PLANT PATHOLOGY NOTES: NO. 41

BACTERIAL WILT OR BROWN ROT OF POTATO

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ABSTRACT

Bacterial Wilt of potato caused by Pseudomonas solanacearum *(Smith) and its control measures are discussed.*

KEYWORDS: *Bacterial Wilt,* Pseudomonas solanacearum, *contagious, brown rot*

INTRODUCTION

Bacterial Wilt (or Brown Rot) of potato is caused by a bacteria known as *Pseudomonas solanacearum* (Smith). Other names (synonyms): *Ralstonia solanacearum, Burkholderia solanacearum.*

Description: *P. solanacearum* is a rod-shaped gram negative bacteria commonly divided into five biovars and five races. Biovar 2-A, race 3 is the most common pathogen (disease causing organism) which causes Bacterial Wilt in potatoes (Jeffries 1998).

Distribution: *P. solanacearum* is distributed around the tropics and sub-tropics, reaching as far as 56° N (in Europe) and 38° S (in South America). In Papua New Guinea, it is wide spread in areas where potato is grown (Bang and Wiles *in press*).

Hosts: *P. solanacearum* has a wide range of hosts in more than 40 families of plants (Hayward 1991). Biovar 2-A, race 3 is more specific to potato and other related plants in the Solanaceae family such as tomato, capsicum, tobacco and eggplant. Two other important hosts in PNG are banana and peanut

Transmission: The pathogen, *P. solanacearum* is spread in a number of ways.

1. Vegetative propagation. Use of infected seed potato tubers for planting.
2. By man (farmer) through contact of infected plant to healthy plant.
3. Use of tools. No proper cleaning of tools used in infected garden to healthy garden.
4. Other plant hosts which may be regarded as weeds and present in and near garden.
5. Soil - from previous infection.

SYMPTOMS

Wilting of a leaf or a side branch is the first sign of infection (Figure 1). If the plant is cut just above the ground and viewed, there would be browning of the vascular bundle, which is the inside centre of the plant where plant food and water is transported from the ground to the whole plant. If an infected tuber is cut, browning and necrosis or Brown Rot can be seen around the vascular ring (Figure 2).

A milky white ooze will come out of the cut stem if squeezed or dipped into a glass of water. This white ooze is made up of millions of the *P. solanacearum* bacteria, and may also be seen coming out of tuber eyes or vascular ring if a cut tuber is squeezed.

IMPORTANCE

Bacterial Wilt is a very serious disease and high yield losses in a whole potato crop may result from this disease. It is also highly contagious, which means the risk of infection is very high.

