

ROGUING SEED POTATOES

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Roguing is an essential practice in the production of healthy seed potatoes. It is the process of identifying and disposing of abnormal plants, including tubers and seed pieces. The affected plants may be diseased, another variety, or simply different.

Only plants showing visual symptoms can be rogued. When diseases are present at low levels, or in the case of some viruses such as potato virus S (PVS), symptoms may be too mild to detect. Some cultivars also tend to mask symptoms of some diseases. For example, Russet Norkotah and Shepody show mosaic symptoms of PVY poorly at best. As a consequence, both varieties are prone to abnormally high PVY levels in both seed and commercial fields. Both can also provide inoculum for infection of neighboring plantings.

Most diseases of potatoes are sap- or insect-transmitted. For this reason, roguing is no substitute for the use of good early-generation seed, careful sanitation during cutting and planting, and effective insect control. Virus-tested nuclear seed stocks and insect and disease control recommendations are available from the Oregon State University Extension Service.

Disease images, symptoms and various control recommendations are available from either the [UC Davis IPM](#), the [Online Guide to Plant Disease Control \(Oregon\)](#), or various other sites (see Pests and Diseases in [The Potato Information Exchange](#)).

Benefits of Roguing

Growers rogue to increase profits by improving seed quality. The [Oregon Seed Certification Office](#) at OSU enforces strict tolerances for diseases, nematodes, and off-types for the various classes of certified seed. Failure to meet tolerances for a given class results in down grading and possibly even rejection of seedlots forcing the grower to sell at a lower price.

Roguing is particularly important in producing seed potatoes because the crop is clonally propagated. That is, pieces of last year's tubers are planted to produce this year's crop. In most cases, diseases in the seed tubers can infect the developing plants reducing yields and quality. Disease infection during the season, on the other hand, can move to the new tubers and perpetuate the problem. Roguing infected plants breaks this disease cycle, making possible the production of healthy seed potatoes.

Training Roguers

Roguers must be highly impressed with the importance of roguing. They should also be at least marginally familiar with disease symptoms and roguing techniques. "Hands on" training by growers or extension workers in a field situation is extremely important in developing dedicated, effective roguers.

Roguers should be not only thoroughly trained, but also dependable, able to concentrate on the job at hand and work the schedule demanded. They should be potential long-term employees. Beginning roguers should be supervised by an experienced crew boss, preferably the grower or a member of his family.

Clothing and Equipment

The use of proper clothing and equipment is essential. Smooth, non-porous surfaces minimize the spread of sap-transmitted diseases, particularly some viruses. Wear smooth-surfaced rain pants and rubber boots and use plastic bags or buckets--not burlap bags or woven plastic seed sacks--to carry rogued plants. Also, keep a small spray tank of disinfectant handy for cleaning digging tools, boots, and rain pants between fields or seed lots. Completely remove all soil from boot bottoms and sides when disinfecting. Consider using disposable plastic gloves to reduce the spread of diseases between lots and to prevent pesticide poisoning from either foliar- or soil- applied chemicals. Carefully observe recommended field reentry restrictions following pesticide applications. Maintain a supply of flags for marking suspicious plants (see bacterial ring rot below).

When to Rogue

Fields should be carefully inspected a week or two after emergence and rogued as soon as disease symptoms are readily visible. Early roguing is especially important for controlling insect- transmitted viruses such as potato leafroll virus (PLRV) and PVY. The earlier the infected plants are removed from the field, the less chance there will be for infection of healthy plants. Another advantage of early roguing is that tubers may not yet have formed, reducing the need for digging. The seed piece should be removed, however, to prevent resprouting. Roguing twice is usually enough. Oregon certified Generation 1 and 2 lots should be rogued two or more times. Roguing should stop after rows close to prevent the spread of sap-transmitted diseases such as PVS and PVX. PVY may also be sap-transmitted under certain conditions.

