

## Grafting Snake Beans to Control Fusarium Wilt

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### INTRODUCTION

Fusarium wilt is a serious problem of snake beans grown in the Darwin area. It is caused by a soil-borne fungus, *Fusarium oxysporum* f.sp. *tracheiphilum*, which infects plants through the roots, especially if plants are damaged by implements or are infected by root knot nematode. The fungus is also seed-borne.

### SYMPTOMS

Infected plants quickly wilt and collapse, often within 24 hours. In some cases this may happen over a period of two to three days. Symptoms usually appear when plants flower and begin to set fruit. Diagnosis of Fusarium wilt involves slicing the tap root, stem and branches with a sharp knife. Infected plants have a reddish brown discolouration of the vascular or water conducting tissues (towards the centre) of the root and stem. The discolouration in some cases reaches the branches.

### CONTROL

Fusarium wilt was first reported in 1999 in Darwin and appears to have spread to most farms. The disease can be controlled by:

1. Using seed harvested from healthy plants and by adopting hygienic practices aimed at preventing the disease from entering the property if it is known to be free of the disease. This will sustain production unless the disease is introduced.
2. Using resistant varieties. However, no suitable and commercially acceptable resistant variety is known at present.
3. Grafting onto resistant cowpea rootstock. Snake beans can then be produced in an area infested with Fusarium wilt. This Agnote describes the technique of grafting.

## ONTO WHAT DO YOU GRAFT?

A variety of cowpea called Iron is resistant to snake bean Fusarium wilt in Darwin and can be used as the rootstock for snake beans. It is important to use a definitely known resistant variety of cowpea rather than any cowpea. Samples of Iron cowpea seed are available from DPIFM Primary Industry, Berimah Farm.

## GRAFTING

Rootstock cowpeas (Iron cultivar) are generally sown in pots (or commercially, in seedling trays) two to three weeks before the scion snake beans. When the scion snake bean seedlings have reached a height of about 300 mm proceed as follows:

1. Cut off the top 100 mm of each snake bean plant and then trim into a wedge shape (see Figure 1).
2. Remove leaves from the snake bean scion to minimise moisture loss.
3. Cut off the Iron cowpea rootstock at the height where it is the same thickness as the snake bean scion. Discard the top portion.
4. Split down the centre of the remaining rootstock stem to the same depth as the scion wedge already prepared (about 15-20 mm).
5. Make the graft by inserting the scion into the split rootstock stem, ensuring that the sides are making good contact. The graft can be held in position by binding it with grafting tape, or better still, by using commercially produced grafting dips.

Grafted plants need to be staked to prevent them breaking until the grafts are sufficiently strong.

Prevent newly grafted plants from drying out by growing in a shade house with mist irrigation or by staking and placing a plastic bag over each graft. Alternatively, cover the whole tray with a plastic bag to prevent air currents from drying out the graft union. The bags can be removed after three to five days and the plants allowed to harden. After about two weeks, the grafting tape or grafting dips can be removed.

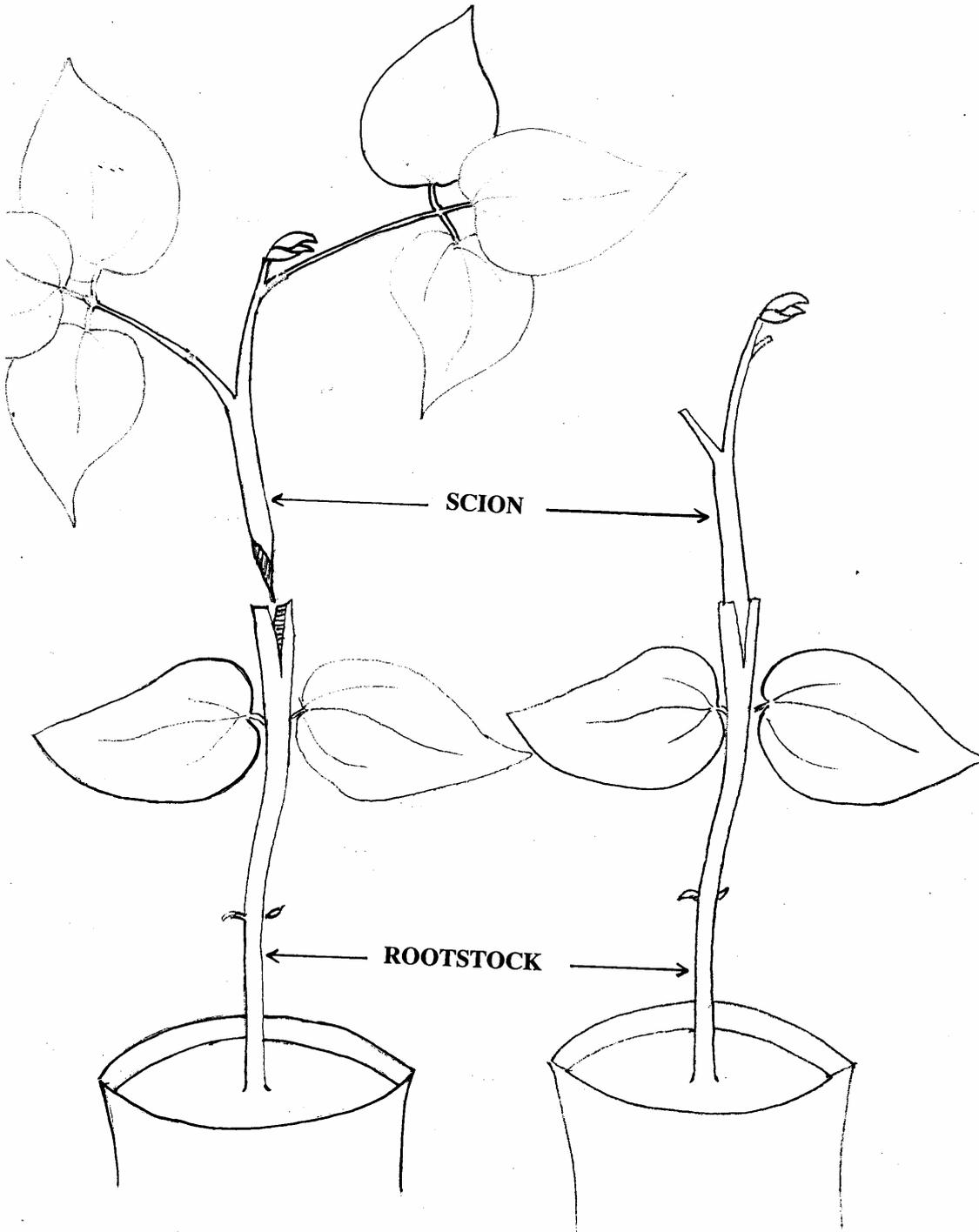
As with all grafted plants, the grafted area must be kept above the soil or mulch level when planting out, otherwise the plant may become infected with Fusarium wilt. It is essential to keep all parts of the plant secured onto trellises or stakes to prevent contact with the soil. Constant attention needs to be given to the removal of side shoots of the cowpea root stock coming from below the graft union.

One more advantage of grafting snake beans onto Iron cowpea is that the Iron cowpea root stock is also resistant to the root knot nematode which can also devastate snake bean crops.

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**Figure 1.** Grafting snake beans onto Iron cowpea