

**Kimberly Potato Storage Advisory Committee Meeting Minutes**  
Kimberly, Idaho, November 20, 2008

The Kimberly Potato Storage Advisory Committee meeting was held in Kimberly, ID from 10 am to 2:30 pm on November 20, 2008. Attending were Mike Lewis, Vicki Taylor, Gary Taylor, Kent Wasden, Danielle Bedke, Marden Plant, Laurie Williams, Travis Blacker, Jonathan Whitworth, Mel Martin, Allan French, Rich Novy, Jerry Swisher, Phil Nolte, Jeff Stark, Mike Thornton, Paris Penfold, Rob Roche, Drew Glascock, Ken Wood, Doug John, Jeff Clark, Ritchey Toevs, Eric Wahlen, Russ Patterson, Phill Wharton, Sanjay Gupta, Tina Brandt, Nora Olsen, Mary Jo Frazier, Gale Kleinkopf, Lynn Woodell, and Maria Chavez.

Nora Olsen opened the meeting by thanking all for attending. Nora stated the purpose of this meeting was to provide a background on research, and to solicit feedback and input from the group. The group was asked to help establish priorities for the Potato Storage Research Facility. The Storage Program is involved in three major areas of study: variety development, sprout control, and disease suppression. Introductions were made speakers provided brief summaries of their projects.

**Project Summaries**

Tina Brandt presented a summary on the *Storage Requirements for New and Potential Release Cultivars for the Potato Industry*. This is the beginning of the eleventh year for this study which is funded by the Idaho Potato Commission. The goal is to develop storage management recommendations for new varieties and provide concise information bulletins easy for the industry to utilize. Bulletins for managing Umatilla, Summit, Gem, Alturas, A93157-6LS and Western Russet varieties in storage have been completed.

Tina illustrated the importance of the study by presenting data from USDA NASS that showed that the percent of acres of potatoes grown in Idaho planted to 'Russet Burbank' has declined over the last 20 years (from 97% in 1988 to 57% in 2008). Of the top 7 varieties grown in Idaho in 2008, 5 of them have been evaluated in the Kimberly storage management research program.

Cultivars in the 2007-08 trial were: AOA95155-7, AO96160-3, Highland Russet (A9045), A95409-1, AOA95154-1 and Russet Burbank. Data was shown on dormancy length, Fusarium dry rot susceptibility, percent glucose, fry color and weight loss. Brief conclusions were presented (based on the one year data).

- Recommended storage temperature for best processing quality for AOA95155-7 was 42-45°F, dormancy at 45°F was 110 days, Fusarium dry rot susceptibility was moderate, and weight loss was moderate to high.
- Recommended storage temperature for best processing quality for AO96160-3 was 42°F, dormancy at 45°F was 120 days, Fusarium dry rot susceptibility was moderate, and weight loss was moderate to high.

- Recommended storage temperature for best processing quality for Highland Russet was 48°F, dormancy length at 45°F was 80 days, Fusarium dry rot susceptibility was moderate, and weight loss was moderate to high.
- Recommended storage temperature for best processing quality for A95409 was 45°F, dormancy at 45°F was 105 days, Fusarium dry rot susceptibility was moderate, and weight loss was moderate.
- Recommended storage temperature for best processing quality for AOA95154-1 was 42°F, dormancy at 45°F was 90 days, Fusarium dry rot susceptibility was high, and weight loss was moderate.

Cultivars in the 2008-09 test were shown, they include; AOA95155-1, AO96160-3, A97066-42LB, A98345-1, AOA95154-1 and Russet Burbank. Copies of the CIS "Storage Management of Western Russet Potatoes" published in September of 2008 were available or can be accessed at <http://www.kimberly.uidaho.edu/potatoes/CIS1151.pdf>.