Mosaic virus symptoms are most visible in the dim light of early morning or cloudy days. Roguing should begin by 8:00 or 9:00 a.m. and stop about noon on clear days. This schedule prevents early morning dew and afternoon plant wilting from hiding disease symptoms. Stop roguing if the wind picks up and moves the leaves. Hold the roguing work day to four or five hours even in cloudy weather, since fatigue causes carelessness. If necessary, find other work such as weeding to

finish the day. Never weed and rogue at the same time since neither job will be done well.

Protect yourself from foliar-applied pesticides by strictly following field reentry times specified on the product label. Soil-applied systemic insecticides may still be present at roguing, so always wear disposable plastic gloves when digging for infected tubers and seed pieces in pesticide bands. ***Do not eat rogued tubers*** unless you are absolutely certain that they contain no systemic insecticides; in most instances, they do.

What to Rogue

Since roguing is based entirely on visual symptoms, fields should be in good condition. The crop should be healthy, actively growing, relatively free of weeds, and show no symptoms of frost or herbicide injury, fertilizer deficiency, or water stress; dew and irrigation droplets on the leaves also tend to mask mosaic symptoms.

Not all fields will benefit from roguing. In some cases, those showing no diseased or off-type plants may be best left alone. A crop should be carefully inspected before deciding not to rogue, however. Refer any questions to your local potato Extension agent or the Seed Certification Service at OSU.

A good and often-quoted rule of thumb stresses "when in doubt, take it out." Remove any plant which appears to be diseased or otherwise obviously different from its neighbors, with one exception--bacterial ring rot (BRR). In the case of viruses, it is usually good practice to also remove plants on either side of the one showing symptoms, especially late in the season. Chances are they are also infected even though no symptoms are evident. When roguing at the tuber-unit stage, always remove entire units rather than single plants.

It is extremely important that you learn to recognize BRR symptoms and mark and immediately report any suspicious plants for further observation (see [Pests and Diseases](#) , [Online Guide to Plant Disease Control \(Oregon\)](#), or [UC Davis IPM](#) for disease symptoms and images). BRR is the most devastating of all seed potato diseases. One infected plant, if found, will cause an entire seedlot to be rejected for certification purposes. As the name suggests, BRR is caused by a bacterium which nearly always travels in infected seed; however, the organism can also move quite handily on equipment, used burlap bags, shoes, or even clothing and pocket knives. Because of the extremely infectious nature of bacterial ring rot, rogues and growers should avoid all contact with questionable seed lots or commercial fields. Once on a farm, the disease can spread rapidly throughout the entire operation and is extremely difficult to eliminate. The presence of BRR on a farm can be extremely damaging to a grower's reputation, especially if the infected seed is sold and planted elsewhere.

Symptoms of bacterial ring rot usually, but not always, first become obvious late in the season, after fields have been rogued. The first symptoms are a green wilting and slight rolling of lower leaves, usually first noticeable soon after bloom. One or two stems of a plant may wilt and the others appear healthy. The affected leaves gradually turn light green, and pale yellowish or bronzed areas develop between veins in some varieties. Internodes are often shortened so that the plant has a "bunchy" or rosetted appearance. Affected plants are usually smaller than normal. Sometimes a milky ooze resembling thin white carpenter's glue can be squeezed from stems cut immediately above the seed pieces and from the vascular ring of infected tubers.

If ring rot is present on a seed farm, it is vitally important that the grower and field inspectors be aware of it in order to prevent potential lawsuits from future buyers. Therefore, suspect plants should be flagged but never rogued. Roguing may hide all visible symptoms and cause the field to pass certification with disastrous results for the grower in future years.

Bacterial ring rot can be easily confused with another bacterial disease, blackleg. Blackleg is also primarily seed-borne and can be spread by the same practices mentioned for ring rot. Blackleg symptoms usually occur much earlier than those of BRR and are normally obvious before flowering. Upper leaves roll upward and the foliage fades to yellowish green. The plant wilts and finally dies. Lower stems are usually, but not always, inky black. When the stem is pulled the lower underground portion of the stem is often black.

It is wise for rogues to become familiar with the dozen or so common diseases affecting seed potatoes. Descriptions and control recommendations for these are available from county Extension offices. Good descriptions for most can also be found via web links in this document such as the [UC Davis IPM Page](#) and the [Online Guide to Plant Disease Control \(Oregon\)](#). Roguing schools are held by Extension workers at a number of locations each year to further educate rogues. These events are extremely valuable to anyone concerned with seed potatoes.

