

Components Of A Wisconsin Research Storage Facility - A Panel Discussion

"How Would The University of Wisconsin Use A Research Storage Facility?"

W. R. Stevenson

**UW-Madison
Department of Plant Pathology**

Many discussions over the past few years have focused on the needs of the Wisconsin potato industry. Invariably the discussions include topics related to storage issues and the quality of research that can be conducted in the current research storage facility located at the Hancock Agricultural Research Station. The current storage facility was designed many years ago to hold potatoes from research plots through the winter months so that additional measurements could be recorded on research materials before the next spring. In short, the storage extended the period of data collection beyond the fall period. The storage is insulated and we are able to keep the potatoes from freezing during the coldest outside temperatures as long as research materials are not stored against the outside walls. After all of the potatoes designated by researchers for storage are catalogued and placed on the metal racks in the storage, the Hancock staff typically fills the storage with excess tubers to help buffer against sudden swings in outside temperatures. Temperatures within the storage are controlled within a 5°F temperature swing. Humidity is added by sprinkling water on the cement floor and by using overhead misters that are manually operated. Fans within the storage keep the air moving and eliminate pockets of colder or warmer air. Over the past several years we have observed that potatoes, placed in storage during September, store reasonably well through the middle of March. After mid-March, when it becomes more difficult to control the interior temperatures, tubers begin to sprout and shrink. Typically the storage is emptied by the end of March in preparation for the next growing season. Potatoes are either transported to Madison where measurements are completed or final data are recorded at the Hancock station and the remaining potatoes are used for composting.

Some might ask why the current storage is no longer adequate. After all, we've been using this storage for at least the last thirty years and probably much longer. The basic answer is that the current storage facility lacks features that would facilitate a robust research program that would help to provide answers to some of the more pressing problems facing the Wisconsin potato industry. Some of the basic shortcomings of the current facility include:

- 1) Lack of precise temperature and relative humidity control. (All potatoes are stored in the same temperature and relative humidity environment. Specific temperature and humidity treatments for separate samples and experiments are not possible.)
- 2) Lack of an ability to segregate potatoes by treatment - especially important in studies on sprout inhibitors, volatile treatments and pathogens affecting tubers.
- 3) Stratification of temperature and humidity from the top shelves to bottom shelves of the storage. (For tuber defects that develop in storage, this environmental stratification appears to be masking what could be real differences between treatments applied before harvest.)

- 4) Lack of space to separate research tubers harvested and stored in one year from seed tubers being prepared for planting in the current year. (Currently emptying the storage by the end of March partially accomplishes this goal, but often there is not enough available space to accomplish either need.)
- 5) Lack of ability to simulate what actually happens in a commercial storage facility when storing tubers harvested in wet years, dry years and years when tuber rots challenge the industry.

Perhaps #5 is the most serious deficiency. We simply lack good facilities for storage research and there is no shortage of storage research topics that many researchers would like to explore. Approximately two years ago, the UW faculty were polled for possible uses of the storage and research topics that would utilize a modern storage facility. I've broken these down by discipline and added some additional areas gleaned from discussions with researchers over the past several months. I've left some blank lines for you to think about your needs and to add to this list. Let us know the research areas you would like to see addressed in a new research storage. It is clear that many of the projects would likely benefit from multidisciplinary approaches. Developing plans for a new storage facility would and should involve the faculty involved with potato research at the UW, the Wisconsin IPM industry as well as the entire potato industry. It is also clear that many of these projects would benefit from multi-state and multi-region cooperative research projects. Having a modern research facility in Wisconsin would allow us to work jointly with other states in developing research projects that would be eligible for regional and national research project funding.

Several of the research topics discussed in the past two years include:

A. Breeding and Varietal Development

- Screening germplasm and breeding lines for desirable storage traits
- Accelerating progress for breeding varieties with improved ability to be chipped or processed from cold-temperature storage
- Developing complete varietal profiles from planting through storage
- Developing storage protocols for hard-to-store varieties that would help varietal diversification within the industry
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B. Seed Potatoes

- Methods for improved storage for seed potatoes
- Evaluating the effect of physiological maturity of seed on field performance
- Studies on factors related to wound healing - early storage, handling of seed
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C. Insects

- Studying the effect of scab gnats on the further development of scab lesions in storage
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D. Tuber Quality

- Evaluating new and novel sprout inhibitors for enhance storability of tubers
- Developing storage protocols to minimize pressure bruising and shrink
- Improving storage conditions for improved tuber appearance and marketability
- Evaluating time-course chemical residue and storability issues as we investigate new chemistries for vine killing, sprout inhibition, disease control, insect control, and weed control.
- The ability to collect tuber samples over time from a GLP (Good Laboratory Practice)-approved storage facility for residue analysis as part of IR-4, EPA and industry registration requirements.
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E. Soil Fertility

- Evaluating the effects of macro nutrients on tuber storability and tuber quality
- Evaluating the effects of micro nutrients on tuber storability and tuber quality
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F. Diseases

- Developing cultural methods for suppression of silver scurf in storage
- Evaluating the efficacy of post-harvest treatments (e.g. OxiDate, Purogene, biological materials, etc.) for control of bacterial soft rot, late blight, silver scurf, black scurf, Fusarium dry rot in storage
- Developing effective guidelines for managing tubers with field infection by tuber rotting pathogens
- Evaluating the effect of foliage applied fungicides/bactericides/nematicides on the storability of harvested tubers
- Evaluating tuber resistance to selected plant pathogens and the impact of resistance on crop storability
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These ideas are but a few of the research areas that might be addressed in a modern storage research facility. As we think about the prospects of funding and eventual construction of a storage facility, it is important to consider how we might best utilize the facility for benefit of the entire industry. Add your ideas to the list and let us know what you think about these areas of research. The more people think about storage issues and what we can achieve with a modern storage facility, the greater the benefit will be to our industry.