Some suggestions regarding this project included adding Russet Norkotah as an additional standard to compare to the varieties and to add in variety response evaluations to Pythium and pink rot. Extensive discussion was made regarding vine kill and the use of Rely versus sulfuric acid on skin set. The committee suggested pursuing additional studies evaluating vine kill but not necessarily in combination with this variety study. It was also discussed that new variety disease management is more of an issue. Growers may need to change some of the ways they manage diseases when growing new varieties as well as changing nutrient and water management.

- Three new varieties will be released this year.
  - A95109-1 = Classic Russet
  - AOA95154-1 = Clearwater Russet
  - A9305-10 = Alpine Russet - has a longer dormancy

Lynn Woodell presented a summary on the *disease management studies evaluating post harvest products for storage disease control*. Her results showed continued efficacy with phosphorous acid (PA) products for pink rot, late blight and more recently silver scurf control in storage. A discussion followed concerning rate reduction due to high prices, combining PA with other products, and also emphasizing the need to continue disseminating this information. Azoxystrobin continues to show efficacy and to be evaluated in storage for silver scurf control although most studies include combination treatments with other products to minimize the potential for resistance development. In past years, multiple products have been evaluated for dry rot control with little success. A preliminary study was conducted this summer with an unregistered product, difenconazole, and some efficacy was seen. This will be repeated during 2008/2009 storage season. The committee emphasized their concern for managing dry rot.

Lynn presented conclusions from the USDA/ARS State Cooperative Potato Research Program (Time Zone) which tested the effects of curing temperatures and relative humidity on the development and spread of pink rot and late blight in storage. She stated that there is greater potential for disease spread in storage from potatoes that have been freshly exposed to diseased potatoes than from potatoes that were already

showing disease at harvest. This finding verified the importance of using a post-harvest fungicide as potatoes are going into storage rather than waiting days/weeks after the storage is full. Decreasing curing temperature and/or RH showed no change in processing quality and varying benefit upon disease control depending on season and cultivar. Reducing curing temperature to 50°F and RH to 80% may reduce the potential for secondary soft rot but it may also result in greater weight loss.

There was additional discussion concerning control of *Pythium* leak in storage, foliar use of PA and the potential for tuber soft rot, Western Russet and susceptibility to tuber early blight, the relationship with manganese and *Fusarium*, how to make post-harvest applications more “user-friendly”, the correlation between physiological age, maturity and disease susceptibility, variety susceptibility to virus in particular PVYntn, and the use of low airflow during filling of the cellar. There appeared to be a greater need for field and storage phosphorous acid programs to be developed to help minimize pink rot infection and if foliar applications of PA have a fungicide included.

Mary Jo Frazier presented a summary on the projects looking at *Alternative Sprout Inhibitors and Disease control*. This IPC-funded project has several objectives. One objective is to identify products and determine best application technology for sprout control in the absence of CIPC. Another goal is to reduce the dependence upon CIPC with reduced rates, timing of application, and the use of combination treatments. A third objective is to evaluate if any other these products may be beneficial for disease control in storage as well. Studies have focused on testing a nine carbon ketone (C9-ketone; WSU570) for sprout control. All sprout inhibitor treatments significantly reduced sprout weight when compared to the untreated control except rosemary oil and low rates of muna oil. Sprout control was significantly greater with the addition of clove oil with low rates of CIPC compared to CIPC alone and higher residues levels were observed with CIPC/clove oil combination when applied at the higher rate. This indicates a need to better understand the use of carriers with CIPC and sprout control efficacy and residue levels. Weight loss was lower in treatments with greatest sprout control.

The proper timing of WSU570 appears to be at sprout development with the highest rate although there was some benefit to applications prior to visible sprout detection. The WSU570 rate study indicated a higher rate of ~100 ppm is necessary for greatest control. WSU570 proved to be better than the essential oils and appears to have great potential market use in the areas that do not allow CIPC (eg. Japan) or as a product to apply after late season sprouting has occurred even after a CIPC application. It also appears to be an excellent product to darken the eyes and may be useful as an EC formulated product for that purpose.

