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Farmnote

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Manganese deficiency in vegetables

By M. Hawson, Senior Adviser, Horticulture Division

Manganese (chemical symbol Mn) deficiency occurs in a wide range of crops with onions, beetroot, parsnip, cabbage, cauliflower, tomato and pumpkin the most susceptible. This deficiency is most common on alkaline soils (high pH), particularly if the irrigation water contains high levels of bicarbonate. It is found on soils of the Cottesloe and Karrakatta associations when high rates of phosphate fertilisers are used.

Manganese is needed for a number of plant functions including chlorophyll synthesis. It is a partially mobile element in the plant so symptoms may first appear in the youngest or oldest leaves.

Symptoms

In general, affected crops are pale green and growth is reduced. Specific symptoms may first appear on the youngest or oldest leaves and vary from species to species.

The most common symptom is for the leaves to turn a pale green between the veins with normal coloured areas next to the veins. As the deficiency progresses the area between the veins becomes paler, enlarges and may brown and die.

In cabbage the interveinal chlorosis symptom is replaced by a general mottled yellowing of the leaves.

Figure 1. Manganese deficient beetroot crop.

Beetroot shows triangular or spear-shaped leaves with the edges curled forward as well as yellow mottling with small dead patches giving the leaf a typical speckled appearance (see Figure 1 and Figure 2). These symptoms are so distinctive in this species to be called ‘speckled yellows’.

In onions and sweetcorn the interveinal chlorosis appears as yellow stripes on the leaves.

Soil types

Manganese deficiencies are most often observed on well drained neutral or calcareous soils. However, other soils may cause manganese deficiencies particularly as a result of heavy fertiliser usage. It can also be induced on these soils by heavy applications of lime.

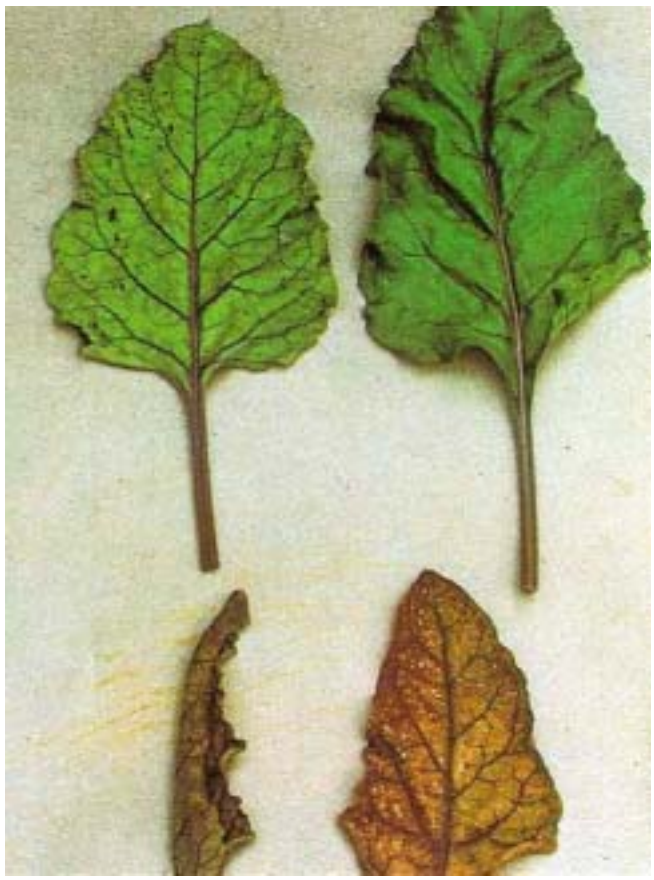

Figure 2. Manganese deficient beetroot leaves. The top leaf on the right is healthy.

In practice, manganese deficiency with vegetables does not occur on acid swamps except after they have been heavily limed, but it is common on marl swamps. It is also common on sands containing limestone.

Treatment

Manganese deficiency is controlled by using manganese sulphate ($MnSO_4.7H_2O$) as a soil applicant or a foliage spray. Chelated forms of manganese can also be used as a foliar spray although this treatment is much more expensive.

Soil application

Soluble manganese quickly reacts with the soil to produce less available forms. Application in a band minimises such reactions and is therefore more efficient and rates can be lower than broadcast application.

For a broadcast application, apply 50 kilograms of manganese sulphate per hectare or 10 to 20 kg/ha if applied in a furrow or band.

Sometimes is has been difficult to control manganese deficiency by soil applications, but good controls have been obtained through foliage spraying.

Foliage spraying

Foliage spraying is usually the best way of correcting manganese deficiency as relatively low rates are as effective as high rates of soil application.

A 0.8 per cent spray (8 grams per litre) applied at 500 L/ha supplies 4 kg of manganese sulphate/ha. A wetting agent should be added for better leaf coverage and a second or third application may be needed.

They spray is most successful when plants are fairly young but good responses have been obtained when plants are more than halfway through their growing period.

Plant requirements

Deficiency symptoms in most species are associated with leaf levels less than 20 parts per million (ppm) with particularly severe symptoms at less than 10 ppm. Healthy plants normally contain 50 to 200 ppm of manganese although levels up to 1500 ppm have been recorded where fungicides containing manganese, such as Mancozeb®, have been applied.

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