

HARVEST AND STORAGE OF LATE BLIGHT EXPOSED TUBERS

by

Loretta J. Mikitzel

Department of Horticulture and Landscape Architecture

Washington State University, Pullman, WA

Previous presentations during the morning session dealt with the biology and control of late blight during the growing season. I will outline some steps you can take to minimize losses during the harvest and storage of tubers exposed to late blight.

You have already spent considerable time, energy and money to control late blight in the field. Do not let all that work go to waste. Control measures must also be taken before and during harvest, and during storage. Late blight can infect tubers in the field and it will, if given the chance. Luckily, late blight does not spread readily from one tuber to the next in storage, but late blight does predispose tubers to invasion and decay by secondary organisms, such as bacterial soft rot. There are no chemicals currently available that can be applied to tubers going into storage for late blight control. Therefore, careful monitoring of storage and pile temperatures, relative humidity and ventilation are necessary to reduce losses due to late blight and/or soft rot.

The first thing to recognize is how much late blight is present on the tubers. If less than 2% of the tubers are infected, chances are with proper management, storage will be successful. If there is more than 2% blight, such as 3-4% of the tubers are infected, do not attempt to store the tubers. It would be better to market or process them immediately. The following comments are aimed at the storage of tubers that have less than 2% blight.

Harvest. Since late blight spores require live tissue to survive, kill potato vines and harvest only after vines have been dead for at least 2 weeks. Three weeks is preferable but may not be possible. Why wait at least two weeks: there should not be viable spores present that can come in contact with, and infect, tubers during harvest; infected tubers will decay in the field and can easily be sorted out or identified; tuber skins will set.

Do not harvest during wet weather. If it is raining, stop harvesting and wait. If you must harvest wet tubers, plan to store them near the door or in a separate location so they can be monitored closely and moved quickly if necessary. Harvesting under wet conditions is undesirable because: soil clings to the tubers and any soil in the storage interferes with air circulation; there will be a film of water on the tubers which creates an anaerobic environment that is conducive to bacterial growth; water in that soil will add humidity to the storage atmosphere which is undesirable when storing diseased tubers.

This Presentation is part of the Proceedings of the 1996 Washington State Potato Conference & Trade Show.

For the reasons mentioned above, skip over wet spots in the field, such as low lying areas or at the center of the circle. Come back to them later.

Also, do not harvest tubers when they are warm (above 65°F). This is nothing new and is a standard procedure when harvesting tubers intended for storage. It is extremely difficult to rapidly remove the field heat and tubers infected with late blight will begin to decay before the pile is cool. This can occur in as little as 7 days.

Loading the storage. Handle tubers to minimize damage. Of course, this also applies to harvest procedures (proper ground and chain speed, keep the chains full, etc.). Any wound allows late blight, if present, ready access to the tuber. Wounds also allow soft rot, which is ever-present, to invade tubers.

Remove as much soil, weeds and plant debris as is humanly possible. I cannot stress this enough. Any soil or foreign material in the pile will interfere with air circulation and anytime circulation is restricted, hot spots develop. When storing tubers that have been exposed to late blight, one of your priorities should be to dry the tuber surface. To do this, good ventilation and circulation are critical. This means store a CLEAN pile.

Grade out tubers that are decayed and that are showing late blight symptoms. The healthier the pile going into storage, the easier it will be to store and losses will be minimal. Also, be realistic about the amount of blight that is in the field or load. If you come across a load from a field or location hit especially hard by late blight, hold it back and place it near the door.

One of the worse things that can be done is to store a heavily infected load next to a healthy one. Let your field representative know the condition of the tubers, especially if a fair number of tubers have late blight. He or she can work closely with you to monitor the condition of the storage.

Be aware that not all infected tubers will show symptoms or will have decayed by harvest. Spores may be present on tubers that do not have any late blight symptoms. What you don't see will cause most of the problems.

When piling the tubers, make the top of the pile as smooth and level as possible. This will improve circulation around the tubers at the top of the pile, reduce the chance of condensation and make monitoring the pile condition much easier.

Curing/wound healing. Two important aspects of storing tubers infected with late blight are to dry down the pile and reduce pile temperature as quickly as possible. Within the first week or so, temperature should be reduced to 50°F (or close to 50°F). Any time the fans are on, the humidifier should be turned off. DO NOT add any moisture to the pile or the tubers will rot very quickly and the storage will be useless.

Running the fans without added humidity should last about 1-3 weeks (maybe longer). It may be necessary to apply continuous air to the pile. An extra fan on the top of the pile may be of some benefit when drying the tubers. Curing temperatures need not be reduced, so cure at the normal temperature. The key here is low humidity and dry tubers.

The first month to month and a half after harvest are critical for late blight development. Most decay will probably show up during this time. So, monitor the storage DAILY, walk around and look at the pile. Be on the lookout for hot spots, condensation or dips in the pile. Check for foul or off-odors. And, monitor the pile temperature especially during filling. If the temperature begins to increase STOP digging, stop loading and cool that pile before adding any more tubers. If you detect a problem, act quickly! You may increase the air to try and dry the tubers, but more than likely you will have to move those tubers as soon as possible. You may only have a week or so before the pile melts down.

Holding. Depending upon the final use of the tubers, storage temperature should be reduced to the recommended temperature: 38-40°F for seed tubers, 40-42°F for fresh market and about 46°F for processing tubers. As mentioned before, reduction of humidity is critical. It may be necessary to run the fans to circulate air without humidity, or run humidifiers intermittently, for example 1 day on then 2 days off or 1 day on then 3 days off. Relative humidity will not be optimal but well below 98%. It may be closer to 90 or even 85%. Since no water is being added, the humidity in the storage is being maintained by the loss of moisture by the tubers. It is a trade off- endure more shrink than normal or lose the entire storage to rot. When the humidity is reduced in a storage, late blight lesions on tubers will remain hard and become sunken. When there is elevated humidity, soft rot invades the tubers, decays them rapidly and spreads through the pile.

We are still on a learning curve when it comes to storage of blighted tubers. How long the tubers can be held in storage is not really known. With proper humidity control and adequate ventilation several months of storage, maybe well into the spring, may be possible.

Important points to remember when storing tubers when late blight is present:

Harvest from dead vines

Store a clean pile

Cool down the pile quickly

Dry the tubers by running the fans (maybe continuously) with NO humidity

Use reduced humidity during holding by using humidifiers intermittently or not at all

Do not allow free water to form in the storage