MINUTES

Potato Crop Germplasm Committee meeting
Potato Association of American annual meeting 2017 at Fargo ND, --- 6:30 AM, July 25th, 2017

Present: Barkley, Bamberg (Chair), Parsons, Jansky, Endelman, Levy, Shannon, Whitworth, French, Novy, Douches, del Rio.

Agenda (attached) had been distributed in advance.

Introductions: Ron French introduced himself and his new APHIS post managing quarantine for potatoes. As usual, importers are encouraged to plan ahead and communicate so yearly imports fit smoothly into the timing and quota number.

CGC-sponsored grants: Dave Douches reported SNP genotyping 725 samples as part of the 2015 CGC grant. These were from USPG, CIP and Seed Savers. There was high duplication. Noelle Barkley suggested that since CIP organized the larger parent grant, CIP would be willing to take the lead in crunching the data, with help from Dave. Julien Levy reported on the 2016 grant to TAMU for Zebra Chip screening. They found psyllid resistance in four accessions, but not much resistance to the bacterium. Rich Novy mentioned evidence of resistance in *chacoense*. Julien has a poster at this PAA meeting (attached). [Bamberg post meeting note: is there promise in the apparently symptomless *microdontum*?]. In 2017 we selected a grant for *Dickeya* screening by Amy Charkowski. Jeff Endelman suggested getting advice from European colleagues who have had longer experience. Rich Novy wondered if introgressed lines involving *etuberosum* or M6 (inbred *chacoense*) would be promising. [Bamberg post-meeting note: We already sent available tubers from >200 lines to Bryan Swingle at Cornell, and got preliminary results indicating *microdontum* has very promising tuber resistance. At this writing we are generating tubers of all members of this species for fine screening.] Bamberg noted that grants in 2017 were double (~$20K) or nothing, so potato CGC needs to do the optimum job of presenting high-quality proposals, as well as have our minutes and Vulnerability Statement up to date.

Big Data: Alfonso del Rio discussed status of GBS data on 700 lines of cultivated species. Jeff Endelman cooperating with Laura Shannon, now at Minnesota. Noelle Barkley noted that data should be accessible on-line, but it is not so useful in raw form. Jeff Endelman said a high value future CGC grant would do the work needed to get these new data accessible to the research community.

Vulnerability Statement update: To keep this current (2014 is our latest version), Sagar Satuvalli agreed to recruit members and chair a committee to review the document each year, and propose revisions prior to our annual meetings.

New members: Laura Shannon, new breeder at Minnesota, Isabel Vales, new breeder at TAMU, Susie Thompson, breeder at NDSU.

Kenosha Potato Project and SSE—Curzio Caravati: Curzio provided a document (attached). He seeks continued cooperation with PCGC. He can partner with us in generating positive publicity for potato, sharing stocks and technology, exploring ways to raise funding. Curzio has a vision for creating a potato institute at Kenosha.

Adjourned at 8:00 AM.
Respectfully submitted,
John Bamberg
POTATO CGC 2017

Agenda

As is typical, the Potato CGC annual meeting for 2017 will be held during the Potato Association of America (PAA) meeting-- this year at Fargo, ND…

at 6:30 AM breakfast on Tuesday July 25th

PAA program will specify the room.

Contact PCGC chairman Bamberg at John.Bamberg@ars.usda.gov for the latest news on timing and agenda for the CGC meeting.

AGENDA

1. Review of past grants and discussion of priorities
   
   2015 SNPs of US/CIP/SSE cultivars – Dave D., Dave E., and Noelle
   2016 Zebra Chip – Isabel
   2017 Dickeya -- John

2. Discussion of big data management – Alfonso, Laura, Dave E., Noelle

3. Update of Vulnerability report – Sagar and sub-committee

4. Review of CGC members and participation -- John

5. Status report of Kenosha Potato Project/SSE – Curzio (document)

6. Other topics
On May 5th, 2017 KPP celebrated the 10 Year Anniversary. It started in Kenosha, WI as a hobby project by a couple of local seed savers, and it now counts over 2,600 Facebook followers in 90 countries. The Group includes professional breeders and farmers / gardeners who experiment with TPS.

The group vision is to become the Global Platform which promotes Potato Breeding. We believe to be the inspiration, the breeding ground of future potato breeders. Some may one day be working for PAA members.

It appears that the more sophisticated PAA members and professional potato breeders focus on the specific needs of the commercial industry. While many of the KPP members “freely” experiment with different cultivars, without specific objectives in many cases!

Often we start with heirloom varieties kept for years by Seed Savers Exchange members – I’m referring to the well-known organization based in Decorah, IA.

SSE has a substantial capital base built on donations and grants. It has been keeping a large collection of potato plant material in a lab as in-vitro plantlets.

SSE is plagued by three major challenges:

1. Many cultivars kept in the collections are duplicates, lots of misspellings.
2. Lacks a clear vision of what is valuable, and what should be discarded.
3. Needs to find funding to do virus elimination of infected material.