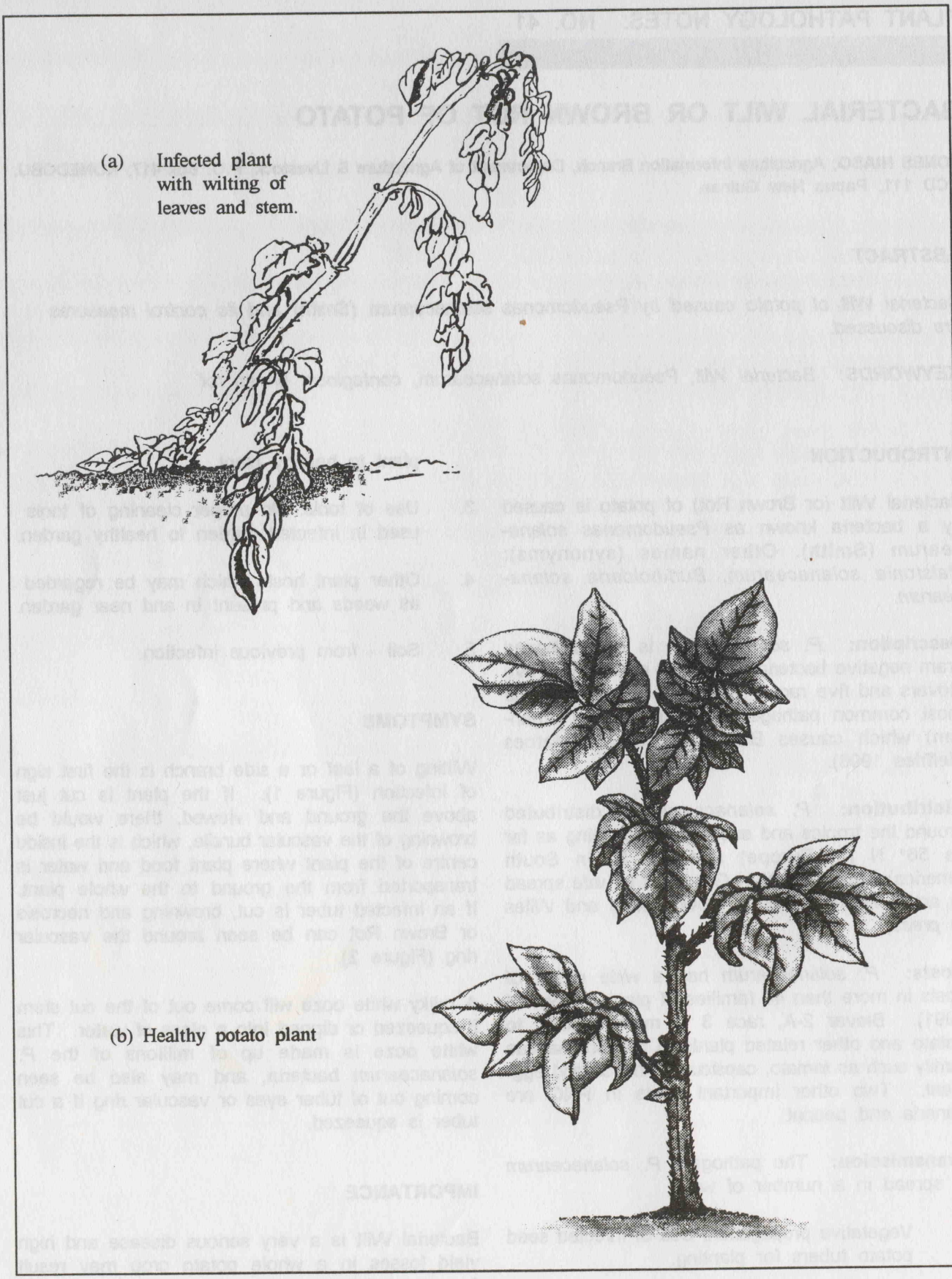

Figure 1. (a) Wilting of leaves and stem of infected potato plant. (b) Healthy potato plant.

