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WHAT CAN BE DONE TO PREVENT DISEASES FROM REDUCING  
THE YIELD AND QUALITY OF VEGETABLE SEED IN OREGON PLANTINGS

by

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Oregon is a relatively new territory for growing many kinds of vegetable seed. Many parts of the state are entirely free from those diseases which limit vegetable seed production in old established centers. The seed grower in this state is therefore faced with two disease control problems. These are (1) to prevent the introduction of diseases which are not present, and (2) to control those which are already present in the state and are likely to reduce seed production. This circular outlines general control measures to meet these problems. The choice of control measures will depend on the kind of vegetable being grown, the local conditions where planted and the time of year the crop is started.

The control of diseases of vegetables being grown for seed is more complicated and difficult than for table vegetables, since seed crops require a much longer time between planting and harvest and the seed crop is thereby exposed to more diseases and for a longer time. Moreover, freedom from disease is especially desirable in growing a seed crop since many diseases are seed-borne and infected seed is unsatisfactory to sell or plant. The seed growers in new Oregon localities should try to begin with clean seed and from these grow clean seed.

PRECAUTIONS THAT CAN BE TAKEN TO PREVENT THE INTRODUCTION OF DISEASES  
INTO VEGETABLE SEED FIELDS IN NEW OREGON PLANTINGS

1. Use disease-free seed to establish the new plantings. Plant only seeds from stocks having a history indicating freedom from the disease one is trying to avoid. It is far better to use disease-free seed to prevent the introduction of disease than to depend on any known seed treatment.
2. Plant old seeds in those special cases, such as late blight of celery, where the use of old seeds tends to eliminate disease germs. In some cases the parasite in the seed is relatively short-lived and will die of old age before the seed expires.
3. Treat the seeds with a treatment that can do some good under the field conditions which obtain. The proper treatment may sacrifice high germination in order to prevent the introduction of disease.

The choice of seed treatment intended to prevent the introduction of disease depends on

- a. The kind of seed.
- b. What diseases the seeds were exposed to before and during harvest.
- c. Whether the disease germs are likely to be living in the seed or merely sticking to the seed coats.
- d. When the planting is made.
- e. Type of soil and how wet or dry the soil is at time of planting.

Exact information on the choice of seed treatments for vegetable seed plantings is being obtained in several sections of this state and in national tests in all areas where vegetable seed crops may be grown. A few special suggestions are included at the end of this circular.

4. Roguing is sometimes practical. It is frequently possible, even in large fields, to rogue out and destroy small diseased plants. For example, alert seedsmen insist that mosaic-diseased plants be rogued from plantings of beans for seeds as soon as they can be detected.

#### GENERAL CONTROL MEASURES WHICH MAY BE APPLIED TO CONTROL VEGETABLE DISEASES WHICH ARE LIKELY TO OCCUR IN ANY VEGETABLE SEED PLANTING

The recommendations above apply here also, but the question of seed treatment must be considered from another viewpoint. Disease-free seed should always be used whenever possible, but even disease-free seed will not prevent damping-off in certain soils and under certain conditions. If the land has been recently planted to potatoes or other truck crops, it is likely to harbor germs which cause vegetable seedlings to damp-off. Moreover, early season plantings in cold wet soils are likely to damp-off. The general control measures are:

1. Use best quality disease-free seed when possible.
2. Treat the seeds against damping-off if they are to be planted after some truck crop, especially potatoes, or if they are to be planted in cold wet soil.
3. Choose locations where soil drainage, wind directions and air drainage, soil acidity or alkalinity, and sometimes type of soil, will be favorable to disease control as well as to good plant growth. For example, avoid planting seed-onions in fields having noticeable depressions or "low places" since these may readily become centers of infection of onion mildew and lead to loss of the seed crop. The use of small fields surrounded by trees which prevent wind drainage sometimes leads to severe development of foliage blights.

4. Crop rotation. When choosing a location for a vegetable seed crop one must consider the previous crop history of the field. Disease germs from fallen leaves and crop debris tend to accumulate in the soil. It is, therefore, bad practice, and for truck crops, dangerous practice, to grow the same crop in the same spot year after year. The seedsmen should follow this principle one step further and carefully avoid placing vegetables belonging to the same family in the same field year after year. See also "sanitation" discussed under No. 12 below.

5. Avoid virus diseases by selecting locations so that crops in adjoining fields and ornamentals in the farm yards will not endanger the seed crops being planted. This consideration is especially important for vegetable seed crops since they have to be grown for a relatively long period of time and a virus disease of minor importance to truck crops may be the limiting factor in growing seed crops. This situation is discussed in "Certain Ornamentals May Carry Virus Diseases to Truck Crops," by Frank P. McWhorter. This paper may be obtained from the Botany Department, Oregon State College, Corvallis, Oregon.

