allowance of lutein, but this depends on variety, with deeper yellow fleshed tending to yield more lutein. Marketing consultants thought that this could be a significant benefit, enabling growers to charge a price premium for high lutein varieties.

► **What to do about Potato Virus Y.** In the February issue of Spudvine (<http://www.if.uidaho.edu/~bingham/Feb%202008.pdf>), Jonathan Whitworth and Phillip Nolte, potato specialists at the University of Idaho, explain that the importance of managing Potato virus Y (PVY) has increased since 2002 when new strains of PVY began to spread across North America. In addition, some new potato varieties produce only mild PVY symptoms so infection is hard to detect. The article goes on to discuss options for managing the disease, including understanding the interactions with the different species of aphids that transmit the virus, using quick tests to detect the virus in the field, using properly certified seed and growing resistant cultivars. Specific recommendations for preventing virus transmission within early generation seed crops are also given. *April 2008: Feature Articles.*

► **China, New Zealand: Wanted – lots more Kiwi spuds to feed China.** An Auckland potato chip-maker, Steven Wong, is excited by the potential of New Zealand's free trade agreement with China and is spending \$2.8 million on new machinery to double production. Currently, his price is about 5c above what the Americans and Europeans charge, but that will change when tariffs are eliminated. However, his major challenge will be satisfying the huge market. Already they are facing a 4000-tonne shortfall this year, and they can only supply about one-quarter of the Chinese requirement. *May 2008: News Headlines.*



Mana Kai Rangahau