

# Roguing Potatoes

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## **Roguing Potatoes**

**Objectives.** Study of this bulletin should enable you to:

- Discuss the principles of roguing
- Identify plants to be rogued
- Carry out roguing
- Determine factors that affect roguing
- Take precautionary measures when roguing

### **Study materials**

- Diseased and healthy potato plants for comparison
- Aphid-proof bags

### **Exercises**

- Practice roguing under different field and weather conditions

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## Questionnaire

- 1 Why do systemic infections within the potato plant move easily into the tuber?
- 2 What is "degeneration"?
- 3 How can you break a disease cycle?
- 4 Why is roguing ineffective against latent infections?
- 5 What is "positive selection"?
- 6 Under what condition do the non-rogued plants compensate for plants eliminated during roguing?
- 7 What two basic criteria should be considered in the roguing process?
- 8 What categories of plants should be rogued?
- 9 What symptoms alert you to the possibility of infections?
- 10 What are "volunteer plants"?
- 11 Why should roguing begin immediately after infected plants are detected? Give two reasons.
- 12 How do you identify plants to be rogued?
- 13 Why should the same staff be used during roguing?
- 14 Which plant parts should be removed by roguing?
- 15 Why should rogued plants be placed carefully in aphid-proof bags?
- 16 Why should rogued plants be removed far from the potato fields and buried or burned?
- 17 How can you achieve a uniform crop stand when only seed tubers of different sizes are available?
- 18 What light conditions are best for roguing?
- 19 How are viruses transmitted from one plant to another?
- 20 Why are careless workers often the most "successful" virus transmitters?

## Roguing Potatoes

- 1 Why rogue
- 2 Identifying plants to rogue
- 3 Roguing procedure
- 4 Factors that affect roguing
- 5 Precautionary measures
- 6 Additional study

The health of seed tubers is a critical factor in potato production. Systemic infections, especially those caused by viruses, can establish a serious disease cycle, which can lead to complete degeneration of formerly healthy seed. Roguing provides an effective means to break this cycle.

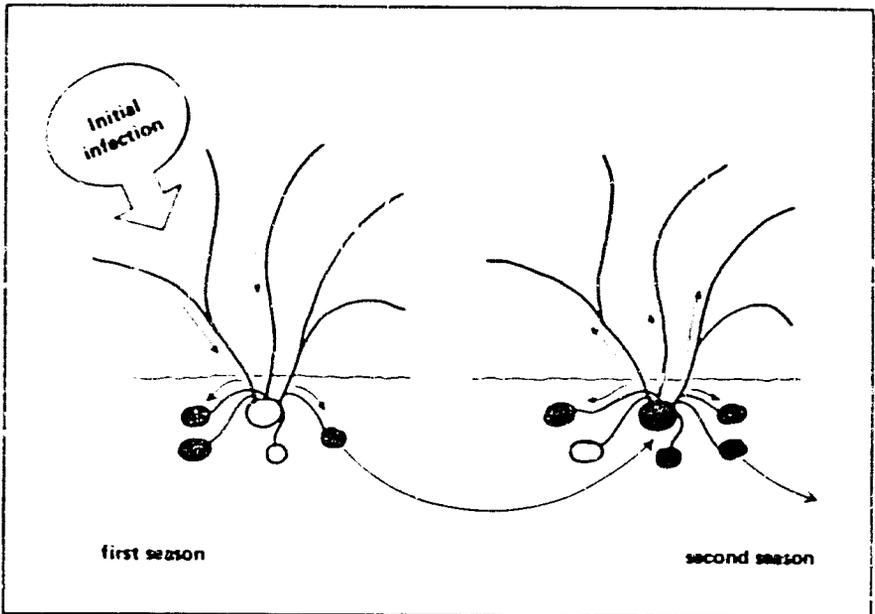
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# 1 WHY ROGUE

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The health of potato plants, particularly of the seed tubers, is a critical factor in potato production. Because tubers are part of the plant's vegetative system, systemic infections within the potato plant, especially virus infections, move easily into the potato tubers. When infected tubers are used as seed, the subsequent plant also becomes infected, establishing a serious disease cycle.

