

Effect of washing on the removal of potato cyst nematode from potato tubers grown on *Globodera pallida* infested soil.

*Globodera pallida*, the pale potato cyst nematode (PCN), has been found in two potato fields in Idaho, one of which is currently planted to potatoes. These potatoes are contracted for processing. The Unified Command has asked the PCN Technical Working Group (TWG) for guidance on whether washing the potatoes in the field will mitigate the risks associated with moving the potatoes from the field. The TWG consists of a virtual panel of scientific experts on PCN. These scientists represent the best available knowledge on *Globodera pallida* from around the world. Scientists within the Center for Plant Health Science and Technology facilitated communication between the TWG and the Unified Command and asked the TWG to examine the feasibility of washing the potatoes directly in the field and whether the washing would mitigate the risks associated with moving the PCN cysts to other potato fields or to packing houses or processing facilities. Responses to the questions posed were gathered and are synthesized here. Additional information is still being gathered. Any changes will be documented and provided to the UC.

Two publications have been found that examine the washing of potatoes and the efficacy of cyst removal. Wood and Foot (1977) found that immersion and washing potatoes in a solution with 1% available chlorine and 0.01% detergent for two hours completely destroyed all PCN cysts. Potato quality was not adversely affected except for tubers from immature plants where a light brown halo appeared around lenticels. This treatment was the optimal regime studied by these researchers in terms of efficacy and economics, but it has been noted that this regime is still not practical owing to the phytotoxic and corrosive effects of high concentrations of available chlorine needed for this treatment (Gardner, et al., 2006).

In order to develop a practical means of reducing risk of cysts in harvested potatoes to acceptable levels, Gardner and coworkers studied the effects of more standard potato washing procedures on the removal of contaminating cysts (Gardner, et al., 2006). In this study, fields infested with 20 cysts per kg of soil (an equivalent of approximately 15 million cysts per acre) were found to have an average of 8 adhered cysts per each set of 100 tubers. After a single washing with a washing plant consisting of an incline delivery elevator, power roller washer and an exit table with 4 banks of three jets each at 200 kPa, an average of less than 1 cyst per 100 tubers was detected. (It was noted that a 200kPa washing pressure is relatively low compared to the industry standard of 480 kPa). It was also noted that no cysts were detected after three washes at the 200 kPa rate. The conclusion drawn by these researchers is that no cysts were found on washed tubers if less than 5% of the tubers had visible soil clumps adhering to them.

This washing standard has been put into practice in a processing facility in Queensland Australia and is the basis of a certification program for interstate movement of tubers for sale to fresh markets, at least to fields in quarantine areas where no cysts have been yet found. Of the 4500 metric tons of tubers representing 146 loads that passed through the

facility in 2005 from the quarantined area in Queensland, no cysts were detected using their standard extraction techniques (Gardner, et al., 2006).

In-field washing has been done in Idaho already for chipping potatoes. The process uses a large amount of water, but may be useful for processing potatoes to go directly for processing from known infested fields. There is an U of I video that examines foreign material control for potato harvest called “Continuing to manage foreign material for quality Idaho potatoes”. This video examines washing as well.

Other considerations:

Gardner and coworkers (2006) specifically concluded that their washing standard has an acceptably low risk of cyst infestation for tubers destined for processing, specifically chipping (but not zero risk). Wood and Foot (1977) noted that their procedure was used as an interim measure for treating seed potatoes in New Zealand, but no risk analysis on this practice is available.

Gardner and coworkers also noted that the soil type used for these experiments is classified as a peaty clay. Other soil types may be more easily removed from tuber surfaces than this type, but no data on how soil type affects cyst adherence are currently available.

In addition, Gardner and coworkers note that their experiments were conducted on a single potato variety. Comments from the TWG indicate that some potato varieties may be susceptible to cyst nematode infestation of tuber eyes, but how this may relate to PNW potato varieties is not known.

Washing potatoes could increase the moisture content of the potatoes and cause additional areas for the establishment of soft rot organisms. This would likely cause additional storage problems. After washing, the potatoes need to be dried, either by dry rolling or by ventilation. In addition, use of washing with potatoes that are destined for cellaring is not recommended.

Washing potatoes in the field will also cause large amounts of water to be released into the area where PCN cysts are known to occur. Great care will be required to ensure that the cysts are not transferred by vehicle traffic or washing equipment from one area to another.

All washing equipment will require strict sanitation protocols and steam sterilization prior to movement from the infested field. Likewise a cleaning area will need to be set up to facilitate the cleaning of vehicles used for transloading the potatoes are properly sanitized prior to leaving the area.

Finally, compliance agreements with processing facilities that wash or otherwise process potato tubers can be used. Research shown above (Gardner, et al., 2006) determined that standard washing procedures in processing facilities would eliminate the vast majority of cysts. Certification of the washing procedures at a given facility should be possible.

Literature Cited

- Gardner, R.; Beardsell, D.; Nambiar, L.; Partington, D. 2006. Efficacy of washing to remove cysts of *Globodera rostochiensis* from potato cv. Trent tubers from peaty clay soil Australasian Plant Pathology 35:385-389.
- Wood, F. H.; Foot, M. A. 1977. Decontamination of potato tubers grown in soil infested with potato cyst nematodes. New Zealand Journal of Experimental Agriculture 5:315-319.