Effect of Climate Change on Crop Wild Relatives in Sri Lanka

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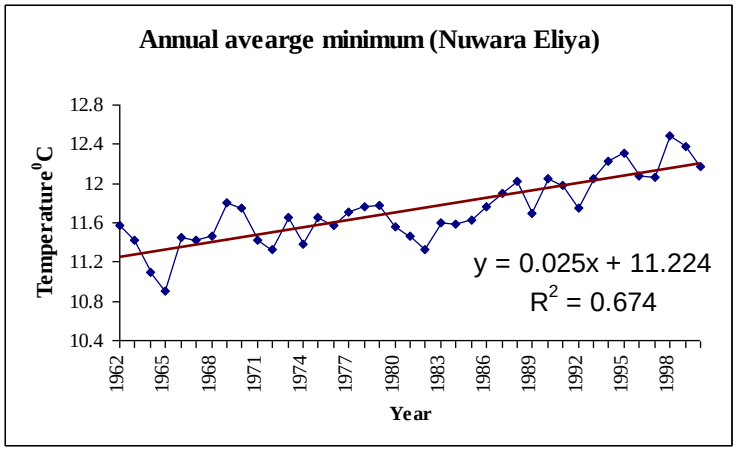
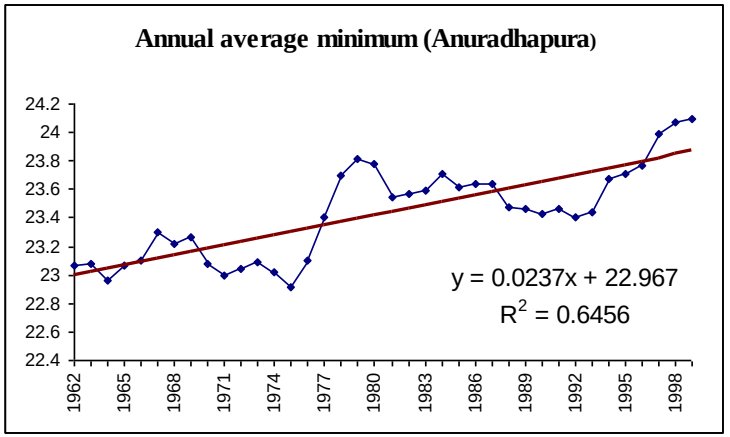
Is Sri Lanka vulnerable for CC ?

- Yes !!
  - Ambient temperature is increasing (0.01 -0.03 0C/year)
  - Rainfall variability is increasing
    - More dry spells
    - More above normal rains
      - Unusual times





Methodology in brief

- Comprehensive literature survey to identify the threshold temperature ranges of each CWR – All are C_3 crops
- Temperature projections
  - Using A2 scenario
    - statistical down scaling
  - Using A2 & B2 scenarioes
    - Dynamic down scaling
- Evaluation of temperature regime on which CWRs find their habitat
  - In 3 climatic zones of the island

