

**PEI POTATO YIELD VARIABILTY STUDY  
INTERIM REPORT  
DECEMBER 2015**



**Genesis Crop Systems Inc**

**December 2015**

## Overview

**Genesis Crop Systems Inc was engaged by the PEI Potato Board to conduct a three year study investigating potential causes of reduced yields in PEI potato fields. This report provides an overview of Year 2 activities.**

**Three commercial processing growers (MacLennan Properties, Island Holdings and Willard Waugh & Sons) served as project collaborators.**

## Methodology

**Each participant installed a yield monitor on their harvesting equipment. Computer generated yield maps were used to provide GPS location points (Fig1) for two lower yielding and two higher yielding zones in each of five fields at each cooperators farm. All fields measured yields from the Russet Burbank variety.**



**Figure 1 GPS data points for sample collection**

**In early summer of the season following potato harvest, each location point was sampled (Fig 2) as follows:**

- **Eight soil core samples collected at 8" depth within a 30 ft radius of the data point. Core samples were mixed in a plastic pail, divided in two sub samples and submitted to the PEI Soils Lab and the PEI Potato Quality Institute for soil chemical analysis and Root Lesion Nematode(RLN)/Verticillium spp. identification, respectively.**
- **Eight soil compaction readings were collected similar to above with a Field Scout SC900 soil penetrometer. Measurements in psi @ 8" depth were recorded and mean values calculated to provide average soil resistance values for the target depth at each site.**



**Figure 2 Tools used for YVS sample collection**

## **Results**

All data are presented in the Appendix 1 (attached) PEI YVS 2015 Master Data spreadsheet. Root Lesion Nematode populations are reported as #s/kg of dry soil. *Verticillium albo-atrum* and *dahlia* spp are recorded as 0 – 3, where 0 = no recovery and 3 = severe potential. Soil compaction measurements are recorded in psi at 8" depth, No statistical analyses have been applied to the data. Comments made at this point are observation points only.

Values tended to vary widely from field to field. Generally speaking, Root Lesion Nematode levels were quite high at most sites. The average of all 60 sites samples was 4806 RLN/kg dry soil. This value is just slightly below the economic threshold level for Russet Burbank (5000 RLN/kg dry soil) identified by Dr Joe Kimpinski and Mr Claude Gallant at the Charlottetown Research Station during during studies conducted during the 1970s-1990s.

*Verticillium albo-atrum* tended to be quite variable as well. *Verticillium dahliae* infestations, however, were extremely high at virtually all sites. Dr Bud Platt, retired AAFC plant pathologist commented that *V. dahliae* has evolved to become the predominant species found in PEI soils. This species can also have the greatest impact on potato crop yields.

Soil compaction levels were quite high as well – average of 207 psi across all sites.

Soil organic matter levels also varied from site to site with some high yielding sites having higher OM levels than the lower yielding sites, others the opposite. Overall, soil OM levels tended to be quite low with the average value for all 60 sites calculated as 2.4%.

**Although data seemed to vary within each field and from field to field, observational differences that *may* cause yield reductions were recorded that deserve mention for the following fields – note that all comments describe the relationship comparing the lower yielding areas with the higher yielding areas:**

**#13 – *Verticillium albo-atrum* (Vaa) level higher; CEC lower – lighter soil texture?**

**#14 – RLN slightly > economic threshold (ET) vs slightly lower for higher yield sites; Mg levels >20% lower**

**#16 – Compaction > 20% higher; one Organic Matter (OM) reading quite low; Mn > 20% lower; CEC lower**

**#18 – RLN > ET**

**#19 - Vaa higher**

**#20 – RLN higher but just slightly below ET**

**#21 – RLN > ET; Mg > 20% lower**

**#22 – Vaa slightly higher**

**#24 – CEC lower; Mg >20% lower**

**#25 – Compaction higher; Mg >20% lower**

**All of these observations are high-lighted in yellow in the data spreadsheet.**

## **Conclusions**

**Data collected from yrs 1-2 activities were quite variable. Regardless of yield variability to date, populations of two major pests are quite high and likely responsible for yield reductions in a number of PEI potato fields. Soil OM levels conversely tend to be low. Subsequent field management strategies need to identify methods of maintaining and improving the soils' OM status. Improvement of this aspect should also improve overall soil structure; leading to decreased soil compaction levels as well.**

**Project activities will continue during the 2016 season.**