

CROP ROTATIONS - CAN THEY EFFECTIVELY CONTROL POTATO DISEASES?

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When we think of plants we think of trees, flowers, weeds, vegetables, corn, wheat, etc. All of these plants grow above ground and use the sunlight to manufacture food. There are many kinds of plants living in the soil which we never see. These plants are composed of fungi (molds) and bacteria. They are dependent on live and/or dead organic matter for their existence because they do not use the sunlight to make food. It is this underground group of microscopic plants that cause most of our root diseases.

Some of these underground plants (fungi) like to feed on the roots of certain crops we grow in Washington and continued planting of the same crop in the same field might increase the population of certain fungi to such an extent that diseases would make it economically impossible to grow this particular crop. By growing other crops in this field that were not affected by these fungi, the latter should decrease and, after five years or more of other crops, it might be possible to plant the original crop again.

The value of crop rotation as a control measure for some of our common diseases follows:

Verticillium Wilt

Caused by a soil borne fungus which can remain viable in the soil for many years and possibly forever. Crop rotation will reduce the incidence of disease some but will not eliminate it. The use of resistant varieties is a practical method of control. Soil fumigation can be used but is expensive.

Fusarium Eumartii Wilt

The same remarks above for Verticillium wilt apply here.

Rhizoctonia

Caused by a soil borne fungus which attacks potatoes, sugar beets, beans, peas, and many other crops. When this fungus attacks so many kinds of plants the merits of crop rotation may be questioned. There are several strains of this organism that are more parasitic on some crops than others. For this reason, crop rotation should be of some value. Experience in the Pacific Northwest has shown it is not a good practice to follow potatoes after potatoes or sugar beets.

Common Scab

The soil borne fungus causing this disease is widespread and is composed of many strains. Soil types seem to have much effect on the occurrence of this fungus. Although continued cropping of potatoes on the same land would

undoubtedly increase the population of this organism, it is very doubtful if crop rotation would ever eliminate it. Soil that has never been cropped may produce scab on potatoes. Resistant varieties, such as Early Gem and Russet Burbank, are the most practical method of control.

Sclerotinia

This soil borne fungus attacks potatoes, beans, and peas in the Columbia Basin. Rotating with crops other than these should give some control but it is doubtful if the organism would be eliminated from the soil. In potato fields, this disease is worse where there is abundant vine growth. This additional foliage helps to create favorable moisture conditions for this organism to attack the vines. Less nitrogen fertilizer would help to reduce the vine size and thereby provide adverse conditions for the fungus. Applications of calcium cyanamide have reduced the incidence of this disease considerably in Arizona.

Water Rot

This soil borne fungus is favored by excessive soil moisture, especially during the latter part of the season. Infection takes place before the tubers are harvested. The affected tubers are generally found in those portions of the field where drainage is inadequate. Crop rotation would not eliminate the fungus from the soil. Provide good drainage.

Leak

This soil borne fungus gains entrance into tubers through wounds made at harvest. Immature tubers are more subject to infection (bruise easier) and harvesting on warm days will increase the incidence of this disease. Crop rotation will not eliminate the fungus from the soil. Prevent injury at harvest.

Early Blight

This fungus can become a problem if potatoes are not rotated. When infected foliage is returned to the soil it provides inoculum for the following year. Crop rotation is an effective method of reducing the incidence of this disease. Since the fungus can exist as a saprophyte (live on dead organic matter), crop rotation would not eliminate it from the soil.

Powdery Mildew

This fungus overwinters on dead foliage which was infected the previous growing season. Since this foliage is a source of inoculum the following year, crop rotation is important in reducing the incidence of this disease. Because infection is favored by high humidity, cultural practices should be followed so as to avoid large vines. Dusting with sulphur has given satisfactory control in the Columbia Basin.

Blackleg

The bacterium causing blackleg is present in the soil so crop rotation is of doubtful value. Most all blackleg infection occurs from improper handling of the seed previous to and after cutting. Providing nondormant cut seed

pieces with proper conditions for healing is the best method of preventing infection.

Ringrot

The bacterium causing this disease overwinters in infected tubers. Infected tubers remaining in the field could be a source of inoculum provided they did not freeze. The chance for infection from these volunteer tubers would be rather remote. Crop rotation is not considered as a means of control. The only method is to purchase seed free of the organism and not contaminate it during cutting or planting.

Leafroll

This disease is caused by a virus that remains overwinter in the infected tubers. Infected tubers buried in the soil often remain alive overwinter and plants produced from them are a source of inoculum. Crop rotation is very important in such instances. Planting leafroll-free seed as far as possible from other potato fields would be desirable.

Aster Yellows

This disease is caused by a virus that overwinters in certain weeds. During the growing season the virus is transmitted from the weeds to potatoes by certain leafhoppers. Crop rotation would be of no value in the presence of such conditions.

Fusarium Seed Piece Decay

The fungi causing this disease are soil borne and crop rotation would be of little value. Proper handling of seed before and after cutting will reduce the incidence of this disease.