virus-based methods are being tested to improve TALEN expression and the efficiency of homologous recombination in plants. Our goal is to optimize the use of TALENs for targeted genome editing in potato. In this study, TALENs designed to target the ALS (acetolactate synthase) gene were expressed in a diploid potato line using a geminivirus-based system and mutations were detected using PCR and sequencing. Co-expression with replicase (REP) was required for efficient virus replication and expression of the GUS reporter in control experiments. These results suggest geminiviruses have the potential to improve TALEN-mediated genome editing and enhance the efficiency of homologous recombination in a range of crop species.

Dandelion as a Host of *Potato Virus Y* in Northern Maine

Buzza, A, and A Alyokhin
School of Biology and Ecology, University of Maine, Orono, ME 04469, USA.

Potato virus Y (PVY) is an aphid-borne pathogen that causes significant crop losses throughout the U.S. It is non-persistently transmitted by at least 50 different aphid species, and can infect approximately 120 plant species in at least five different taxonomic families. Insecticides are not particularly effective in preventing its spread because no insecticide kills non-colonizing aphids quickly enough to prevent their inter-plant movement and probing. Our earlier surveys of vegetation surrounding potato fields in Maine found PVY in several common weed species, including dandelion (*Taraxacum officinale*). Furthermore, infection patterns suggested that dandelion might serve as an overwintering host. Potential existence of a PVY reservoir outside of potato fields is likely to play a role in the overall dynamics of this disease.

Calibration Model Impacts on Nitrogen Recommendation and Potato Productivity

Cambouris, AN[1], BJ Zebarth[2], N Ziadi[1], C Grant[3], L-É Parent[4]
[1]Agriculture & Agri-Food Canada (AAFC) Soils and Crops Research and Development (R&D) Centre, QC, Canada; [2]AAFC, Potato Research Centre, NB, Canada;[3]AAFC Brandon R&D centre, MB, Canada, [4]Laval University, Soil & Bioengineering Dep, QC, Canada.

Appropriate N fertilization is essential to optimize potato yield and minimize environmental N losses. This study evaluated the effect of rate of fertilization with 3 N sources on tuber yield for Russet Burbank grown in Quebec. The experimental design included 13 treatments repeated 4 times in each of 5 years. Treatments were 4 N rates (60, 120, 200, and 280 kg N ha^{-1}) for each of 3 N sources [ammonium nitrate (AN), ammonium sulphate (AS) and a controlled-release N (CRN)] plus an unfertilized control. The CRN was applied 100 % at planting and the AN and AS were applied 40 % at-planting and 60 % at-hilling. At harvest, total yield (TY) and marketable yield (MY) were evaluated. Two models (quadratic and quadratic-plateau) were used to establish yield N response and the optimal N rate. TY and MY were significantly influenced by N rate, but not by N source or year. With the quadratic model (r^2=48 and MSE=34.7), the N rate to reach maximum TY (39 t ha^{-1}) was 216 kg N ha^{-1} with a confidence interval (CI) of 200–230 kg N ha^{-1}. With the quadratic-plateau model (r^2= 50 and MSE=32.6), the N rate to reach maximum TY (37.5 t ha^{-1}) was 153 kg N ha^{-1} with a CI of 128–180 kg N ha^{-1}. The quadratic-plateau model produced better statistical parameters (higher r^2 and lower MSE) and an average reduction of N rates of 29 % and a reduction of TY less of 4 %. The choice of the model did not influence significantly the TY but the N rate calculated by the 2 models varied greatly. In the long-term, this N rate reduction will certainly be beneficial for the reduction of N loss in the environment.

Potato Germplasm Enhancement for Drought Tolerance at Embrapa-Brazil

Castro, Caroline M, Carlos Reisser Jr, Arione da S Pereira, and Angela Rohr
Embrapa Clima Temperado, Caixa Postal 403, Pelotas-RS, 96010-971, Brazil.

In Brazil, potato is grown in more than 140,000 ha. Embrapa, the Brazilian corporation for research in agriculture, coordinates a national potato breeding program. Given to the climate change prognosis, research activities aiming to evaluate potato germplasm for drought tolerance have been under development since 2006. A polyethyleneglycol-based methodology to simulate water deficit in hydroponic system was established. Experiments have been carried out annually at Embrapa Clima Temperado, Pelotas, RS, Brazil (41°40′42″S, 52°26′ 22.5″W), in one or two growing seasons per year, i.e. autumn/winter (March-July) and winter/spring (August-December). Potato genotypes have been evaluated for several morpho-agronomical and physiological traits. So far, around 50 genotypes, including old and modern potato varieties as well as advanced clones, were evaluated. Based on the results, it was concluded that potato genotypes respond differently to drought stress. It was also found that the negative effect of drought stress in tuber development and yield is more pronounced in spring than in autumn season, and that some varieties recently released by Embrapa have shown good performance under drought stress. The genetic mechanisms