[1]Potato Research Centre, Agriculture and Agri-Food Canada, 850 Lincoln Road, Fredericton, NB E3B 4Z7, Canada; [2]Key Laboratory of Horticultural Plant Biology, Huazhong Agricultural University, Wuhan, China; [3]Faculty of Forestry and Environmental Management, University of New Brunswick, Fredericton, NB E3B 6C2, Canada; [4]McCain Foods Canada Ltd, 107 Main Street, Florenceville, NB E7L 1B2, Canada; [5]Plant Science Dept, Macdonald Campus of McGill University, 21,111 Lakeshore Rd, Ste Anne de Bellevue, QC, H9X 3V9, Canada, Sabbatical location[1].

Potatoes are usually stored at low temperatures for'year-round supply and to preserve quality. Low storage temperatures promote accumulation of reducing sugars such as glucose in tubers of temperature sensitive cultivars. This problem is known as low temperature sweetening and causes fried potato products to undergo browning, taste bitter, and accumulate acrylamide. Invertase has long been known to be the enzyme responsible for the conversion of sucrose to glucose in vitro. The main form of invertase is present in cell vacuoles and is called acid invertase. Inhibitors to acid invertase also occur in potato cells. Acid invertase activity was reported to be correlated with the sucrose/glucose ratio but not to the glucose content, and the genes responsible for cold sweetening have been in dispute. We improved the invertase extraction method to minimize damage to the enzyme and thereby increased its recovery. This enabled us to find a significant correlation between the in vivo acid invertase activity and glucose levels in tubers from different cultivars. Using transcriptome analysis, real-time quantitative PCR validation, genetic mapping, and transgenic confirmation, the major genes of invertases and invertase inhibitors responsible for cold sweetening in stored potato tubers were identified.

Ploidy Effects on Potato Starch Granule Size

Li, Xiu-Qing[1], Jichong Zhang[2], Stephen Allaby[1], Muhammad Haroon[1], Agnes Murphy[1], Gongshe Liu[2], Danielle J Donnelly[3,1], and Yves N Leclerc[4]
[1]Potato Research Centre, Agriculture and Agri-Food Canada, 850 Lincoln Road, Fredericton, NB E3B 4Z7, Canada; [2]Institute of Botany, Chinese Academy of Sciences, Beijing 100093, PR China; [3]Plant Science Department, Macdonald Campus of McGill University, 21,111 Lakeshore Rd, Ste Anne de Bellevue, QC H9X 3V9, Canada (currently on sabbatical leave at location[1]); [4]McCain Foods Canada Ltd, 107 Main Street, Florenceville, NB E7L 1B2, Canada.

Autotetraploid plants often have larger organs. The autotetraploid potato is usually a more productive crop than the diploid one. Positive gene dosage effects for tuber production have been reported in potato. To investigate the ploidy effects on starch granules, we examined the size of starch granules in field grown potatoes of four pairs of diploid and their colchicine-induced tetraploid copies in 2009 and 2010 and studied the tuber size in three of the four pairs. Tuber size increased in tetraploid potatoes significantly in one 2X-4X comparison pair, but the increase did not reach the significant level in other two pairs. The starch granule size in 4X potatoes after chromosome doubling is not significantly changed in one 2X-4X comparison pair, decreased in one pair, and increased in two pairs. The results indicated that gene dosage affects starch granule size and that tetraploidization may either decrease or increase starch granule size in different genotypes.

Reaction of Potato Cultivars to *Pratylenchus brachyurus*

Lima-Medina, I, Dediel J Rocha, Arione S Pereira, and Cesar B Gomes
Embrapa Clima Temperado Cx Postal 403, Pelotas, RS-Brazil.

Pratylenchus is the second most important genera of phytoparasitic nematodes to the potato crop in Brazil. Potato plants with roots and tubers heavily infected with this pathogen exhibit necrotic lesions, which may become infected by other microorganisms associated to tuber rot and plant wilt. Although the use of genetic resistance is one of the most desirable management strategies, selection for resistance to *Pratylenchus* spp. has not been reported in Brazil. Therefore, the aim of this study was to evaluate the reaction of the potato cultivars Cristina, Eliza, Ana, Catucha, Cota, Clara, and Bel from Brazilian breeding programs besides Asterix and Agata to *Pratylenchus brachyurus*. The experiment was planted in a randomized completed design, with six replications in greenhouse, at Embrapa Clima Temperado. Plants grown in 5 L pots filled with sterilized soil, were inoculated with 800 individuals of *P. brachyurus* and '5067' sorghum plants were used as a control. Sixty-five days after inoculation, nematodes were extracted from the roots and counted to determine the reproduction factor (RF=Final population/Initial population) of *P. brachyurus*/plant in the different genotypes. Clara, Cristina, Bel, and Eliza cultivars showed immune reaction to *P. brachyurus*; Ana, Agata, Cota, and Catucha, resistance; and Asterix, moderate resistance compared to the control (FR=6,8).

Antioxidant Activity, Photosynthesis Associated Parameters, Lignin and Productivity in Potato Infected Plants by *Candidatus liberibacter* sp Sprayed with Hydrogen Peroxide

López, ZC[1], GR Martínez[2], HA López-Delgado[2], LIH Almeyda[3]