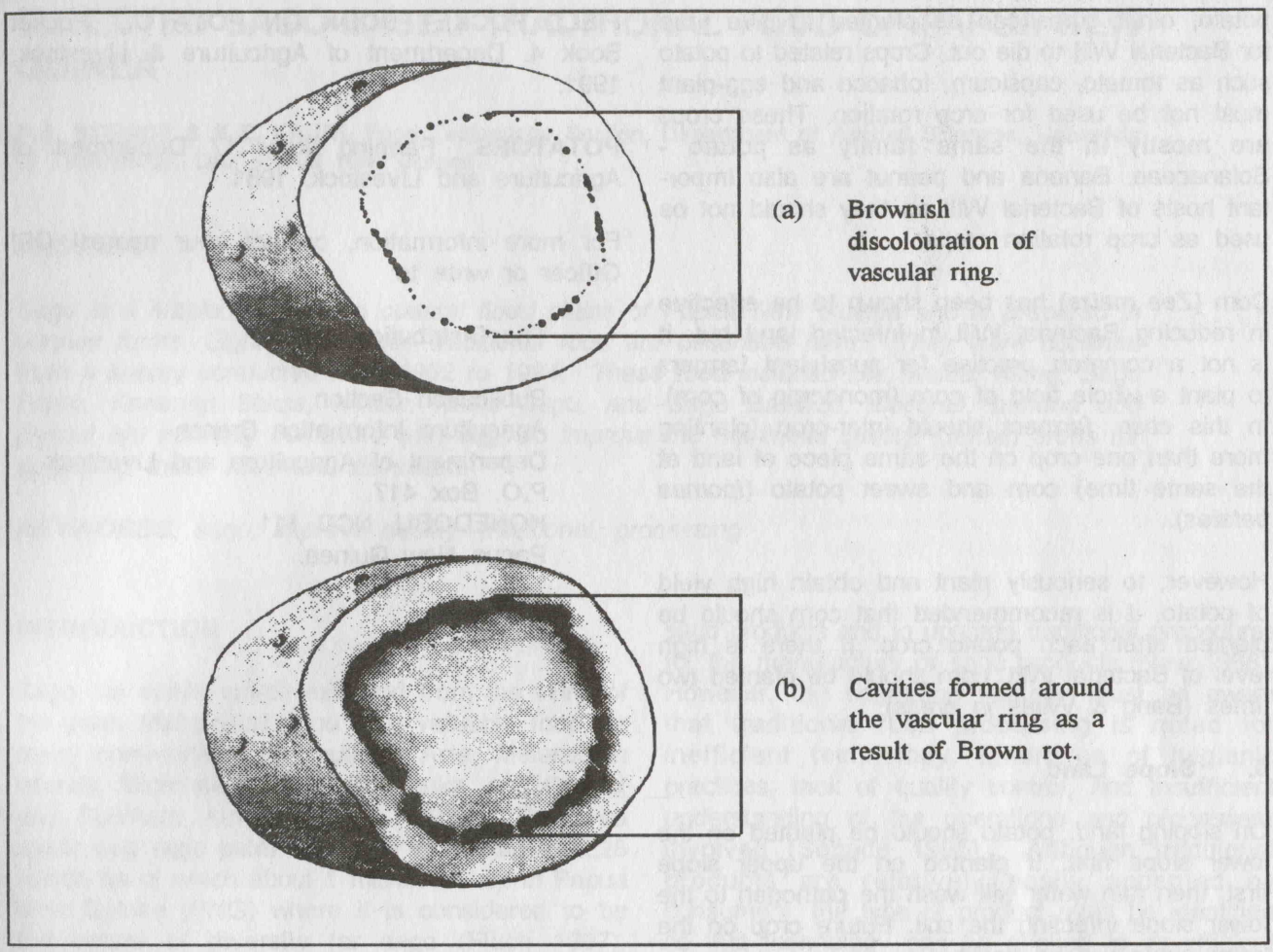

Figure 2. Brown rot of tuber around the vascular ring. (a) Brownish discolouration of vascular ring. (b) Cavities around the vascular ring.

The pathogen can be persistent in infected fields for a very long time.

CONTROL

There is no easy chemical control for this disease. The only effective method for potato at present is through gardening practises and the use of resistant potato varieties. However, no resistant potato varieties have been selected for PNG yet.

Farmers should carefully follow the following management procedures to effectively reduce the incidence of Bacterial Wilt.

1. New Seed Tubers

Always use new seeds not infected by Bacterial Wilt for planting. Get information from the nearest DPI office.

2. Disease Plants

Uproot the whole plant including the roots and burn or bury it away from the garden.

3. Disinfection

If you have to work in more than one garden, always wash and clean your feet and hands including all the tools used. DAL / DPI recommendation of 2 parts Formalin in 100 parts water for foot bath and sterilising of tools must be used. Get more information from your nearest DPI office for this.

4. Crop Rotation

Crop rotation means planting different crops during different times, one after the other, on the same piece of land. In between or before planting

potato, other crops can be planted to give time for Bacterial Wilt to die out. Crops related to potato such as tomato, capsicum, tobacco and egg-plant must not be used for crop rotation. These crops are mostly in the same family as potato - Solanaceae. Banana and peanut are also important hosts of Bacterial Wilt so they should not be used as crop rotation crops.

Corn (*Zea maize*) has been shown to be effective in reducing Bacterial Wilt in infected land but, it is not a common practise for subsistent farmers to plant a whole field of corn (monocrop of corn). In this case, farmers should inter-crop (planting more than one crop on the same piece of land at the same time) corn and sweet potato (*Ipomea batatas*).

However, to seriously plant and obtain high yield of potato, it is recommended that corn should be planted after each potato crop. If there is high level of Bacterial Wilt, corn should be planted two times (Bang & Wiles *in press*).

5. Slope Land

On sloping land, potato should be planted on the lower slope first. If planted on the upper slope first, then rain water will wash the pathogen to the lower slope infecting the soil. Future crop on the lower slope will be spoilt.

REFERENCES

BANG, SERGI, K. & WILES, GEOFFREY C. (*in press*). The control of Bacterial Wilt (*Pseudomonas solanacearum*) of potato by crop rotation in the Highlands of Papua New Guinea.

HAYWARD, A.C. 1991. Biology and epidemiology of bacterial wilt caused by *Pseudomonas solanacearum*. *Annual Review of Phytopathology*. 29: 65-87.

JEFFRIES, C. 1998. *FAO / IPGRI Technical guidelines for the safe movement of germplasm. No. 19 Potato.* FAO-UN. International Plant Genetic Resources Institute, Rome.

FURTHER READING

BACTERIAL WILT. Plant Pathology Note 15, by Derek Tomlinson. *Harvest* vol. 7 (4), 1981.

FIELD POCKET BOOK ON POTATO. Pocket Book 4. Department of Agriculture & Livestock, 1991.

POTATOES. Farming Notes 17. Department of Agriculture and Livestock, 1981.

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