Climatic zones of Sri Lanka

Average temperature

Dry zone → 28 ^{0}C

Intermediate zone → 24 - 26 ^{0}C

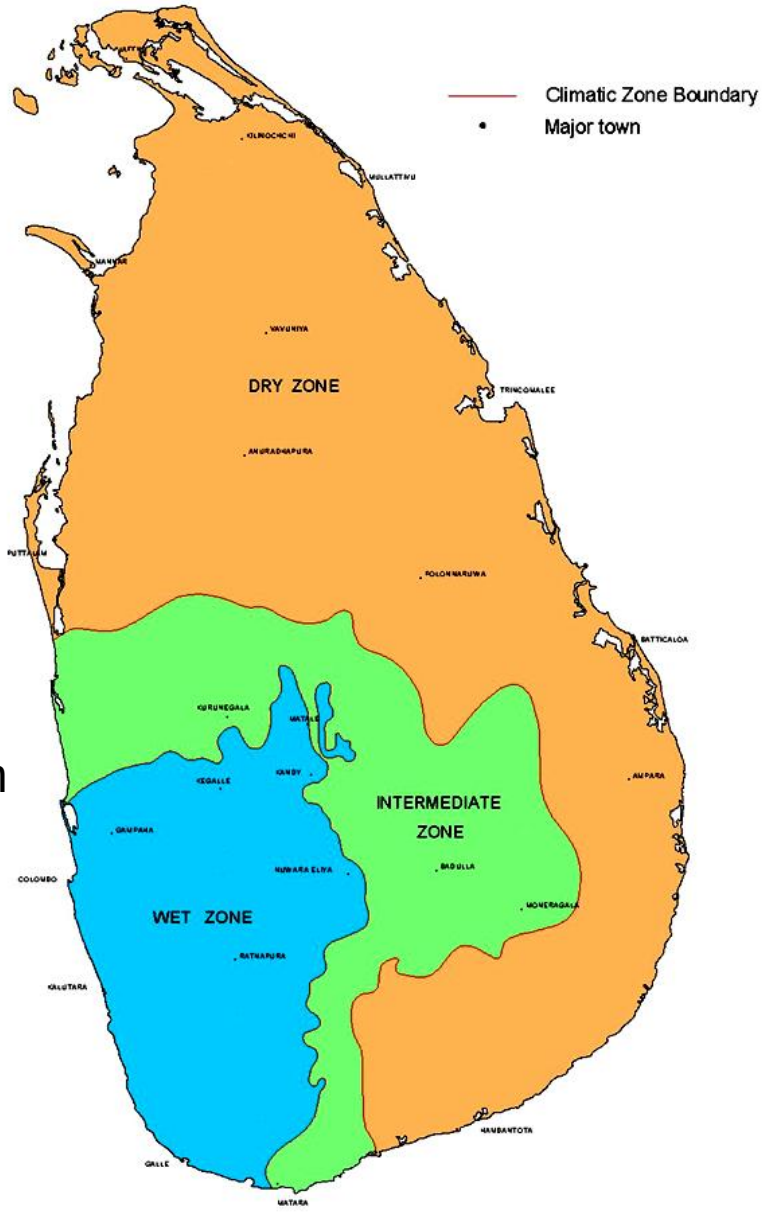
Wet zone → 24 ^{0}C

Average Rainfall

Dry zone → < 1,750 mm

Intermediate zone → 1,750-2,500 mm

Wet zone → > 2,500 mm



Threshold temperature regimes of CWRs – As per the Literature survey

- Oryza spp. 30 – 33 ^{0}C
- Cinnamomum spp. 25 – 30 ^{0}C
- Piper spp. 25 – 30 ^{0}C
- Vigna spp. 30 – 35 ^{0}C
- Musa spp. 25 – 30 ^{0}C

Baseline situation during FIM (March – April)

