Introduction: Temperature is an important abiotic factor that profoundly affects plant architecture. Small increase in temperature, below heat stress, results thermomorphogenesis, which is characterized by hypocotyl and petiole elongation, reduced leaf area and early flowering in Arabidopsis. The high ambient temperature signaling and response is not studied much in crop plants. Understanding the genetic basis of higher ambient temperature signaling is essential for sustainable crop production under increasing global temperature.

Morphological and architectural changes induced by high ambient temperature

Temperature mediated hypocotyl elongation in Arabidopsis involve PIF4 and auxin signaling

Seedling Phenotype

Adult Phenotype (14 days old)

Features to be studied:
- Cotyledonary and leaf area
- Leaf length
- Hypocotyl, petiole and stem length

Higher Ambient Temperature: Impact on Plant Development and Growth

Seedling Phenotype

Arabidopsis

Solanum lycopersicum

cv. Pusa ruby Phenotyping

Seedling Phenotype (4 days old)
Representative pictures of four day old *Solanum lycopersicum* cv. Pusa ruby grown at different temperatures

- Higher ambient temperature suppresses cotyledonary area of tomato seedling.
- Tomato hypocotyl show reduction in response to higher ambient temperature.
- High ambient temperature drastically effect tomato root length.

Higher ambient temperature show strong negative impact on leaf area, leaf length and petiole length as these traits are reduced significantly with increase in temperature.
**PIF Family of Transcription Factors: Candidate for Higher Ambient Temperature Signaling**

- Most of SlPIFs are highly expressed in mature leaves and stem.
- Since leaves are prime organ perceiving and stem is responsive to environmental signals, SlPIFs are likely involved in higher ambient temperature signaling in tomato.

**Summary:**
- Higher ambient temperature suppresses tomato growth at both seedling and adult stage.
- SlPIFs highly express in mature leaves and stem indicating their role in temperature mediated signaling.
- Overexpression lines of SlPIF4/5 show hypocotyl elongation and reduction in cotyledon length under higher ambient temperature.

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