Bunchy top of banana

Banana bunchy top virus

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Erect leaves, narrower and smaller than healthy leaves, with yellow edges.

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Look carefully to see how minor veins are hooked (J-shaped) as they join the midrib in infected plants.

SUMMARY: Bunchy top of banana is a viral disease that gets inside the plant and stays there. Infected planting material appears healthy. An aphid that is present in all banana growing countries helps to spread the disease over short distances. The bunches of erect leaves caused by the disease are more than a curiosity: the plant does not fruit and production is severely affected. All bananas are susceptible and there is no chemical treatment. However, careful selection of healthy planting material can prevent the introduction of the disease to new countries and early detection of symptoms enables its spread to be limited.

KEY SIGNS

The development or appearance of the symptoms depends on how the plant becomes infected. The first leaves (suckers) from an infected stool or mother plant (primary infection) are small and crowded together. They stay erect and do not arch outwards as in healthy banana plants. The leaf edges are a lighter colour (chlorotic), going brown towards the centre as they decline. New leaves are successively narrower and smaller, giving a distinct and typical bunchy appearance. Suckers from an already infected stool rarely produce fruit bunches.

Secondary infections occur when the aphid introduces the virus to a healthy plant. Symptom development is at first less dramatic and more difficult to see when compared to infected suckers. The second leaf produced after virus inoculation develops dark green streaks on minor veins that look like dashes, though these may be difficult to distinguish. The veins are hooked (J-shaped) as they join the middle of the leaf (midrib). The 'J' hooks and dashes are best seen on the underside of a leaf held against the light. Dashes may also occur on midribs and the main trunk of the banana.

The initial symptoms of a secondary infection can be mistaken for a nutrient deficiency or abiotic (physical not biological) stress. Bunchy top becomes more evident with the production of subsequent leaves that are successively smaller. Bunchiness is less pronounced, though still visually detectable, if secondary infection occurs at a later stage of banana development. A banana plant with a secondary infection may produce one set of fruit but these will be small and distorted. New suckers will contain the virus and produce leaves that are affected from the outset.

MANAGEMENT

Prevention – what to do before signs are seen

Cultural approaches: : The virus moves throughout the plant and may occur in parts which do not show symptoms, hence the importance of ensuring that material used for propagation, such as corms and suckers, is virus-free. It is crucial to screen material used in tissue culture so that plantlets are virus-free.

Where the disease is absent (e.g. Uganda) but present in neighbouring countries (e.g. DR Congo), it is vital that plant health

inspectors and extension officers recognize the symptoms of bunchy top so that farmers can be advised on how to select healthy planting material. Healthy planting material should be made available to farmers.

There is no biocontrol option for the banana aphid.

There is some evidence from central African countries to suggest that plantains (AAB or BBB group) are tolerant to bunchy top. For all practical purposes, however, all bananas should be considered at risk from infection.

Control – what to do after signs are seen

Cultural approaches: Constant vigilance (for example through plant clinics) and regular surveys by extension staff are essential to ensure that any suspected outbreaks are detected early and swiftly dealt with. In such cases affected banana plants should be removed and cut into small pieces to prevent new suckers growing.

Once the disease is well-established, the number and proximity of smallholders growing bananas and the difficulty in coordinating crop destruction in a timely manner makes it unlikely that local eradication campaigns will succeed without strong official enforcement. Such a campaign would also involve cutting down healthy banana plants.

Chemical approaches: There is no chemical control for the virus, either as a preventative or curative measure. Chemicals can, however, be used against the aphids which spread the disease: infected plants can be sprayed, particularly the underside of leaves, forcefully with water or a water-soap solution (about 2% by volume) to kill the aphids and thus help to contain an early outbreak. Insecticidal oils can also be used, such as those containing paraffin or neem extract (2% by volume).

CAUSE

Banana bunchy top virus is a type (species) of nanovirus. The disease is initially spread in planting material. Once established, the virus is spread locally by an aphid, *Pentalonia nigronervosa*, a sucking insect which is widely distributed and already present in countries still free from the disease.

Isolates of virus taken from across a wide geographic area of five central African countries, including DR Congo and Malawi, are genetically identical. The widespread distribution of the same strain of virus shows how local movement of banana planting material, from farmer-to-farmer, as well as aphid transmission, has helped to spread the disease. The virus is not mechanically transmitted so cleaning of tools will not affect spread to new plants.

IMPACT

Bunchy top is one of the most serious diseases of banana. In severely infected plants total yield loss can occur. An outbreak in Malawi in the mid-1990s affected 3500 hectares and is estimated to have destroyed 800 hectares. Outbreaks cause great concern because of the difficulty in managing the disease once established, followed by rapid spread through exchange of infected planting material. The presence of the aphid vector in countries currently free of the disease, such as Uganda, heightens the risk of banana bunchy top virus to a vital food crop.

DISTRIBUTION

Bunchy top of banana is found in West Africa (Benin, Nigeria and Cameroon) and in East and Central Africa (Burundi, Rwanda, DR Congo, Malawi and Zambia). It also occurs in several other African countries. The disease has not been recorded from Uganda or Tanzania.

FURTHER READING

www.rtb.cgiar.org/rtb-centers-and-partners-prepare-to-battle-banana-bunchy-top-disease-across-sub-saharan-africa/

Plantwise Knowledge Bank (www.plantwise.org).

CABI Crop Protection Compendium (www.cpc.org/cpc).

Promusa also has information on the disease (www.promusa.org).

For a recent review of bunchy top virus and overview of the disease:

Lava Kumar P, Hannab R, Alabic OJ, Sokod MM, Obena TT, Vangue GHP, Naiduc RA (2011). Banana bunchy top virus in sub-Saharan Africa: Investigations on virus distribution and diversity. Virus Research 159, 171-182