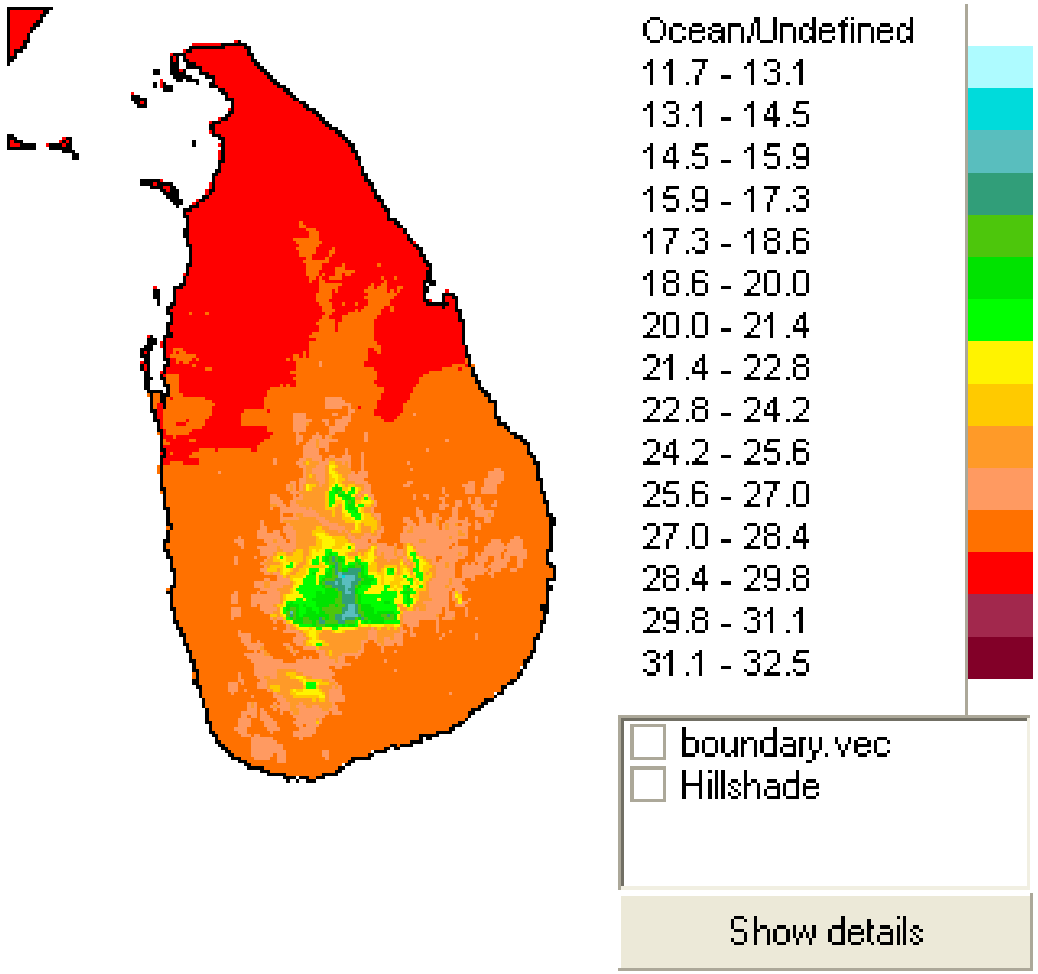
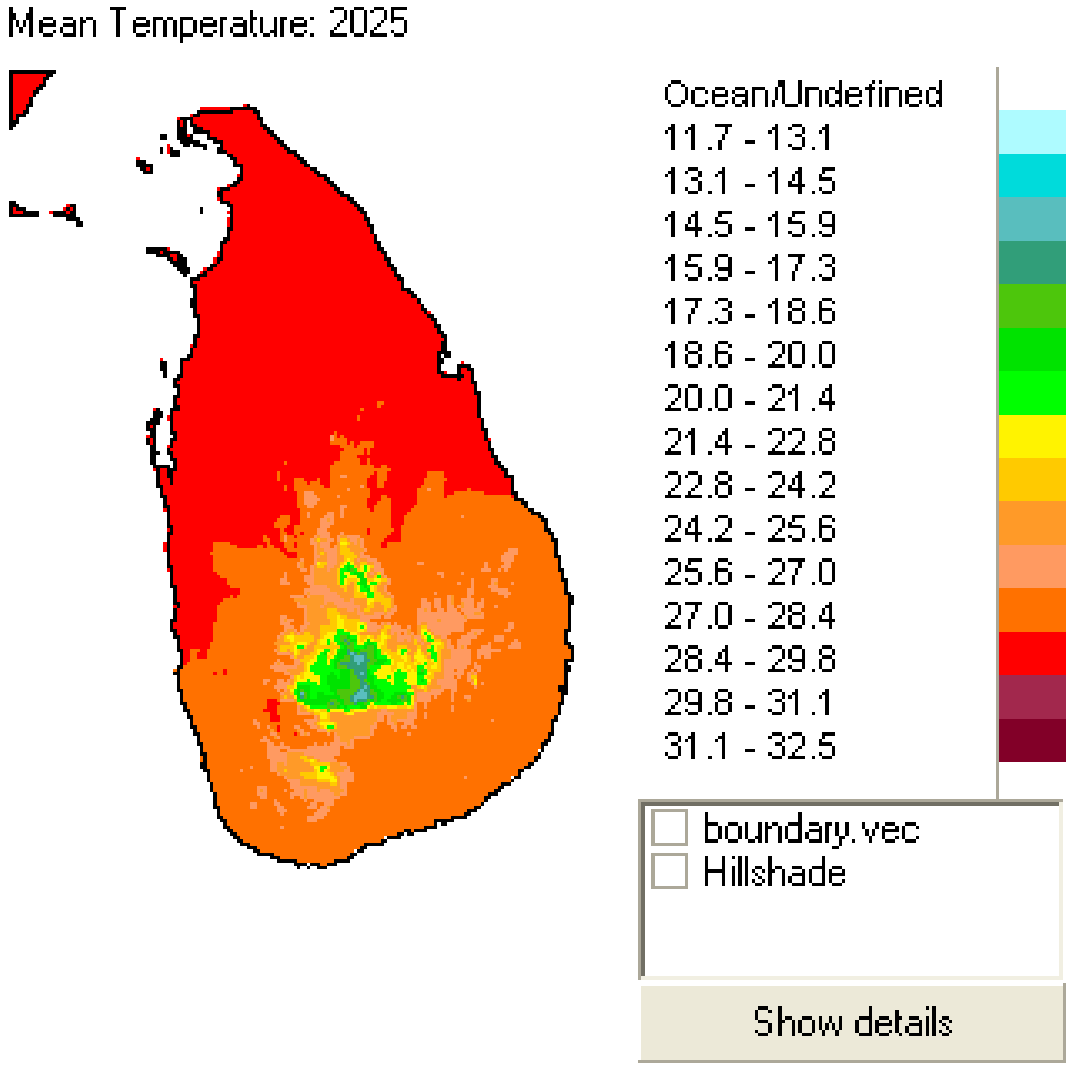