Here is a case study:

For full disclosure, Kenosha Potato Project is part of Kenosha Urban Farm, which is in transition to become a 501 c3 non-profit, educational corporation. I have been receiving donations from SSE members and non-members which I keep in a separate trust account, in addition to my own personal donations to the project. Specifically the assets of KPP are estimated at $20,000 – including a professional grade cooler, mostly used for multiple year seed tubers’ storage.

In order to “force the topic” which seems NOT to be a top priority at SSE, I have donated $3000 to Seed Savers Exchange for the very specific use of virus elimination.

SSE has been quoted $1000 for the virus treatment, per cultivar line IF 6 cultivars are sent in at the same time, by the Pathology Department of UW-Madison.

The KPP donation of $3000 is matched by SSE so that we now have funding for 6 lines.

As one of the donors, I got to pick the names of three cultivars. SSE may select the other three. BUT I have a strong suspicion that the SEE Management does not have a clear idea what to select, out of the many “virus loaded plantlets” they are keeping in the lab.
I’m addressing this letter to this PAA Committee to ask for help.

Study of the complete list of SSE collection names.
Identify what is MORE valuable and should be given priority

Perhaps your Association has funds to contribute?

There is no “burning fire emergency”. SSE is in the process of having the entire collection genetically fingerprinted to identify duplicates. All decisions are postponed to after that exercise is completed.

Another case study:

SSE is holding material for both heirloom cultivars known as Cowhorn and Seneca Horn. The latter was collected directly from the Native American Tribe – Seneca People.

Some SSE members believe that the cultural value warrants keeping both strains, and not drop one because it may return a genetically similar or possibly identical. It is really hard to pin point somaclonal variants in heirloom varieties.

Thank you very much for your attention and considerations.

Curzio Caravati
Kenosha Potato Project
Founder and Curator
INTRODUCTION

Zebra Chip (ZC) is a vector-borne disease of potato affecting many potato producing regions of the US, Mexico, Central America and New Zealand. The pathogen is a phytoplasma (E. coli) and the vector is a leafhopper (Cicadula viridula). ZC symptoms include yellowing, leaf curling, chlorosis, mosaic, purpling, swellings, internodes, aerial blenders, and reduced yield. Other symptoms include darkening of the tubers medially, late, especially during shipping, rendering tubers unsuitable for crop production (Fig. 1).

Over a thousand selection/introduced varieties have been evaluated for tolerance resistance to ZC as part of the Texas Potato Breeding Program. Data from field trials throughout Texas suggest ZC is a low-level resistance is present in advanced lines. Since no plant resistance against Lao has been found in commercial varieties, crop protection relies on pest and disease control in the vector populations. Consequently, there is an urgent need to find complementary methods to protect crops, including for plant resistance and limiting pathogen transmission, which are the key long-term solutions.

Objectives

Our goal was to identify accessions with enhanced protection against phytoplasma and Lao infection with natural resistance and selected for resistance or resistance, respectively, which could lead to a decrease in pathogen transmission.

Materials and Methods

The mini-core collection (80 accessions) was obtained from the US Potato Genebank, Sturgeon Bay, WI. Plants were started from seed. After germination, plants were transplanted to small 5.8-litre pots (Fig. 2). Experiments were conducted in the greenhouse from March to June 2016 and from September 2016 to February 2017.

Non-choice assay

Plantlets (20) plants were infected with 3 to 4 phytoplasma (2 per tomato and 1 or 2 melon) placed on a single plant (leaf) in a mesh bag (Fig. 3). Four plants were infected with Lao-infected phytoplasma (infected plants) and 2 control plants were infected with Lao-free phytoplasma (control plants). One week after infectious, the infected leaf was cut with the mean to remove the leaf.

RESULTS

Insect resistance

One week after infections, insect survival and number of eggs were counted from both the control (Lao) and treatment plants (Lao-free). All insects (Lao-free) survived to the adult stage. However, Lao-infected phytoplasma had a survival rate of 77.7% and inoculated (B-2) eggs. The above were previously identified as insect resistant (Ozaki, 1983).

Table 1: Insect resistance: evaluated by insect survival andoviposition.

<table>
<thead>
<tr>
<th>Insect resistance</th>
<th>Low survival (%)</th>
<th>High survival (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lao-free</td>
<td>77.7</td>
<td>22.3</td>
</tr>
<tr>
<td>Lao</td>
<td>0</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 2: Insect resistance: evaluated by insect oviposition andoviposition.

<table>
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<th>Insect resistance</th>
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</thead>
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<tr>
<td>Lao-free</td>
<td>0</td>
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<td>0</td>
<td>100</td>
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</tbody>
</table>

Potted plants treated with Lao-resistant yielded better than infected and were cut enough to be chopped. After 7 days of exposure to the control treatments produced tubers that could be excited by chopping. The difference observed in the resistance to yield induced by Lao treatment compared to the control treatments produced tubers that were dark upon excision.

Table 3: Reduction of yield, tuber count, and tuber weight.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Yield (g)</th>
<th>Tuber count</th>
<th>Tuber weight (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Lao-free</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Lao</td>
<td>0</td>
<td>0</td>
<td>0</td>
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ACKNOWLEDGMENTS

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REFERENCE