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BACTERIAL SOFT ROT OF VEGETABLES

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INTRODUCTION

Bacterial soft rots affect many types of vegetables as well as a number of ornamental plants and field crops. They are most common and distinctive on introduced vegetables such as cabbage, cucumber, tomato, squash, carrot, onion and potato. They are less common on traditional subsistence crops.

A number of different types of bacteria can produce soft rots, but the most important ones by far are three closely related bacteria combined in a single group known as the *Erwinia caratovora* group. The bacteria are named after a biologist, Erwin Smith, who first isolated them from a rotting carrot (Caratovora = carrot devouring). Two of these bacteria, *Erwinia caratovora* var *caratovora* and *Erwinia chrysanthemi* attack a wide range of plants whilst the third bacterium in the group (*Erwinia caratovora* var *atroseptica*) only infects the English potato.

The diseases caused by these bacteria occur world-wide. They probably cause greater economic loss than any other bacterial plant disease. Losses are particularly severe in hot, humid climates especially where storage facilities are inadequate.

SYMPTOMS

Symptoms are similar on all hosts. A water-soaked region first appears, almost always associated with a wound caused either by an insect or by cultivating tools. This then enlarges rapidly in area and depth. It becomes soft and watery as the plant tissue is broken down by the activity of the bacteria. The infected tissue is rapidly invaded by other secondary bacteria which live off the decaying tissues in the same way as the original pathogen.

The combined activity of all these bacteria can reduce a whole fruit or vegetable to a soft watery mass within a few days of infection. At the same time a characteristic foul smell is produced.

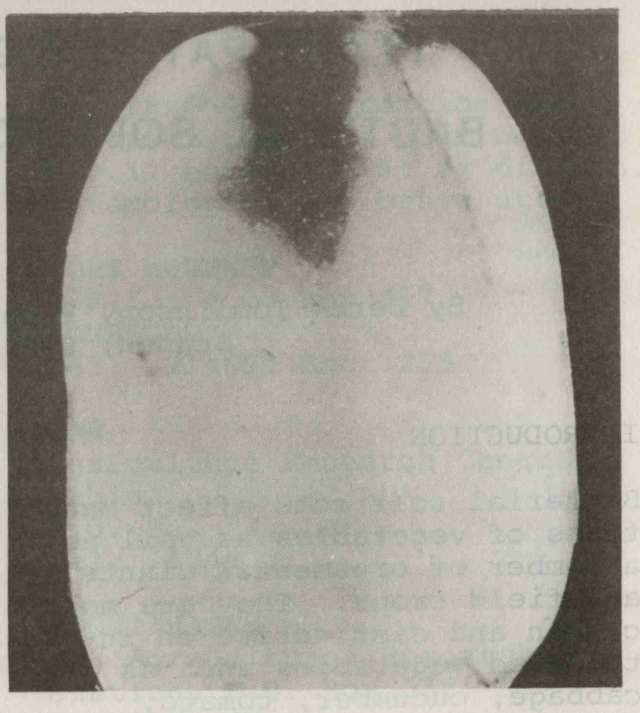
When root crops are infected in the field, symptoms may also develop in the lower stem. The stem becomes soft and watery and turns brown or black. This is especially common in the English potato. This particular form of the disease on potato is known as 'black leg'.

Infection of succulent leaves and stems is rarely serious in the field. However, if rotting starts in storage, it spreads rapidly and may cause total loss of the stored produce.

DISEASE CYCLE

The bacteria survive in infected fleshy organs in storage

An English potato plant infected with 'black leg'. Rotting in the lower stems (the dark areas) has caused some of the shoots to collapse.



A section through an English potato infected with 'black leg'. The black rotted area will eventually spread through the whole tuber.

and in the field, in the soil, or in the pupae of a number of insects. Vegetables may become infected directly from bacteria surviving in the soil. Infection usually takes place through wounds either on the roots or on the stem just above the soil line. In potato, the more common method of infection is from using infected seed tubers which often contain the bacteria but show no symptoms. These pathogens grow best in warm, wet conditions. This often leads to heavy losses in the field.

Insects often cause the bacteria to enter the host tissue. Insects also very effectively spread infection both between plants in the field, and in storage. The bacteria can survive for a time in, or on, all stages of the insect. Insect larvae become contaminated when they crawl about in infested soil or on rotting plant material. The mouthparts of adults become contaminated as they feed on the host plant. When these insects attack healthy plants or storage organs by boring holes into them, they transfer the bacteria into the new host tissue.

CONTROL

Control of bacterial soft rot is almost entirely based on cultural and sanitary practices: keep storage buildings clean; do not leave debris lying about; wash walls and floors with diluted solutions of formalin or copper sulphate.

Avoid wounding plants and stored products as much as possible and store only undamaged produce. Remove infected products from storage as soon as they are noticed, and burn them

immediately. Stored products should be dry, and packed to allow good air circulation. Where possible, humidity of storage spaces should be kept low. The temperature should also be kept low (about 10°C).

In the field, plant susceptible crops in well-drained soil, space them well to allow adequate ventilation and do not water using overhead irrigation. Two to three year rotations with non susceptible cereals or legumes have been claimed to reduce the incidence of the disease.

Chemical sprays to control the rot are ineffective. However control of the insect vectors can often reduce disease incidence markedly.

FURTHER INFORMATION

Further information may be obtained from the Chief Plant Pathologist, D.P.I., P.O. Box 417, Konedobu.

Copies of this Plant Pathology Note, and of others in the series are available from the Publications Officer, Publications Section, D.P.I., P.O. Box 417, Konedobu.