Image generated using SimCLIM

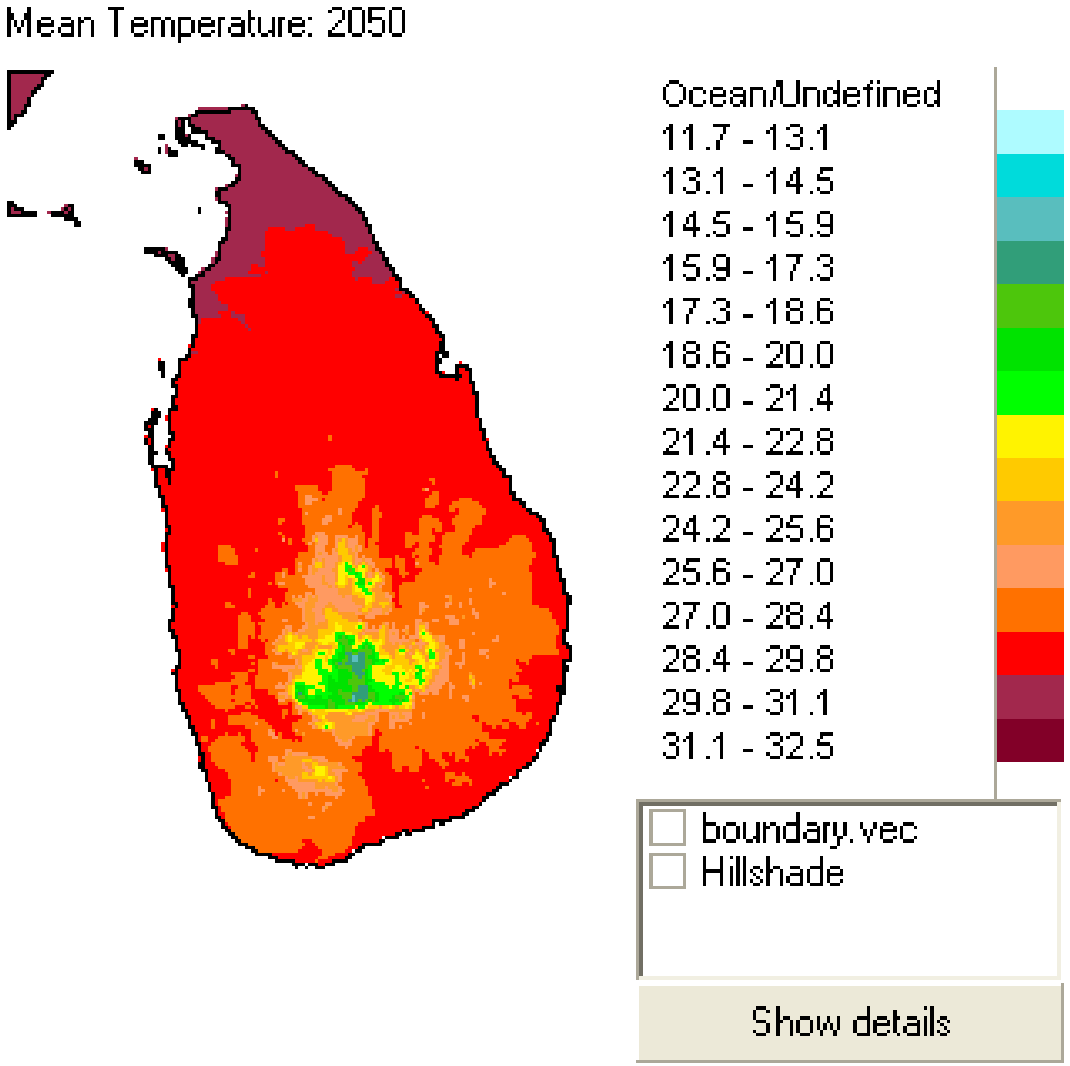
Projected mean temperature regime during FIM (March – April)

