Diseases of Pepper (Part 1)

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Disease problems are major constraints in the cultivation of pepper in all pepper producing countries and Malaysia is no exception. In Sarawak, pepper vines are affected by a myriad of diseases; some of these are devastating causing heavy crop losses or plant death while others are less severe with minor economic significance.

The first part of this article on diseases of pepper covers four major diseases and their management.

Phytophthora foot rot

Foot rot caused by *Phytophthora capsici* is deemed the most devastating disease of pepper. Infection usually starts at the collar region of the vine. Leaves become progressively yellowed, wilted and defoliated. Branches droop. Characteristic fimbriate-edge leaf lesions may develop on leaves. The underground stem has brownish-black lesion and most of the roots are rotted leading to death of the vine in few months' time.

Early stage of Phytophthora foot rot infection

To prevent and contain this disease, an integrated disease management system should be adopted. Cuttings to be planted should obtain from foot rot-free gardens to avoid introducing the disease to a new area. The garden should have a good drainage system as waterlogged environment is conducive for disease development. Sharing of farm tools and foot-wares between gardens are not encouraged and they should be disinfected after use. Pruning of lower branches up to 30 cm above ground should be practiced to prevent them coming in contact with the soil. Vines should be inspected regularly as success in containing foot rot depends very much on early recognition of the disease followed by prompt application of a suitable chemical. Once the disease is detected, soil application or spraying of metalaxyl, a systemic fungicide is required. Application of fungicide to healthy vines surrounding the infected vine is also necessary to prevent further spread of the disease to those vines. Copper fungicides including copper oxychloride or copper hydroxide can also be used.

Underground stem infected with Phytophthora foot rot

Leaf symptoms of Phytophthora foot rot infection

Black berry disease

Black berry disease caused by either one of the three species of the fungus, *Colletotrichum*, namely, *C. gloeosporioides, C. capsici* or *C. piperis* is one of the most serious diseases of pepper. The characteristic symptom of the disease is numerous black spots on the berries which may also be found on spikes and leaves. It starts with small blackish spots which enlarge or coalesce as the disease progresses. In severely infected plant, berries turn black and dry-up. They may remain as mummified berries on the spike which dangle on the branch or the whole spike may detach from the branch.

Berry spike infected with black berry disease

The most effective control of this disease is to adopt the integrated disease management approach consisting of tolerant varieties, cultural and chemical measures. The use of more tolerant varieties such as Uthirancotta, Belantung, Semongok emas, Semongok perak, Hybride 10, Balancotta and Semongok 1 are encouraged. Unfortunately, variety Kuching, which is popularly grown in Sarawak is very susceptible to the disease. Culturally, the practice of farm hygiene by removing infected old leaves and mummified berry spikes which have dropped onto the mound and surrounding areas help to reduce disease incidence. The use of living supports such as *Erythrina indica* and *Gliricidia sepium* are encouraged as research has shown that vines grown under these living supports had lower incidence of black berry disease. In areas where the disease is prevalent, fungicides including benomyl, mancozeb, prochloraz zinc complex, carbendazim, chlorothalonil or copper hydroxide can be used to control the disease.

Slow decline

Slow decline is caused by an association between the root-knot nematode, *Meloidogyne* sp. and the fungus, *Fusarium* sp. In this disease complex, the nematode is thought to cause injury to the root providing ingress for the fungus to infect the plant. Infected plant shows a progressive decline leading to its ultimate death in one to few years' time. It starts with leaf yellowing and wilting, branches droop. Brownish-black lesions are found on terminal and lateral shoots and vascular bundle of infected plant parts. Defoliation and breaking of shoots at the nodes occur; leaving only the main stem and a few bare branches. The root system with brownish-black lesions is damaged with reduced growth.

Advance stage of slow decline infection

Cultural control plays a significant role in managing this disease. Vines should be inspected regularly so that the disease can be detected in its early stage. Regular application of organic manure promotes other beneficial soil microbes making the soil environment less favorable for the pathogens. Practice field hygiene such as eliminating movement of infected soil into disease-free areas and removal of infected plants to reduce the spread of the disease. At present, there is no known fungicide that is effective against diseases caused by *Fusarium* sp. Controlling the nematode using carbofuran, a nematicide should reduce the disease incidence.

Cross section of stem affected by slow decline

Velvet blight

Velvet blight is caused by the fungus, *Septobasidium* sp. in association with the scale insect, *Pinnaspis* sp. The relationship of this fungus with the scale insect is a complex form of symbiosis. The fungus confers protection on the scale insect and in return, it derives nutrients from the latter. The distinctive feature is velvet-like incrustation on the stem, branches, twigs, leaves and fruit-spikes. The incrustation is purplish-grey in colour but becomes brown with age. It increases in length, encircles branches and twigs. Heavily infected plant parts dry-up and break at the nodes and Infected leaves turn brown and dropped. Scale insects are found beneath the layer of incrustation.

As the scale insect provides source of nutrients for the fungus, eliminating the former can reduce velvet blight incidence. The layer of fungal mat should be scrapped off before application of white oil, albolineum to control scale insects. Infected plant parts including branches, twigs, spikes and leaves should be pruned off and removed from the garden.

Velvet blight on twig and leaves