Once infected tubers are introduced into a field, the disease spreads quickly to healthy plants, either by insect vectors or mechanical contact. If the disease is not controlled, a healthy potato crop can become completely infected within a few years by a process known as "degeneration."



Systemic infections within the potato plant move easily into the potato tubers. When infected tubers are used as seed, the resulting plant also becomes infected, establishing a serious disease cycle.

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Control components to break this disease cycle include:

- reduce the transmission of disease by taking proper cautions in the field (see Section 5), and
- remove the source of the disease by **roguing**

Roguing is a control technique in which infected plants are identified, dug up, removed from the field, and destroyed. By roguing, seed growers eliminate plants that produce diseased seed tubers as well as contamination sources within a crop.

Roguing, also referred to as "negative selection," involves selecting undesirable plants to be removed from a field. These plants are selected on the basis of **visible symptoms**. Thus, roguing is ineffective against latent infections, which display few, if any, clearly visible symptoms.

Roguing is also impractical in fields where most of the plants are infected. In such cases, use "positive selection," a process in which only the best plants are selected and reproduced.

How thoroughly a field is rogued depends on the use of the produced seed. Production of basic seed requires more thorough roguing than production of commercial seed.

Because of economic reasons, farmers are often reluctant to eliminate plants, even those with serious diseases. Experiments have shown, however, that the remaining healthy plants fill up the empty spaces and compensate for this plant loss by producing higher yields, especially when roguing is carried out early.

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## 2 IDENTIFYING PLANTS TO ROGUE

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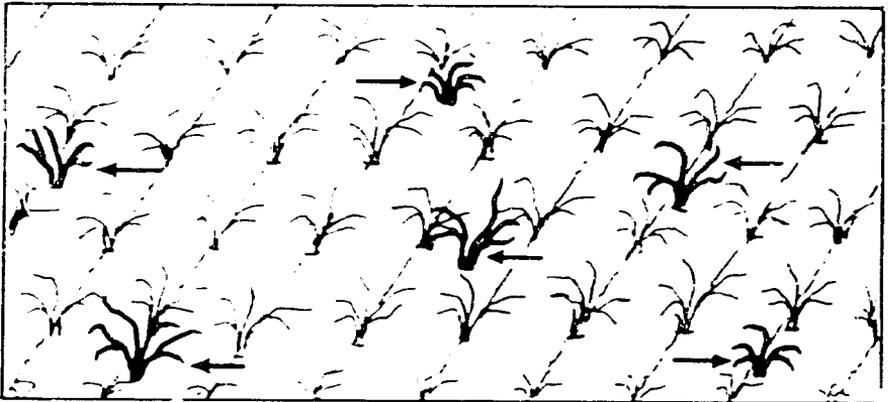
Two basic criteria should be considered in the roguing process: plant health and varietal purity. Typically, the types of plants to be rogued fall into the following categories:

- diseased plants
- atypical plants
- volunteer plants

**Diseased plants** Certain symptoms of systemic viral, bacterial, and fungal diseases should alert you to the possibility of infections. These symptoms include variations in leaf color—especially mosaic symptoms—leaf deformations, stunting, necrosis, and wilting.

**Atypical plants** Atypical plants or plants of other varieties ("mixtures") affect varietal purity. Identifying varieties is easy, when plants are in the flowering stage. At other growth stages, better familiarization is required with varietal characteristics such as growth habit, leaf type and color, and stem shape and color.

**Volunteer plants** Volunteer plants grow from tubers that remain in the ground from previous seasons. These plants affect varietal purity, and are sources of infection and hosts to the first insects that appear in a field. Volunteer plants are easy to detect because they, usually, emerge earlier than the planted variety.



**Volunteer plants (arrows) grow from tubers that remain in the ground from previous seasons.**

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### 3 ROGUING PROCEDURE

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To be effective, roguing should begin immediately after infected or undesirable plants are detected, usually a few days after emergence. The sooner the infected plants are removed, the less chance there is of disease being spread to healthy plants. Roguing should continue on a regular basis as long as diseases and vectors are present and as long as the worker can walk between the rows without touching the foliage.