2025



Projected mean temperature regime during FIM (March – April)

2050



Projected mean temperature regime during FIM (March – April)

2100

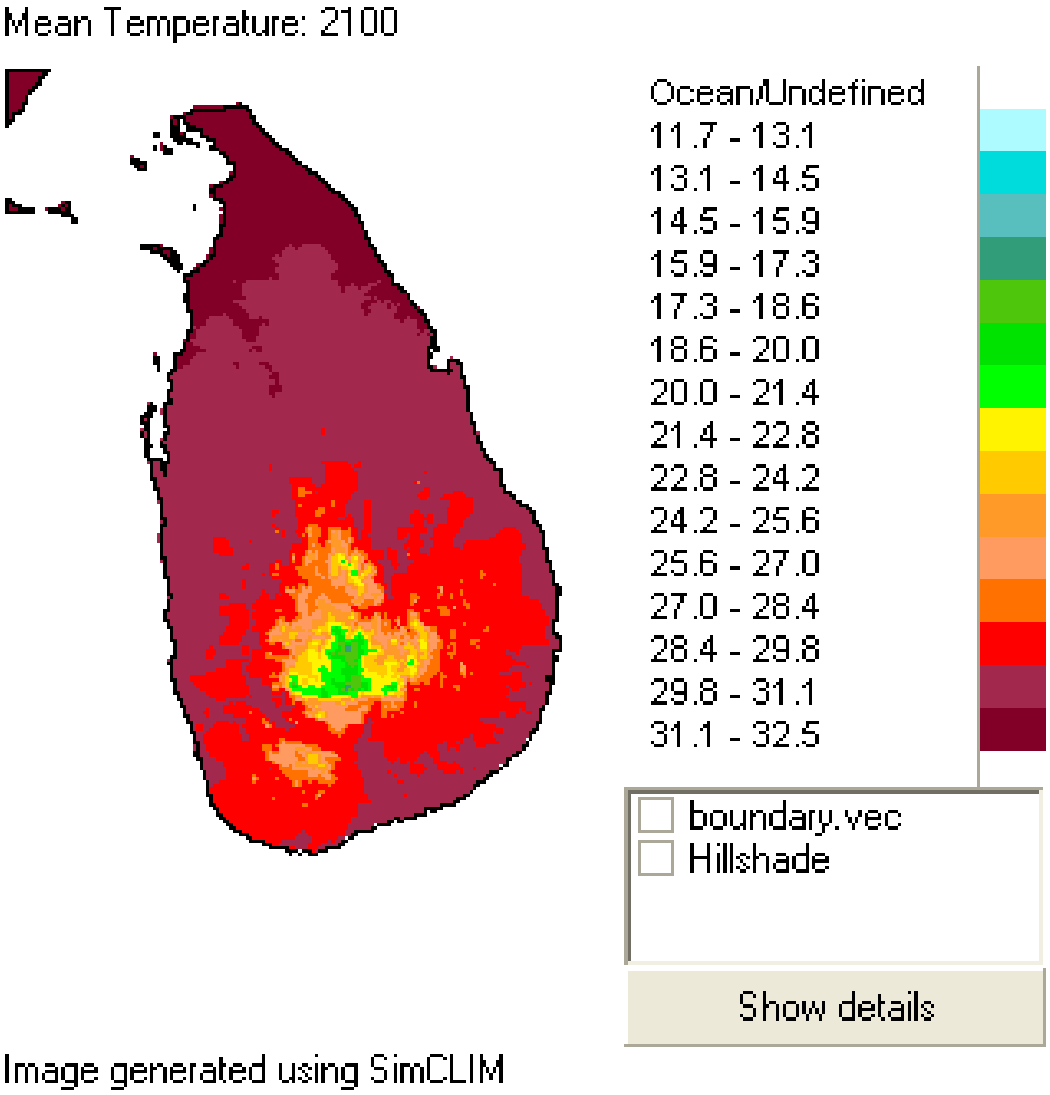
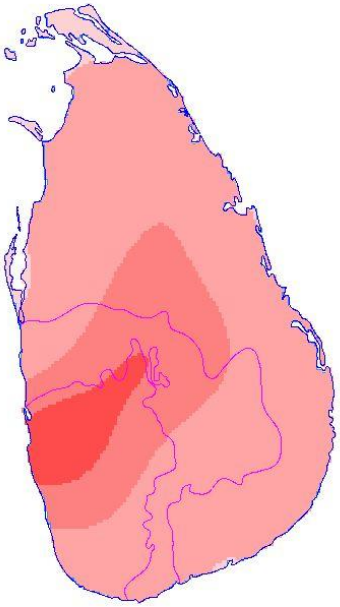


