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Potato-Bacterial Wilt: Causal Organism, Disease Cycle and Management

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ABSTRACT

Bacterial wilt is a standout amongst the most dangerous disease of the potato, which has a wide host extend. On potato, the disease is otherwise called brown rot, southern wilt, sore eye or jammy eye.

Keywords: black spots, tubers, wilt

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INTRODUCTION

Bacterial wilt of potato is for the most part supported by temperatures in the vicinity of 25 and 37°C. It is more often than not does not bring about issues in areas where mean soil temperature is beneath 15°C.

Under conditions of ideal temperature, contamination is supported by wetness of soil. In any case, once disease has happened, seriousness of manifestations is expanded with hot and dry conditions, which encourage wilting [1].

Bacterial wilt is a difficult issue in many developing nations in the tropical and sub-tropical zones of the world. It is normally found between the latitudes 45°N and 45°S. It has been recorded in every single Australian state with the exception of Tasmania.

MATERIAL AND METHODS

Economic Importance

Bacterial wilt is in charge of making considerable losses the potato business where the disease exists.

In the south east of Victoria, it has brought on considerable losses in the past to the potatoes planted essentially in the swampy areas. Be that as it may, the threat of the disease is possibly critical to the seed potato industry. Some importing states and nations respect regard bacterial wilt in the same light as black wart, ring rot, and potato cyst nematode (PCN) ban imports from areas known to be infected.

The disease can bring about aggregate loss of a yield and keep the utilization of land for potato generation for several years [2].

Causal Organism

Bacterial wilt is brought about by dirt borne bacterium named *Ralstonia solanacearum* (before known as *Pseudomonas solanacearum*). Based on the kind of host plants it attacks it is separated into three races, and based on its biochemical properties it is divided into four biovars. The broadest strain in Australia is race 3/biovar ll. This strain is known to happen in New South Wales, Queensland and it basically attacks potato. Two different strains, which attack other hosts rather than potato, are limited toward the Northern Territory and Queensland.

Host Range

Bacterial wilt attacks more than 200 species. These incorporate economically important hosts, for example, tobacco,

potato, tomato, eggplant, pepper, banana, nut and beans. Thorn apple and nightshade are two regular weed hosts that are attacked by the disease.

Symptoms

Figure 1 shows the bacterial ooze from vascular ring of a cut infected potato tuber.

Fig. 1. *Bacterial ooze from vascular ring of a cut infected potato tuber (photo: courtesy of* www.infonet-biovision.org*).*

Common indications are wilting, yellowing and some stunting of the plants, which at last die right back. Wilting is first observed as a drooping of the tip of a portion of the lower leaves like that brought about by a temporary shortage of water.

At first just a one branch in a hill may indicate wilting. Affected leaves later become permanently wilted and roll upwards and inwards from the margins. The wilting then extends out to leaves additionally up the stem and is trailed by a yellowing of the leaves. This yellowing, wilting and in-rolling of the leaves makes diseased plants very obvious, especially when surrounded by healthy plants [3]. The leaves finally turn brown and fall off, start at the base of the stem and proceeding with upwards.

Symptoms in the tuber are very specific: brownish-grey areas are seen on the outside, particularly near the point of attachment of the stolon. Cut tubers may show pockets of white to brown pus or caramelizing of the vascular tissue which, if left standing, may exude dirty white globules of bacteria. As the disease progresses bubbly globules of bacteria may radiate through the eyes; soil will frequently stick to the exuded bacteria, thus the name "sore eyes" or "jammy eyes."

Disease Cycle

Figure 2 shows the typical wilt symptoms.

Fig. 2. *Typical wilt symptoms caused by Ralstonia solanacearum (photo: courtesy of www.cgiar.org).*

Potato wilt bacterium is a soil-borne organism principally occupying the roots. It enters the root framework at points of injury brought about by farm implements, nematodes and by different means. It is spread by irrigation water, flood waters and contaminated soil. The wilt bacterium is able to survive for periods up to 2–3 years bare fallow soils, and for longer periods in cropped to non-solanaceous crops [4].

Contaminated seed is an imperative technique for scattering, both locally and over extensive separations. It is not the heavily infected tuber that is the issue since these generally rots away, just maintaining contamination of the land in which they were developed. However, slightly infected tubers, which demonstrate no visible symptoms, represent a serious threat of spreading the disease to new areas. Self-sown potatoes extremely difficult to eradicate and, if a paddock is infected, the disease may stay in it for five or six years after the initial outbreak.

Bacteria can also be spread to clean tubers from an infected seed-cutter. There is additionally a real danger of contamination if real danger is utilized or if half ton containers have held infected potatoes. Cultivators ought to know about these dangers and take prudent steps.

Disease Management

Figure 3 shows the "sore-eye" symptom.

Fig. 3. *Typical "sore-eye" symptom on infected tuber (photo: courtesy of International Potato Center).*

Bacterial wilt is difficult to control (or eradicate) because of the soil-borne nature of its causal organism. Therefore, following options should be considered in managing the disease.

Minimizing the Occurrence

- Adopt rotations with pastures, cereals and non-solanaceous crops for periods surpassing five years
- Use of guaranteed seed from dependable sources. Prohibition of the infection might be practiced by isolate or other administrative measures. For instance, Tasmania, which so far has not recorded bacterial wilt, is exceptionally cautious to import just healthy seed. New Zealand and South Africa prohibit the importation of seed from regions known to have the malady. Different measures of control include:
- Planting in zones where bacterial wilt has not occurred previously.
- Control self-sown potatoes.