How to Rogue

Roguing can be divided into three steps:

- (1) identifying plants to be removed,
- (2) removing affected plants including tops, tubers and seed pieces, and
- (3) discarding the rogued plant materials at a distance from the field.

Rogue all obviously diseased (except for Ring Rot), weak, off-type or otherwise atypical plants. Flag and leave suspected ring rot plants as noted above. Don't

touch ring rot plants unless absolutely necessary. If contact does occur, immediately wash and disinfect all tools, gloves, and clothing.

When light conditions are good and/or the sun is low, with the sun behind you, inspect the second and third rows on the shaded side. This provides a clear view of lower leaves and stems as well as plant tops. Ideally, rows should run in a north-south direction to allow facing away from the sun when walking in either direction. Having the sun behind you will reduce eyestrain and throw a shadow across the inspected plants, making mosaics more visible. It also reduces reflection off leaves. If you must rogue when the sun is high and/or bright, and you are particularly interested in mosaic viruses, inspect the first and second rows or only the first row to the side; this will allow you to shade plants with your body or some handy object such as a hat. Be especially alert at the end of fields since virus diseases are often most severe there and rogues tend to be most negligent when beginning or ending each pass.

Continuous roguing on bright days can cause eyestrain. A wide-brimmed hat and polarized sunglasses are highly recommended under such conditions. Polarized glasses also minimize glare and enhance mosaic virus symptoms.

Assigning specific seed lots or sections of fields to individuals can improve performance in some instances and may prevent re-roguing the entire acreage if one roguer is consistently missing a particular problem.

The objective of roguing is to remove all diseased plant parts from the field. This requires digging for tubers and seed pieces. This job is easier with good quality, sharp trowels, shovels, or short hoes. Touch only those plants being removed to reduce the spread of diseases. Place rogued plants and tubers in plastic containers and dispose of them well away from the field. Diseased plants left in the field could possibly reroot and serve as a source of infection while diseased tubers and seed pieces could re-sprout or end up in storage with the good seed. If rogued plants absolutely must be left in the field, seal them in plastic bags. Virus-infected rogued plants left in place may be counted against the grower by certification inspectors.

Tuber unit fields should be meticulously rogued with particular attention to tuber-perpetuated leafroll and mosaic viruses, other varieties, and trueness to type. The tuber-unit stage is an excellent time to rogue any off-type plants. As noted above, all plants in a tuber unit should be removed if any appear diseased or off-type.

Rogue in late season to remove giant hill plants or units. These can be identified by their long, thick stems, vigorous growth habit, late season flowering, resistance to frost, and (often) large tubers with large eyebrows or bulging eyes.

A Roguer's Checklist

1. Take your time.
2. Keep the sun behind you.
3. When possible, rogue early in the morning on normal days. On cloudy days, you can rogue any part of the day, but don't become fatigued.
4. Use a hat to shade your eyes and polarized sunglasses to reduce glare.
5. Begin roguing when plants are still small to prevent the spread of diseases by plant-to- plant contact. As the normal plants enlarge, remove suspect smaller plants which could become hidden by their vigorous neighbors.
6. Use plastic bags or buckets to carry plants.
7. Wear rubber rain pants and boots.
8. Use proper sanitation. Keep clean by liberal use of disinfectants on tools, boots, rain pants, and buckets.
9. Wear disposable plastic gloves to prevent pesticide poisoning if digging in insecticide bands and to reduce the spread of disease.
10. Clearly mark all suspect ring rot plants and call them to the attention of your boss-- immediately.
11. Except for ring rot, "when in doubt, take it out."
12. Try to touch only those plants you intend to rogue. Rogue plants on either side of obviously virus-infected plants.
13. Don't hesitate to dig for tubers and seed pieces; treat vines gently.
14. Attend roguing schools whenever possible.
15. Don't eat rogued tubers since they probably contain traces of pesticides.
16. Always remember the importance of the job you're doing.