We tested the possibility of thermal aerosol application of phosphorous acid. Using a hot plate applicator and electronic temperature controller, observations of the liquid and vapor states of the chemical could be made at discrete temperature settings. At temperatures staggering from 100°C (212°F)-190°C the salt solution boiled and some water vapor was evident leaving behind a salt residue. At temperatures of 250°C and above a true vaporization of the product occurred generating a gas with a strong garlic odor, apparently phosphine gas, and was observed to ignite. It was determined thermal

aerosol application is not appropriate for phosphorous acid due to the safety issue of generating **highly toxic and flammable gas** at higher temperatures.

There was additional discussion concerning the use of MH and other varieties in particular Alturas, how early is too early of an MH application, the potential use of WSU570 as an EC formulation to help blacken eyes, timing of CIPC application of early versus late, the feasibility of a constant application of WSU570 and the ability to cold aerosol phosphorous acid into storage.

*Miscellaneous projects* were discussed.

Nora Olsen made comments on the IPC-funded *Seed Aging of 'Russet Burbank' and 'Ranger Russet'* study which is being done with Dr. Mike Thornton and Dr. Phil Nolte. The third and final year of this study was completed in 2008. This project is focused on determining a relationship between n-butanol concentrations in a seed tuber as it relates to physiological age and seed performance in three locations in Idaho. She also provided an update on the USDA/ARS funded project *Potential Impact of Potato Wound Healing and Quality Due to Post-Harvest Sprout and Disease Control Product Applications*. The objective of this study is to evaluate if post-harvest products (disease and sprout control such as CIPC, phosphorous acid, biocontrol agents) interfere with wound healing. Even with an increased potential in retarding suberization of the wounded surface, the question remains if that delay in wound healing translates to greater disease development. Nora also updated the committee on an IPC-funded project led by Amber Moore on *Fertilizing Potatoes in Idaho with Dairy Manure – Nutrient Availability, Disease/Disorder Susceptibility and Pathogen Persistence*. This project utilizes a certified organic field where we evaluated Russet Burbank to organically approved manure, compost, fish fertilizer and looked at Defender, Alturas, RB, Yukon Gold, Dark Red Norland, Norkotah, Norkotah-8 under an organic system. It was recommended to add Ranger Russet and Yukon Gem to this study. This study compliments our on-going organic storage management program. In a conventional field, long-term applications of manure, compost and fertilizer are being evaluated for tuber yield and quality. Nora highlighted the *Good Agricultural Practices (GAP) Audit Manual* and how you can "build-a-manual" using our internet site [www.kimberly.uidaho.edu/potatoes/gap](http://www.kimberly.uidaho.edu/potatoes/gap). The information displayed on this website needs to be tailored to an individual farm. Since April 2008, there have been approximately 1,300 hits on the GAP website.

An update on the IPC-funded *Effects of Vine kill Methods on 'Alturas' and 'Russet Burbank' Potatoes* was discussed which is a study in collaboration with Dr. Pam Hutchinson and was completed in August 2008. Storage quality differences were observed among vine kill treatments (no vine-kill, Rely vine kill, Reglone vine kill, sulfuric acid fast vine kill) in both cultivars. Additional studies currently in storage were discussed as they related to various vine kill treatments. The committee discussed the concerns with skin set with the use of Rely and experiences with the use of Rely and Reglone at cooler temperatures may not be as effective in obtaining desired skin set. It was indicated that additional studies are warranted on vine kill and the impact on skin set and processing quality. Additional studies incorporating nitrogen management and timing of application may be needed.