6. Select healthy "root crops." Select healthy planting stock in those cases where the production of a seed crop involves storing and planting a "root crop." Growers should learn to distinguish between "storage rots" or "soft rots" which generally do not become permanent field diseases and "hard rots" or "black rots" which usually become permanent diseases of the plants which survive.

7. Isolate and protect seedbeds. When a seed crop involves transplanting, as for example, cabbage, the seedbed should be located well away from field plantings of that seed crop. Transplant only healthy plants.

It is often desirable to sterilize the soil in plant-beds by heat or by chemical means. The use of soil sterilization methods for field plantings does not seem generally applicable or advisable for vegetable seed crops.

8. Avoid overcrowding. Do not plant seeds so thickly that overcrowding of plants will furnish conditions favorable to downy mildews and other leaf troubles. This question must be considered to determine the proper spacing of plants for maximum yield.

9. Roguing against virus diseases. It is frequently possible, even in large fields, to reduce the damage done by viruses by roguing the first individuals which show symptoms of the disease. The roguing should be done early before insects become abundant in the fields.

10. Spraying and dusting. It is feasible to apply sprays or dusts in those cases where the need is apparent, a specific spray is known, and the cost is not prohibitive. Remember, however, that if the disease is caused by a virus, spraying is usually of no value whatever.

11. Precautions during harvesting. Harvest at such a time and in such a manner that danger of seed infection and contamination will be minimized. Harvesting seeds of tomatoes and certain other fleshy fruits involves a special situation. Danger of seed infection from bacterial diseases is greatly reduced if the seeds are harvested by fermentation process instead of mechanical cleaning.

12. Practice general sanitation. The sooner, and usually the deeper, a crop is turned under, the less the danger of fungus parasites or bacterial germs living over the summer or winter period which follows the harvest. In some cases, as for example, the clubroot disease of cabbage, the feeding of cattle with truck crop debris may lead to the formation of infectious manure, which is dangerous when put on land to be used for the same or related crops. In all cases, harvesting and threshing should be so performed that there is no danger of contaminating seedbed plants or soil with dust or debris from the same or related crops.

#### SPECIAL RECOMMENDATIONS FOR 1943

Experienced seedsmen are familiar with the standard treatments. The following suggestions, based on careful surveys and recent research, involve new information which is being released before complete investigation because of the war emergency involved in seed production.

1. Pea Crops. Growers are urged to try Spergon on both early and late-planted peas. Graphite is not necessary with this material. Unlike copper oxide it is not known to be injurious to some varieties of peas. It is usually applied at the rate of one-half ounce to fifteen pounds of seed.

Do not inoculate peas with nitrifying bacteria and then dose the seed with copper oxide or any other disinfectant. Decide whether you wish to inoculate or to disinfect. However, the combination treatment can be made with some success with Spergon since this material is largely a stimulant.

2. Cuprous Oxides. Because of war conditions, the red copper oxides are practically unavailable. If the yellow form is used, follow closely the directions given by the manufacturers to avoid injury. The yellow form is more potent.

3. Cuprous Oxides vs. Organic Mercuries. While the cost of the copper compounds is less, the disinfection properties of the mercury compounds are greater. Seedsmen aiming at complete disease control should have this point in mind.

4. Cabbage and related plants. Do not treat cabbage seed with Spergon. Experiments made by Dr. Huber in the cabbage seed growing area of Washington State have shown that this is dangerous practice.

5. Onion mildew can be greatly reduced by means of specialized sprays. See O.S.C. Station Cir. of Information No. 276. The increase in seed yield following Malachite Green sprays is greater than the apparent control when judged in terms of foliage appearance. The critical problem is availability of suitable spray machinery.

6. Spinach. Seedsmen or growers should treat spinach seed for all seed plantings to reduce the danger of introducing the black leaf spot often called "rust." A generous trial should be made of zinc oxide or Vasco 4, using about 24 ounces of the disinfectant and 8 ounces graphite to every 100 pounds of seeds.

The planting of spinach after spinach increases the hazard of severe damage from mildew.

7. Damping-off from conditions in the soil is likely to be encountered in early-season plantings in cold soils. Planting vegetable seed crops on land which has been used for potatoes, especially if the soil is sandy loam, may lead to damping-off of crops if the seed is planted late in the season and the soil is somewhat warm.

8. Virus control. The question of locating crops to avoid viruses is being actively investigated. For seed crops the following "don'ts" are pertinent:

Do not grow carrots, spinach or celery near overwintered parsnips.

Do not expose peas or beans to overwintered crimson clover, red clover or sweet clover.

Do not grow solanaceous crops such as tomatoes for seed in regions where tip blight or spotted wilt is known to occur.