Exploiting cultivated germplasm to breed for enhanced tuber calcium accumulation ability. Vega, Sandra E[1], Jiwan P Palta[1] and John B Bamberg[2]. [1]University of Wisconsin-Madison, Dept. of Horticulture, 1575 Linden Drive, Madison, WI 53706; [2]USDA/ARS, Vegetable Crops Research Unit, US Potato Genebank, 4312 Hwy 42, Sturgeon Bay, WI 54235.

Potato tuber tissue is naturally deficient in calcium. Lack of adequate calcium is associated with tuber defects such as internal brown spot, hollow heart, and storage rot. We found that potato chip quality can be improved by increasing tuber calcium concentration. The popular chipping cultivars (e.g. Atlantic, Snowden) accumulate low calcium in the tuber (100-150ppm) and are prone to tuber defects and bruising. However other cultivars such as Superior can accumulate significantly higher calcium in the tuber (250-300ppm) and have many fewer internal defects and bruise problems. From reciprocal crosses between Atlantic and Superior we have created two segregating progenies. Over 500 genotypes were evaluated for specific gravity, tuber yield and tuber number, and a subsample was evaluated for tuber calcium accumulation. Duplicate plants from each genotype were grown in controlled greenhouse environment. For both crosses, the progeny's average tuber yield per plant was closer to the Superior parent. However, average tuber number and specific gravity of the progeny were closer to the Atlantic parent. Many individuals with enhanced tuber yield, tuber number and specific gravity than either of the parents were recovered in the two-way reciprocal crosses. Mean tuber calcium concentration for the progeny was closer to mid-parent value. Many genotypes with tuber calcium concentration greater than either of the parents were recovered. These results provide evidences that it is possible to improve tuber calcium concentration using cultivated germplasm. We plan to use these progenies for developing chipping cultivars with improved tuber quality.

Timing of irrigation on 'seed' grade yields for contrasting potato cultivars. Wahab, Jazeem and Greg Larson. Canada-Saskatchewan Irrigation Diversification Centre, P.O. Box 700, 901 McKenzie St. South, Outlook, Saskatchewan S0L 2N0.

Tuber size grade is an important consideration for seed-tuber lots. Agronomic practices including water management can affect yield and tuber size distribution. Transient moisture stress during stolon formation or tuber initiation can reduce tuber set, while moisture stress at tuber bulking can reduce tuber size. This study, conducted in 2002 and 2003, examined the effects of timing of irrigation in relation to crop growth stage on seed grade yield for contrasting potato cultivars (early-season Norland; mid-season Atlantic, Russet Norkotah and Shepody; and late-season Alpha, Ranger Russet, and Russet Burbank). Supplementary irrigation was provided or withheld at the following crop growth stages: Planting to stolon formation (Stage I+II), stolon formation to tuber initiation, and flowering to senescence (Stage IV).

Seed grade yields were higher in 2003 than 2002. Treatment effects and cultivar responses differed between years. Highest yields were obtained when favourable soil moisture was maintained throughout the growing season. The lowest yields were obtained under dryland production. Withholding irrigation at various crop growth stages reduced tuber yield. Yield depressions were more pronounced when irrigation was withheld during two crop growth stages relative to withholding irrigation during one growth stage irrespective of when moisture shortage occurred. Yield losses were more marked when irrigation was withheld during the latter growth stages as compared to withholding water during the early growth stages. The cultivars responded differently to the various irrigation treatments over the two years.

Effect of soil type and nutrient management on potato tuber after-cooking darkening. Wang-Pruski, Gefu, B Zebarth, T Astatkie, Y Leclerc. Nova Scotia Agricultural College, PO Box 550, Truro, NS B2N 5E3; Potato Research Centre, Agriculture and Agri-Food Canada, Fredericton, NB E3B 4Z7; McCain Foods, Florenceville, NB E7L 1B2.

After-cooking darkening is one of the most widespread and undesirable characteristics of potato tubers. It is caused by a non-enzymatic oxidation reaction where a ferrous-chlorogenic acid complex is formed during cooking, which on exposure to air, oxidizes to a bluish-gray compound ferridichlorogenic acid. The factors that contribute to the tuber susceptibility to after-cooking darkening are genetically controlled and influenced by environment. The interaction of these factors affects the overall concentration of chlorgenic acid, citric acid, ascorbic acid and iron, which in turn determines the degree of the dark pigmentation. The projects presented here focuses on the effects of soil and nutrient management strategies. In this two year (2002 and 2003) study, the processing variety Russet Burbank was planted on two types of soil (medium soil texture planted Early and Late, and