



Common mosaic of bean

Bean common mosaic virus



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Bubble-like appearance of leaf blades of Phaseolus; also the plant is stunted.



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Mosaic patterns on the leaves of Vigna sp., yard long bean.

SUMMARY: Common mosaic of bean is caused by a virus that mainly affects *Phaseolus* and *Vigna* beans. It is spread in seed and by a number of aphid species. Plants are stunted, with leaves that show dark and light green patterns (mosaics), dark green areas along the main veins, and a bubble-like appearance. Pod yield losses range from 35% to near 100%. In Africa, management options are limited by the lack of healthy seed programmes and access to commercial seed with resistance to the virus, and rely mainly on cultural controls. Insecticides do not offer solutions, even if affordable and available.

KEY SIGNS

Common mosaic of bean is caused by a virus that infects *Phaseolus* species, especially *P. vulgaris* (common, snap or French bean) but also *Lablab purpurea* (hyacinth bean) and *Vigna unguiculata* subsp. *sesquipedalis* (yard long bean). Additionally, many pasture legumes are hosts, i.e. they are susceptible to infection. The disease is spread in infected seed and also by aphids.

Plants grown from infected seed are stunted; leaves are distorted and show dark green areas along the main veins and light green-yellow between. This light and dark green pattern is called a 'mosaic'. Often the green areas have a bubble-like (or blister-like) appearance. The leaves may also curl downwards with rolling of the leaf blade. Plants with these symptoms rarely produce pods.

MANAGEMENT

Prevention – what to do before signs are seen

Cultural approaches: Use seed that is certified free from virus infection, or from an approved source.

Varieties have been bred for resistance to common mosaic of bean. Check to see if these are available locally.

Smallholders who save their own seed should:

- Carefully select plants for seed that do not show symptoms of disease, i.e. they look healthy.
- If most plants show symptoms, do not use them as a source of seed, but instead obtain seed from reliable sources, such as a commercial company or from other growers whose plants have been monitored for the disease.

Interplant with maize to reduce aphid infestation and virus infection.

Plant mixtures of bean varieties – a strategy used in parts of Africa.

Control – what to do after signs are seen

Cultural approaches: Do not plant new crops next to those that have the disease.

During early crop growth the most practical recommendation is to learn to identify plants with symptoms of seed-borne infection (see KEY SIGNS, above) and remove them as soon as symptoms are seen.

After harvest, collect and burn or plough back the diseased crop to destroy the aphids.

Chemical approaches: The use of insecticides for the control of aphids that spread the virus is not recommended. The time is short between an aphid sucking up the virus when it feeds on a diseased plant and spreading the virus as it feeds again on a healthy one. By the time the insecticide has killed the aphid it has spread the virus.

CAUSE

Bean common mosaic virus is transmitted through seed and by a number of aphid species. The virus can also spread in pollen, although seed and aphid transmission are the more important.

The aphids *Acyrtosiphon pisum*, *Aphis fabae* and *Myzus persicae* do not normally colonise beans. These transmit the virus in a non-persistent way: this means that after feeding on an infected plant, aphids can straight away move to a healthy plant and infect it as they feed once more. However, the aphids quickly lose the ability to spread the virus in this way. Other species, including the common aphid, *Aphis gossypii*, infest crops of beans and transmit the virus.

Several strains of the virus are known. It was previously thought that some cause wilting and death, known as 'black root', but these symptoms are now recognised as belonging to a separate virus, Bean common mosaic necrotic virus.

IMPACT

Common mosaic of bean is an economically important disease throughout Africa, Europe and North and Central America. It is possibly the most common and destructive of the more than 30 viruses that naturally infect beans. Seed infection can be high, with over 30% being common and up to 70% having been reported. A combination of infected seed and secondary spread by aphids can result in total infection with yield losses ranging from 35 to 98%. In general, the earlier the symptoms present, the greater the impact on yield. Plants produced from infected seedlings rarely produce beans.

DISTRIBUTION

The virus occurs worldwide, wherever beans are grown. It is present in North and South America, Central America and the Caribbean, Europe, Asia, Oceania, and in more than 20 African countries.

FURTHER READING

Bean common mosaic virus. CABI Crop Protection Compendium. (<http://www.cabi.org.ezproxy.library.uq.edu.au/cpc/datasheet/9424>).

Common mosaic of beans (Bean common mosaic virus). Plantwise Knowledge Bank. (<http://www.plantwise.org/knowledgebank/datasheet.aspx?dsid=9424>).

UC IPM Online. Dry beans: Bean Common Mosaic. (<http://www.ipm.ucdavis.edu/PMG/r52101611.html>).