- Control weed hosts, for example, nightshade, thistle apple, Narrawa burr around dames, along directs and in the enclosures in the paddocks after cropping potatoes.
- Avoid deep ploughing – the living beings make due in the profound, cool layers of soil.
- Irrigation water ought to never be permitted to run unreservedly over or underneath the soil surface. It ought to never be permitted to come back to the dam or stream from which it is pumped, nor to some other irrigation source.
- Regular crop inspection for disease symptoms and remove and destroy diseased plants, tubers and prompt neighbors.
- Use stock to clean up chats, disposed of tubers and crop debris, yet don't permit the stock back onto clean paddocks.
- Do not return potato waste, e.g. oversized, misshapen and diseased tubers to paddocks.

Minimizing the Spread

- Machinery taken onto a diseased paddock ought to be left on the paddock while it is being worked.
- Machinery expelled from the paddock ought to then be washed clean with a disinfectant arrangement in a committed zone for gear wash down.
- Use high- pressure wash to clean machinery, sheds and so on to expel soil adhering to any surfaces
- Clothing and boots of individuals working in the paddock ought to be traded for clean items when leaving the paddock, or else boots ought to be washed in an appropriate disinfectant.
- After harvest, all diseased and discarded tubers ought to be gathered and covered no less than one meter underground.
- On no record ought to any of the deliver from an infected product be kept as seed.
- Load and unload vehicles just in designated areas with fixed or hard ground or bare paddocks far from potato bare paddocks.
- Choose transport roots that limit travel through potato paddocks and regions.
- If second-totes or half ton containers have been utilized to hold potatoes, these ought to be altogether washed and disinfected before being utilized once more. Bags ought to be cleaned or disposed of.
- Ask visitors, contractors and workers to wear overalls, gumboots and overshoes on the property.

Insect Associated With Diseases in Potatoes

Pests

Damaging pests can work quickly in a potato patch. Stroll through the plot routinely searching for insects and the damage they cause. It is a great deal less demanding to manage a pest before it turns into a catastrophe. On the off chance that you utilize sprays or dusts to forestall or control a pest problem, read the directions and follow them carefully.

Colorado Potato Beetle

This pest is available and working in pretty much every state. Destroy any potato bugs you see and check the underside of leaves for their orange egg masses. Both the adults, who are yellowish with black stripes, and the larvae, which are dark red or orange with dark spots, feed upon potato foliage. Pick them off or spray Bacillus thuringiensis San Diego on the young larvae. Bt 'San Diego' attacks just the potato beetle larvae and is safe to beneficial insects, animals and humans.

Flea Beetle

Flea beetles are little, dark or darker, and pesky. They bite little gaps in plant leaves and can do genuine harm quick on the off chance that they attack young plants. To foil these pests, cover young plants with

fabric row covers when you set them out. Keep flea beetle populaces low through crop rotation and by keeping up high soil organic matter.

Aphid

These tiny insects can transmit virus diseases. They suck juices from the leaves and stems of potato plants, harming them seriously. Insecticidal soap sprays are a compelling control.

Wireworm

Wireworms are the larvae of the click beetle. They're an issue when potatoes are planted in a segment of garden that was recently sodded. Completely developed wireworms are 1/2-to 1/2-inches long. They are slim, brownish or yellowish white and passage into plant roots and tubers, ruining them. In your soil is heavily infested, contact your extension service agent for counsel on taking care of the issue, or take a stab at developing your potatoes in the "tower" mold said in our article “Planting Potatoes.”

Other Diseases in Potatoes

You may have an illness issue in the potato patch one year and none at all the next. The climate has a major impact in the health of a potato edit. Moisture and temperature conditions may trigger certain diseases, which will spread quickly through the potato columns. In any case, there's no compelling reason to just kick back and let the environment determine the fate of your crop.

To protect your crop, pivot the potato plot every year. Plant healthy, certified seeds should be used. In the event that you have severe disease problems, consider utilizing a standard potato dust or spray routinely all through the season. These are chemical mixtures that prevent some diseases such as late blight. They defeat a few vermin, as well, for example, the Colorado potato beetle. In the event that you utilize a potato dust or spray, read and take after the directions carefully. To be successful, most standard dusts must be connected to the potato foliage each 7 to 10 days, starting when the plants rise up out of the ground.

The fungus that causes basic scab lives in the soil for many years. It's not dynamic, however, when the soil pH is beneath 5.4, so on the off chance that you have a serious scab problem, take a soil pH test. You might need to bring down the pH by not liming or adding wood ashes remains to the potato segment of the garden.

Early Blight

Early blight injures foliage and reduces overall yields. Influenced leaves develop small, dark brown spots that regularly develop in size, and which inevitably kill the leaves. Gardens in central, southern and eastern states are most susceptible. Planting affirmed seed and mulching with hay can keep this infection.

Late Blight

Late blight is brought on by the downy mildew fungus – *Phytophthora infestans*, which set off the Irish product failures of 1845 and 1846. You will see the disease first by water-soaked areas on the leaves that turn dark colored and dark as the black as the leaf dies. The infection strikes regularly cool, wet climate and may spread quickly if the climate warms up. Plants can die in an extreme case, and potatoes can be genuinely influenced, especially in storage. Plant affirmed seed and utilize a potato clean to prepare for late blight.

Mosaic Virus

Aphids can spread mosaic viruses, which cause potato leaves to curl and show up right around two- toned (light and dim green). Mosaic happens all through the United States and cuts down on the harvest, but it won't kill the plants.

"Kennebec" and "Katahdin" assortments have some imperviousness to specific sorts of mosaic.

CONCLUSION

Potatoes wilt is common in many countries. By using disease free seed tubers, certified seed potatoes, developing resistance varieties to bacterial wilt of potato will minimize the spread of bacterial wilt.

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