Roguing consists of four basic steps:

- 1 Identify plants to be rogued
- 2 Dig up plants, including the tubers and stolons
- 3 Remove plants from the field
- 4 Destroy plants

**Identify plants.** When identifying plants to be rogued, familiarize yourself first with the characteristics that a variety displays under your particular field conditions. Stay at least one row away in order to compare differences within groups of three to five plants. Once you detect differences, move closer to verify the specific symptoms.

Also, avoid changing the staff who do the roguing. Responsibility should remain with the same experienced staff. Individuals who routinely check the fields will notice more easily the subtle changes in a plant. Successful roguing requires experience that is gained through constant practice.

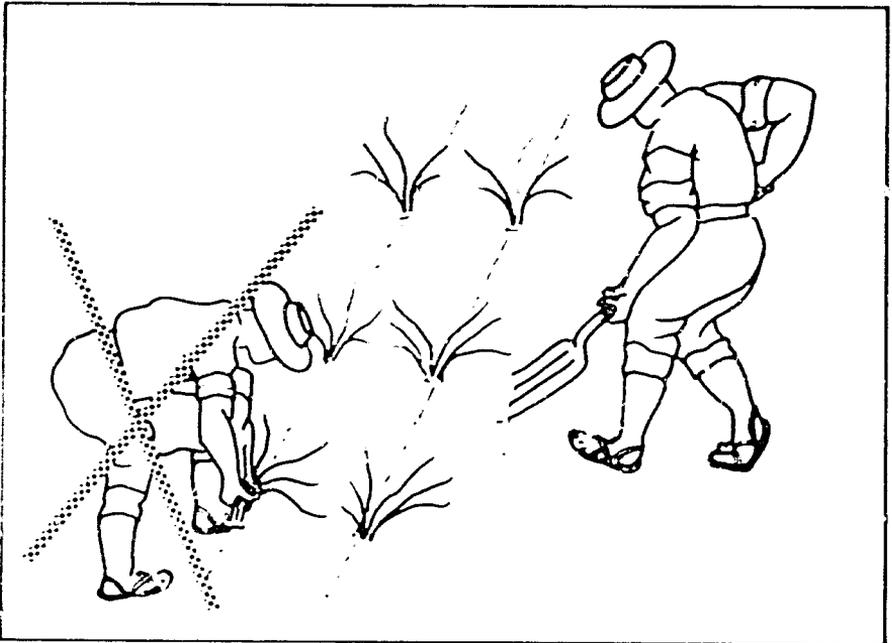
**Dig up plants.** Once a plant is infected, the disease spreads to all its vegetative parts. Therefore, all parts of the plant should be removed—including the smallest tubers and stolons, as well as the mother tuber. If not, regrowth from these plant parts may become a new source of infection. Use a fork when digging up the plant; do not remove the plant by hand, as parts may break off and remain in the soil.

Sometimes it is sufficient to rogue only the infected plant. At other times, you will need to rogue the neighboring plants as well. This depends on several factors, including the severity of the symptoms, the suspected cause of the infection, the stage of plant growth, the seed category, and legal regulations.

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**Remove plants from the field** To avoid disseminating infective (viruliferous) aphids, carefully place rogued plants in aphid-proof bags to be removed far from the potato field. This prevents aphid vectors from reinfesting the crop. (See cover photograph.)

**Destroy plants** Bury or burn the infected plants.



Do not remove the plant by hand (left), as parts may break off and remain in the soil; use a fork when digging up the plant (right).