Table 2. Predicted temperature increase in Sri Lanka using ECHAM/RCM model under B2 scenario

	2020	2050	2080
Dry zone	0.9 - 1.2 ^{0}C	1.7 - 2.2 ^{0}C	2.4 -3.1 ^{0}C
Intermediate zone	0.9 - 1.2 ^{0}C	1.7 - 2.4 ^{0}C	2.4 -3.1 ^{0}C
Wet zone	0.9 - 1.3 ^{0}C	1.7 - 2.4 ^{0}C	2.4 - 3.1 ^{0}C

TEMPARATURE VARIATION ECHAM-B2

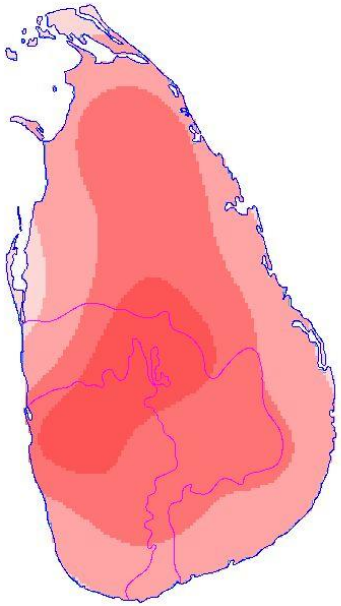
2020



T (°C)

- 0.7 - 0.8
- 0.9 - 1.0
- 1.1 - 1.2
- 1.21 - 1.3

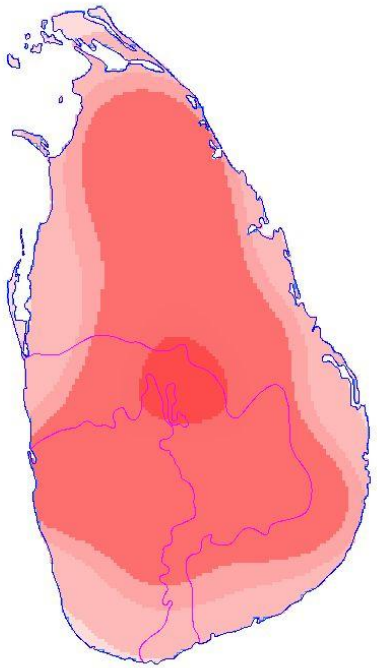
2050



T (°C)

- 1.4 - 1.6
- 1.7 - 1.9
- 2.0 - 2.2
- 2.3 - 2.4

2080



T (°C)

- 2 - 2.3
- 2.4 - 2.7
- 2.8 - 3.1
- 3.2 - 3.5

Current Temperature regime of CWRs and projected situation in different climatic zones of Sri Lanka

Species	Optimum T range	2.4 -3.1 ^{0}C	2.4-3.1 ^{0}C	2.4-3.1 ^{0}C	2080 ← Projected Temperature increase by
		DZ	IZ	WZ	
Oryza spp.	30-33 ^{0}C	30-34 ^{0}C	31-33 ^{0}C	28-30 ^{0}C	← Operational T
Cinn. spp.	25-30 ^{0}C	N/A	N/A	24-26 ^{0}C	← Operational T
Piper spp.	25-30 ^{0}C	30-32 ^{0}C	26-31 ^{0}C	24-27 ^{0}C	← Operational T
Vigna spp.	30-35 ^{0}C	30-35 ^{0}C	30-32 ^{0}C	24-28 ^{0}C	← Operational T
Musa spp.	25-30 ^{0}C	N/A	24-28 ^{0}C	24-26 ^{0}C	← Operational T

Conclusions

- At present, all CWRs survive at the upper margin of the optimum temperature range for their growth;

- By 2080, ambient temperature is likely to exceed the optimum T range of each CWR;

- Vulnerability to extinction of them may increase due to increase in ambient temperature due to climate change.
    - CWRs in the Dry zone are highly vulnerable
        - Oryza Spp., Vigna Spp., Piper Spp.

Contd..

- Think beyond the dichotomy of Mitigation and Adaptation to Climate Change
    - In-situ or Ex-situ conservation !!!


Thank you.