

Varietal Differences in Pollen-Tube Growth in the Pistil of Passion Fruit (*Passiflora edulis*) under High Temperature Conditions

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Introduction :

- High temperature during anthesis (flower opening) reduces fruit set in passion fruit by affecting reproductive functions.
- Thermal response in the reproductive stage of floral organs in passion fruit is essential for successful fertilization.
- The responses of both male and female organs are evaluated by observing pollen-tube growth inside the pistil.

Objectives :

- Identify the temperature range among cultivars where pollen-tube growth in the pistil becomes inhibited.
- Compare the thermal responses during the reproductive stage of passion fruit cultivars.
- Observe pollen-tube growth anatomically in the pistil under different temperatures.

Methodology:

- Design:** 4 cultivars × 6 temperatures (25, 28, 30, 33, 35, 38 °C).
- Pollination:** Detached flowers hand-pollinated with 'SQ' inside incubator.
- Measurement:** Ovary diameter (0 h/24 h after pollination).
- Processing:** Pistils fixed (FAA), paraffin-sectioned (16 µm), stained (aniline blue).
- Observation:** Pollen-tube growth in the pistil under fluorescence microscopy.

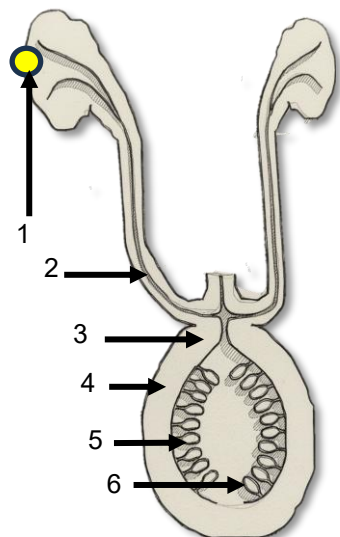


Fig 1. Fluorescence microscope observation of the pollen tube elongation in the pistil of "Summer Queen" passion fruit (Temperature 30°C). The growth of pollen-tube (pt) was shown dividing the path way into 6 portions; (1) pollen grains (pg) germinated on stigma (stg); (2) pollen tube was penetrating through the style (stl); (3) pollen tubes arriving at the upper part of ovary (ovr); 4; pollen tubes elongating along the wall at the middle part of ovary (ovw); 5a: pollen tubes elongating along the funicle (fn) toward ovule (ovl); 5b: through the micropyle (mp); 6: penetrating through the nucellus (nu) and attaining the egg apparatus (ep) in the embryo sac (es).

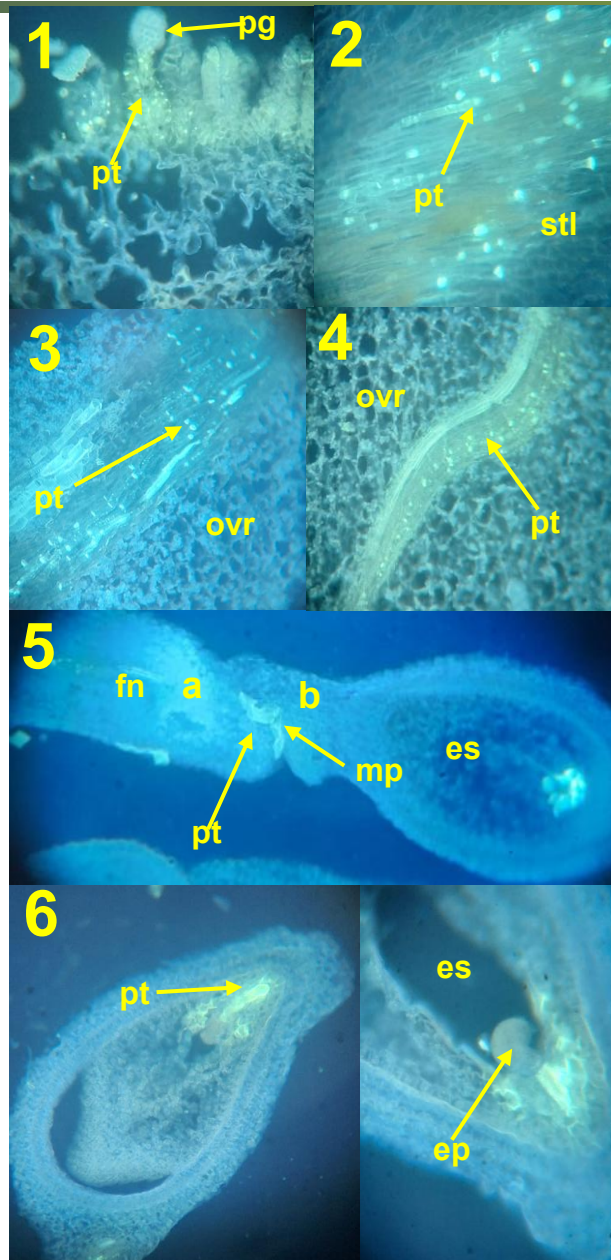


Table 1. Effect of temperature on ovary enlargement of detached flowers in four passion fruit cultivars.

Cultivar	T (°C)	ODE (mm)
Yellow passion fruit	38	0.52 i
	35	0.54 i
	33	2.11 cde
	30	1.61 defg
	28	2.14 cde
Purple passion fruit	25	1.59 efg
	38	1.24 fgh
	35	0.63 i
	33	1.99 cde
	30	0.78 hi
Summer Queen	28	1.74 def
	25	1.05 ghi
	38	2.37 bc
	35	2.38 bc
	33	3.12 a
Tai-Nung #1	30	2.79 ab
	28	3.23 a
	25	2.21 cd
	38	0.56 i
	35	1.24 fgh

Significance	
Cultivar (A)	***
Temperature (B)	***
[A] x [B] interaction	***

Mean ± SE (n = 10). A, B, and A × B significant at p < 0.001 (ANOVA). Different letters denote p < 0.05 (DMRT).