

Grafting Snake Beans to Control Fusarium Wilt

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INTRODUCTION

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

SYMPTOMS

Once infected, plants wilt quickly 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. The diagnosis of Fusarium wilt is conducted by 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. In some cases, the discolouration reaches the branches.

CONTROL

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

1. Using seed from healthy plants and by adopting hygienic practices to prevent the entry of the disease into a property known to be free of it. This will sustain production for as long as the disease is kept out.
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 Fusarium wilt-infested areas. This Agnote describes the technique of grafting.

ONTO WHAT DO YOU GRAFT?

As a cowpea variety called Iron is resistant to snake bean Fusarium wilt in Darwin, it can be used as a rootstock to grow snake beans. It is important to use a definitely known resistant variety of cowpea rather than any cowpea. Samples of Iron cowpea seeds are available at Berrimah Farm. For best results, grow your own Iron cowpea seeds. Store your seeds in cool dry conditions (refrigerator) to maintain viability.

GRAFTING

Rootstock Iron cultivar cowpeas are generally sown in pots (commercially, in seedling trays) two to three weeks before scion snake beans. The seeds should be sown in clean potting mix in new or sterilised pots or seeding trays to prevent contamination with *Fusarium* wilt. The growing equipment needs to be kept off the ground and away from soil splash contamination. When the scion snake bean seedlings reach a height of about 300 mm, proceed as follows:

1. Cut off the top 100 mm of each snake bean plant and then trim it into a wedge shape (see Figure 1).
2. Remove the 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 clips.

Grafted plants may 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 to allow the plants to harden. After about two weeks, the grafting tape or grafting clips 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 be infected by *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.

Another advantage of grafting snake beans onto Iron cowpea root stocks is that they are also resistant to root-knot nematodes, which can also destroy snake bean crops.

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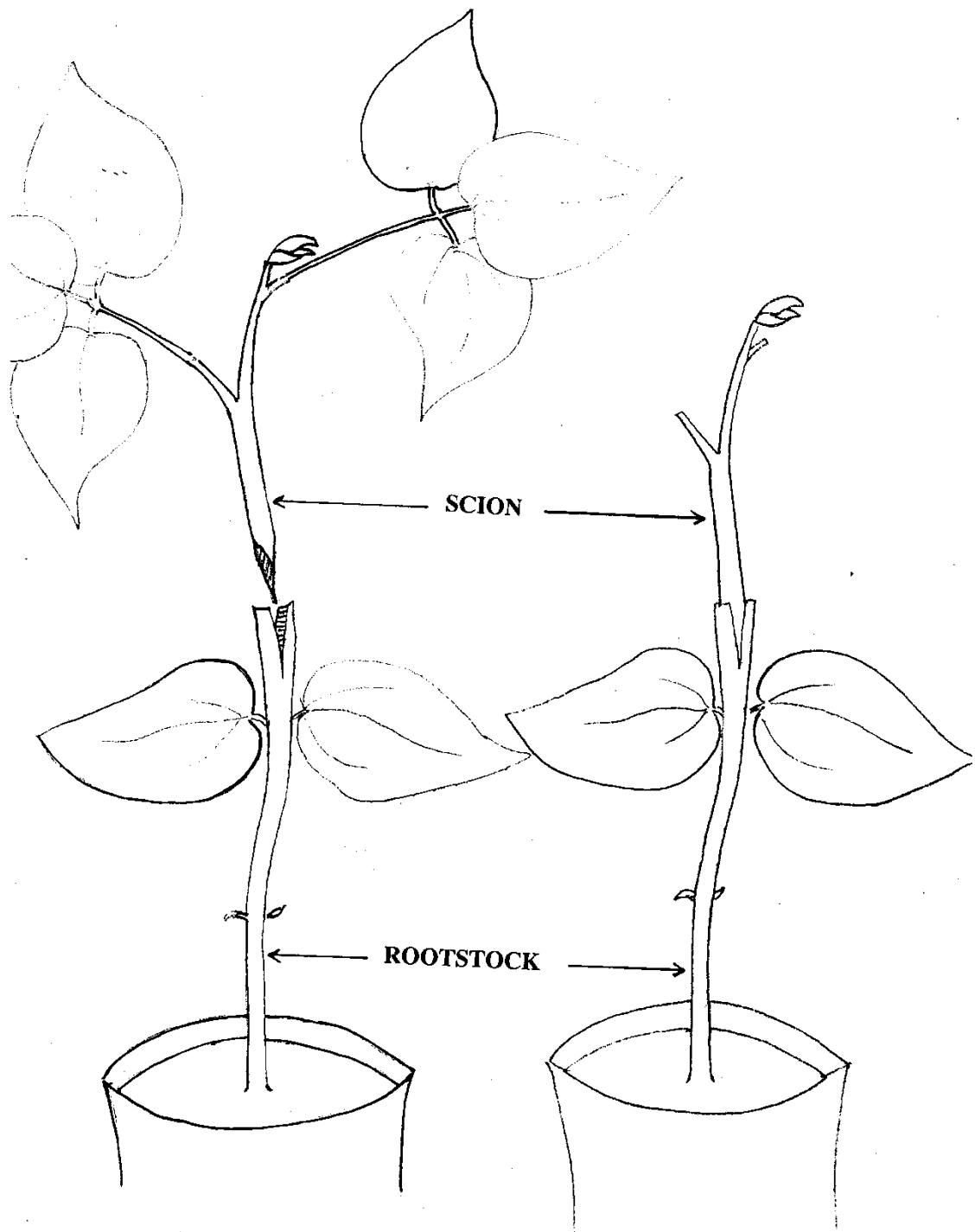


Figure 1. Grafting snake beans onto Iron cowpea