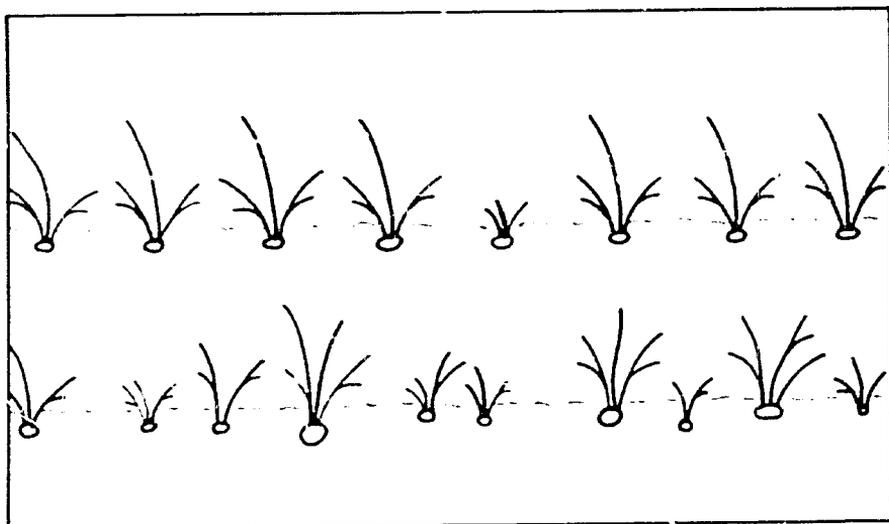
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## 4 FACTORS THAT AFFECT ROGUING

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Certain factors, such as the following, affect identification of plants to be rogued:

**Crop uniformity.** Undesirable plants are relatively easy to recognize in a uniform crop. Roguing is difficult, however, in an irregular crop. To achieve a uniform crop when only seed tubers of different sizes are available, group the tubers according to size and plant the groups separately.



Undesirable plants are relatively easy to recognize in a uniform field (above). Roguing is difficult, however, in an irregular-growing crop (below).

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**Moisture.** Disease symptoms are difficult to detect on wilted plants. Crops grown under irrigation should be watered one to two days before roguing. This will also allow the soil surface to dry, which makes walking in the field easier.

**Light conditions** Changes in leaf color, especially mosaic symptoms, are easiest to detect under uniform light. Therefore, the best time to rogue is when the sky is uniformly cloud-covered. Shadows from direct sunlight increase the difficulty of distinguishing changes in leaf color. If you cannot avoid roguing on sunny days, cast your own shadow over the plants by roguing with your back to the sun.

**Wind** You should rogue in calm weather because disease symptoms are difficult to detect when plants are moving in the wind.

**Dirt** Foliage should be free of spray residues or dirt, which make recognition of diseased plants difficult.

**Foliage damage** Disease symptoms are difficult to detect on foliage that has been damaged by hilling or insects. Leaf spots or wilts caused by pathogens also hinder accurate roguing.

**Weeds** Weed infestation makes it difficult to compare plants. If herbicides are needed, apply them carefully to avoid phytotoxic effects that may be confused with disease symptoms.

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## 5 PRECAUTIONARY MEASURES

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Roguing reduces the chances of diseases being disseminated to healthy plants. In addition, precautionary measures should be followed to reduce vector and contact transmission of viruses.

**Vector transmission** is caused mainly by insects. Roguing is ineffective when insects, especially aphids, are disseminated over the entire field. Vectors disturbed by roguing move to other plants and, consequently, spread the infection. To control this problem, combine roguing with the use of an effective insecticide. Use formulations that leave no visible residues on the foliage. Apply insecticides two to three days before roguing.

**Contact transmission** results from direct contact with diseased plants. Because your hands and clothes become contaminated during roguing, touch **only** the plants to be rogued, so that the infection is not transmitted to healthy plants. Careless workers often are the most "successful" virus transmitters. To reduce transmission of viruses when walking through a field, try to rogue before the spaces between the rows are covered with foliage.

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## 6 ADDITIONAL STUDY

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Bokx, J.A. de (ed.) 1972. Viruses of potato and seed-potato production. PUDOC, Wageningen, Netherlands. 233 pp.

Bryan, J.E. 1981. Clonal selection in potato seed production. Technical Information Bulletin 12. International Potato Center, Lima, Peru. 15 pp.

Bryan, J.E. 1983. On farm seed improvement by the potato seed plot technique. Technical Information Bulletin 7. International Potato Center, Lima, Peru. 13 pp.

Raman, K.V. 1980. Insect vector transmission of potato viruses. Technical Information Bulletin 2. International Potato Center, Lima, Peru. 15 pp.

Technical Information Bulletin Coordinator: Rainer Zachmann

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Processed and printed by the Training and Communications Department, CIP, Lima, Peru.  
January 1984

Copies printed: 2000