Cucurbit Grafting

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Grafting Cucurbits

Cucurbits:
- Cucumber
- Watermelon
- Other melons

There are three methods widely used:
- Hole-insertion grafting
- One cotyledon grafting
- Approach grafting

Why use Cucurbit grafting?
- Promotes plant vigor
- Increased yield in presence of disease
- Tolerance to abiotic stresses
- Resistance to soilborne plant pathogens
Diagram of Grafting Methods:

(A and B) hole insertion grafting
(D, E and J) splice grafting
(H and I) pin grafting

(C) tongue approach grafting
(F, G) cleft grafting

Hole insertion grafting (HIG)

- Commonly used for watermelons
- The rootstocks used in watermelon grafting are usually squash or bottle neck gourd
- Watermelon scion seedling size needs to be smaller than the rootstock seedlings
- Watermelon seeds are sown 7–8 days after the sowing of gourd rootstock seeds or 3–4 days after sowing squash rootstock seeds
- Grafting is made 7–8 days after the sowing of watermelon seeds
- The true leaf including the growing point should be carefully and thoroughly removed with a scoping motion
- A hole is made with a bamboo or plastic gimlet or drill at a slant angle to the longitudinal direction in the removed bud region
- The hypocotyl portion of the watermelon scion is prepared by slant cutting to a tapered end for easy insertion into rootstock hole
- The grafted plant is placed into a healing chamber

Tongue approach grafting (TAG)

- Scion and rootstock seedlings need to be similar height and stem diameters
- The seeds of scion
  - usually watermelons, cucumbers, and melons
  - Sow scion seed 5–7 days earlier than the rootstock seeds
- The growing point of the rootstocks should be carefully removed before grafting
- One cotyledon may also be removed when removing the growing point to ensure complete removal of the growing point and to avoid overcrowding in the healing chamber
- The grafting cut for rootstock should be made in a downward direction and the scion cut in an upward direction at an angle, usually 30°–40° to the perpendicular axis
- Grafting clips are placed to fix the graft position at the graft union site
- Grafted plants are then planted together in container
- After healing the rootstock top is removed and the scion roots are cut

Splice grafting (SG), tube grafting (TG), and one cotyledon splice grafting (OC-SG)

• Splice grafting can be done by hand, machine, or robot and can be applied to most vegetables
• For the cucurbit rootstocks, 1 cotyledon and the growing point are removed for grafting
• After placing the scion on the rootstock grafting clips are used to fix the grafted position at the union site
• This is the most common methods for cucurbits and also called as one cotyledon splice grafting (OC-SG)
• For solanaceous crops, grafting is usually made at lower epicotyl and fixed with grafting clips, elastic tube-shaped clip with side slit, or ceramic pins
• Tube grafting is performed by holding the grafted position together in a slit elastic tube rather than using the usual grafting clips
• The tube may be used several times depending upon the materials.

Cleft grafting (CG)

• Cleft grafting in herbaceous plants may be somewhat different from those of woody plants
• Usually a portion of the stem is cut longitudinally
• The rootstock seedlings are decapitated and longitudinal cut is made in a downward direction, 1–1.5 cm long and 3/4 depth of the stem diameter
• The scion is pruned to have 1–3 true leaves and the lower stem is cut to slant angle to make a tapered wedge
• After placing the scion into the split made on the rootstock, a clip is placed to hold in position until the union
• Various types of grafting clips, differing in material, size, shape, and others, have been developed for cleft grafting
• Cleft grafting had been used in cucurbits for a while in several countries, but the use is usually confined to solanaceous crops

Pin grafting (PG)

- Pin grafting is basically the same as the splice grafting
- Instead of placing grafting clips to hold the grafted position, specially designed pins are used to hold the grafted position in place
- The ceramic pin developed by Takii Seed Co., in Japan is about 15 mm long and 0.5 mm in diagonal width of the hexagonal cross-section
- The pins are made of natural ceramic so it can be left on the plant without any problem

Healing:

• Keep 95% relative humidity in healing chamber
• Temp 28-29C (82-84F) in the humidity chamber – Increase callus formation at union
• Darkness for 1-2 days and ween into light
• Cover healing chamber with two 70% green mesh shade cloth and one layer of 100% black shade cloth.
  – Remove black shade cloth after 2 days
  – Remove one layer of green mesh shade cloth 2 days
  – Remove the final layer of green mesh shade cloth after 2 more days
  – Leave in the healing chamber an additional day
  – Take out of healing chamber and put plants into greenhouse conditions

http://cals.arizona.edu/grafting/howto/cucurbits/grafting_methods
Cucurbit Grafting Methods:

- Hole insertion grafting is the most popular grafting method in watermelon.
- In cucumbers, tongue insertion grafting is most popular method.
- In eggplant, split grafting is preferred.
- In summary, small-scale farmers select tongue approach grafting for most vegetables whereas large-scaled experienced professional seedling producers like to adapt splice grafting.
- Manual or hand grafting is by far the major grafting method even though several grafting machines and semi-automatic machines or robots have been developed and commercially available.

QUESTIONS?

Tomato grafted on Potato

Cucumber

Tomato

Eggplant and Tomato

Dr. Louws