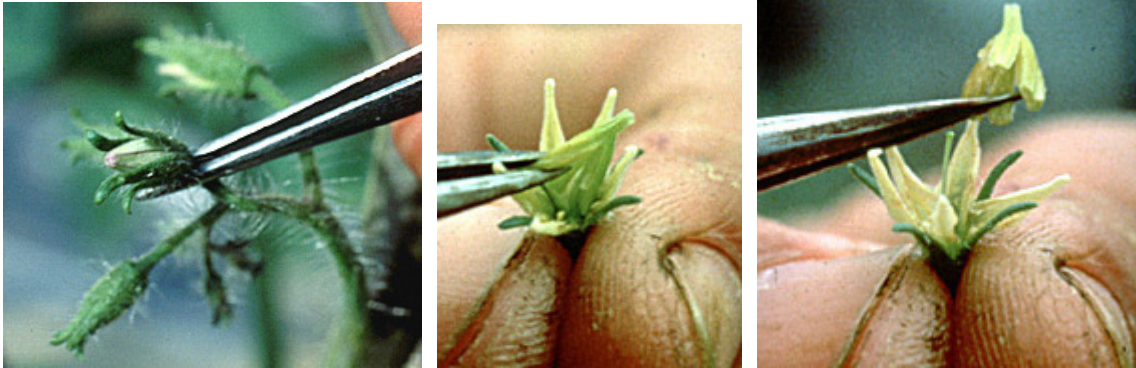


## Guidelines for Emasculating and Pollinating Tomato Flowers

**Emasculation:** Easy to do for cultivated tomato, as the flowers are large and anthers come off easily. If stigmas are sufficiently recessed in the anthers, one can emasculate simply by pulling on the tip of the anther cone while twisting back and forth. Otherwise use forceps or dissecting needle to remove the anther cone. We emasculate buds that are about 2 days before opening. A nice feature of the tomato inflorescence is that flowers open in succession, at approx. 1 day intervals, so skip the flower that will open tomorrow, and emasculate the next youngest one (Rick 1980). Another rule is to avoid flowers that have begun to develop substantial coloration in the unopened corolla, as these may have shed some pollen internally. Emasculation of the wild species can be trickier since the style and anthers sometimes have interlocking hairs (*L. hirsutum* is one of the worst), in which case anthers should be teased apart with a jeweler's forceps before removal. Remove all open flowers on the same or nearby inflorescences that might shed pollen onto the exposed stigma.



(photos from <http://www.avrdc.org>)

**Pollen collection and storage:** If you're only pollinating a few flowers, you can dig enough pollen out the anther cones (a natural pollen storage device!). Use a flattened dissecting needle to gather pollen by cutting a slit in the anther cone and scraping the contents of one antheridia at a time. You can also use a glass slide or the end of your finger placed under the opening of the flower to catch pollen, tap the flower to release the pollen (an electric toothbrush works well for this). If you have a lot of crosses to make, use a pollen collector (see <http://tgrc.ucdavis.edu/pollengel.html>) to gather larger amounts of pollen in a gelatin capsule or micro-centrifuge tube. You can also collect the desired male donor flowers and dry them so they will open up to release pollen (e.g. a glass Petri dish works well). It may be best to try two different methods to have pollen ready. Do not dry anthers in a heated oven as it may kill the pollen. Drying anthers in the sun or under an incandescent lamp that is at least 18" away from the pollen seems to work well. Pollen can be kept at -80°C for extended periods of time and thawed as needed. For best results, store pollen in gelatin capsules over desiccant in a sealed container, and minimize the number of time it is thawed by storing in small aliquots (Sacks and St. Clair 1996).

**Pollination:** Apply pollen to the exposed stigma with a dissecting needle (see photo), or by dipping style into the gelatin capsule containing pollen (you may need to shorten of the capsule first). Make sure to get plenty of pollen onto the stigma to ensure good seed set and be careful not to damage the pistil. In a few days, you should begin to notice the ovary enlarging, the first signs of a successful pollination. If pollination and subsequent fertilization don't occur the flowers will abort and abscise. This can happen for various reasons – damage to the pistil during emasculation, low pollen viability or fertility, excessive temperatures, etc. – so it's often worthwhile to make extra crosses to be sure that at least a few will take. For best results, pollinate the same day as the emasculation, then again 1 to 2 days later. **Always clean pollinating tools thoroughly between crosses with 95% ethanol.**



**Marking flowers:** A simple way to mark flowers that have been cross pollinated is with colored twist ties (Rick 1947). Cut them into short lengths (ca. 3-4cm), wrap around pedicel of pollinated flower by folding into three sections. Tags of different colors can be used to indicate the date of pollination or the pollen source. Striping tags with a colored pen provides additional color combinations. The crossing dates, pollen parents, or other treatments associated with each tag color can be recorded on a large manila shipping tag tied to the plants. Small paper pricing tags on string also works for marking flowers, and more information can be recorded

#### **Useful Links:**

Steps and Photos of Tomato Crossing: AVRDC:

<http://www.avrdc.org/LC/tomato/hybrid/08emasc.html>

Crossing Tomatoes

<http://www.kdcomm.net/~tomato/Tomato/xingtom.html>

Tomato Flower and Fruit Anatomy

<http://www-plb.ucdavis.edu/labs/rost/Tomato/Reproductive/flranat.html>

#### **References:**

Rick, C. M. (1947) A flower marker for plant-breeding operations. Science 106: 645.

Rick, C. M. (1980) Tomato. In: Hybridization of Crop Plants. ASA-CSSA, Madison. pp669-680.

Sacks, E. J., and D. A. St. Clair (1996) Cryogenic storage of pollen: effect on fecundity. HortScience 31: 447-448.