"Why Don't My Tomatoes Set Fruit?"

"Why don't my tomatoes set fruit" is a common question asked by gardeners from temperate climates who move to the tropics. A related question is, "Local markets only have cherry or plum type tomatoes. Can you send seed of a larger tomato?"

If you have a tomato plant that is healthy and flowering but not setting fruit, the reason is likely related to temperature. Both daytime highs and nighttime lows have a variety of effects on the ability of a tomato to set fruit. Cherry, plum, and other small tomatoes seem to be less adversely affected by these extremes, which is why those types are the ones in local markets. We had hoped to find clear-cut guidelines, but could not, so we will venture our own: If daytime temperatures are not less than 33°C (92°F) and nighttime temperatures less than 22°C (72°F), you may experience difficulty. If daytime temperatures are over 40°C (104°F) or nighttime temperatures over 26°C (79°F), you will almost surely have poor fruit set and possibly damaged fruit.

These are fine rules-of-thumb, but the reasons are too complex to be precise. Understanding some of the factors may help you find a solution.

Nighttime temperatures. These can be too low or too high. Night temperatures that do not drop to at least 26°C (78°F) are clearly damaging to fruit set. Cultivars developed for early production in temperate regions are able to also set fruit earlier–when temperatures are low, some as low as 4.4°C (40°F). On the other hand, those developed for warm climates typically will not set fruit if temperatures fall below 10°C (50°F).

Pollen grains must germinate before the ovule can be fertilized. At 25°C (77°F) germination takes about an hour; at 10°C (50°F), 5 hours; at 5°C (41°F), 21 hours. Once it germinates, the pollen tube must grow until it reaches the ovule. Growth rate increases with temperature from 10 - 35°C (50-95°F), but is reduced outside that range. The ovule may deteriorate before it is fertilized.

High daytime temperatures. The anther must dehisce (burst open) before pollen grains can be released. This process is inhibited by temperatures that are too high. Over 35°C (95°F), the surfaces of both the pollen grain and the stigma may dry out, causing poor fruit set. The pollen germination rate increases with temperatures up to a point, but is inhibited over 37°C (99°F).

A high of 40°C (104°F) seems to be a critical point. Exposure to temperatures greater than this can damage both ovules and pollen production. E.g., if the ovule has been exposed to very high temperatures nine days before flowering, it can deteriorate. Once fertilized, the endosperm of the developing seed can deteriorate over 40°C (104°F) for between 1-8 days after fertilization.

The difference between daytime highs and nighttime lows (diurnal variation). In regions and seasons where days are *long*, tomatoes are not productive unless the difference between day and night temperatures is at least 5.5 C° (10 F°). We have been told that a very high diurnal variation, as might occur in a desert or high in the mountains, can apparently overcome some of the above effects of high temperatures.

Fruits that do set at high temperatures are often so badly damaged or misshaped that they are not marketable. Red varieties may become more orange at higher temperatures. This is because synthesis of the red pigment, lycopene, is slowed at high temperature but the orange pigment, beta carotene, continues to accumulate normally.

Heat-tolerant varieties have been developed which can extend the range a bit. Recent examples are 'Solar Set' and 'Heatwave' which are supposed to give improved fruit set at temperatures around 32-35°C (low 90s F). Presumably tomatoes grown under shadecloth would be a little less damaged by heat.Heat-tolerant varieties have been developed which can

[References: *Vegetables: Characteristics, Production and Marketing* by Lincoln Peirce, Wiley & Sons, 1987; *The Tomato Crop*, Atherton and Rudich, Chapman & Hall, 1988; personal conversation with Dr. Don Maynard, Florida Gulf Coast Research and Education Center.]

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