Tina Brandt presented *Fine Tuning Storage Management for Premier Russet ('A93157-6LS')*, which is the second-year of an IPC-funded project recommended to pursue by the Storage Advisory Committee. Premier Russet (PR) is a new low-sugar variety that can be stored at cold temperatures (42°F) and still be processed into French fries. This study was comprised of three main objectives to address challenges growers are facing in storing this variety. Objective 1 was disease management; both Fusarium dry rot and pink rot. The effect of pulp temperatures on disease development of both diseases was studied. For Fusarium, tubers with pulp temperatures of 45°F had significantly higher incidence of dry rot compared to tubers with 55 and 65°F pulp temperatures. A trend was observed for a lower incidence of dry rot with 55°F pulp temperatures. These results indicate additional studies are warranted. For pink rot, data from this first year indicated that pulp temperatures of the potatoes had no effect on pink rot incidence or severity. The effect of phosphorous acid (PA) on pink rot was investigated. Results show that an application of 12.8 fl oz/ton of PA significantly reduced pink rot incidence and severity. Additional products will be tested in 2008-09 for both pink rot and dry rot control. The second objective was to look at weight loss in Premier Russet over time in storage. Percent dry matter throughout the storage season was significantly higher in Premier Russet compared to Russet Burbank. These results indicate that most of the shrinkage observed in Premier Russet may be attributed to water loss and not necessarily carbon loss. Additional studies are needed to better understand the greater weight loss observed with this variety. The third objective was to assess the use of maleic hydrazide on PR to retard sprout development. Maleic hydrazide was applied in the field at a rate of 1.33 gal/A on August 20, 2007. No significant differences were observed in yield or grade on the MH plots. Sprout ratings and weight measurements were taken in storage. Results indicate that applications of MH significantly reduced sprout growth compared to the untreated controls. MH is a very effective tool to decrease sprout growth (weight/elongation) for Premier Russet. Additional studies are warranted to investigate the most effective timing of MH. Additional comments were given to look at cultural practices, such as vine kill and pre-harvest irrigation, on Premier Russet susceptibility to dry rot and weight loss.

*Sanjay Gupta* the new Potato Post-harvest Physiologist located at Kimberly was introduced and he presented information on his previous work looking at the biochemical components of cold-induced sweetening in stored potatoes. Sanjay also plans to investigate starch content, respiration, and invertase activity of various cultivars. He can be reached at 208-423-6666 or [sgupta@kimberly.uidaho.edu](mailto:sgupta@kimberly.uidaho.edu).

*Phill Wharton* the new Potato Pathologist located at Aberdeen was introduced and he presented information on dry rot, black dot, Pythium leak and other ideas for future field and storage research. He presented an idea regarding "active packaging" (chemically active packaging) to help decrease concerns with silver scurf and black dot. He can be reached at 208-397-7000 ext. 108 or [pwharton@uidaho.edu](mailto:pwharton@uidaho.edu).

## **Future projects and additional comments**

Nora Olsen presented a list of ideas for future direction for research and extension efforts for feedback from the committee.

- To approach the acrylamide issue and look at the impact of varieties and field and storage conditions that may impact glucose levels, asparagines level, and subsequent acrylamide content. This area of research was strongly supported by the committee.
- To evaluate if a relationship is present between the presence of virus (PLRV, PVY and associated strains) and quality (fry color, sugar content, mottling). This area of research was supported by the committee.
- To investigate the use of carriers or surfactants with CIPC to potentially increase the effectiveness and efficiency of CIPC. This would also be in combination with CIPC residue sampling. This area of research was supported by the committee.
- To focus on the use of CIPC and export market concerns. In particular, the use of CIPC for sprout inhibition as phytosanitary solution, impact of CIPC on cell division/expansion, and the impact of various CIPC levels on sprout development on seed. This area of research was supported by the committee.
- Evaluate post-harvest aesthetic changes (eg. color, russetting, etc.) in storage with a project led by Mike Thornton. This area of research was supported by the committee.

The committee was reminded of the 41<sup>st</sup> Annual Idaho Potato Conference and 30<sup>th</sup> Ag Expo, January 20-22, 2009 in Pocatello, ID. The theme is "*Potatoes 2009 and Beyond: Efficient, Sustainable and Profitable*".

The committee was thanked for their continued support of the University of Idaho and the Potato Storage Research and Extension Programs and to contact us with further research and extension suggestions. Nora Olsen can be contacted at 208-736-3621 or [norao@uidaho.edu](mailto:norao@uidaho.edu).