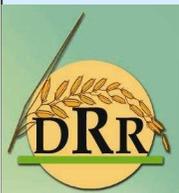


Identifying vulnerable temperature zones for rice crop

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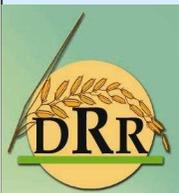
Introduction

Rice is the most important food crop and livelihood for millions in the country.

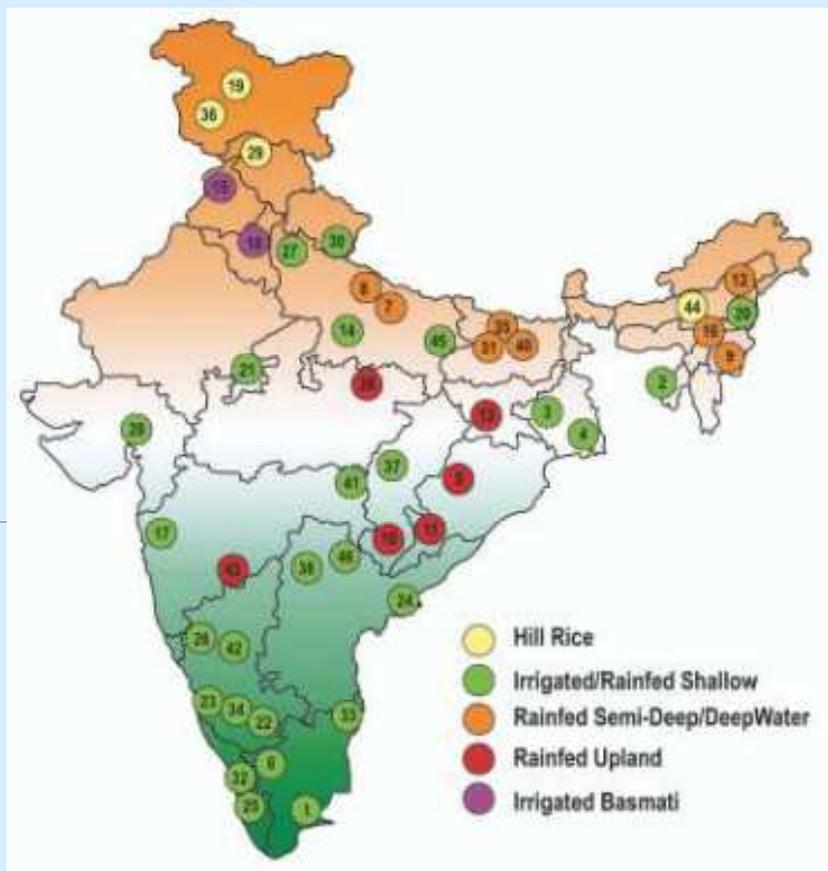
It is widely cultivated in diverse agro ecological zones

Managing this variability is a major challenge for further increasing the productivity of intensive rice cropping systems.

One of our objectives is to coordinate multi-location testing at national level to identify appropriate varietal and management technologies.



AICRIP

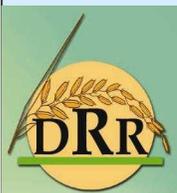


All India Coordinated Rice Improvement Program (AICRIP) is largest research network on rice crop comprising 47 funded centers spread across all over the country.

Every year multi locational trials are conducted from different disciplines to evaluate genotypes, crop production and protection technologies.

Under NICRA project work is going on identifying genotypes tolerant to high temperatures.

Objective : To Identify AICRIP Centres vulnerable to high and low temperatures

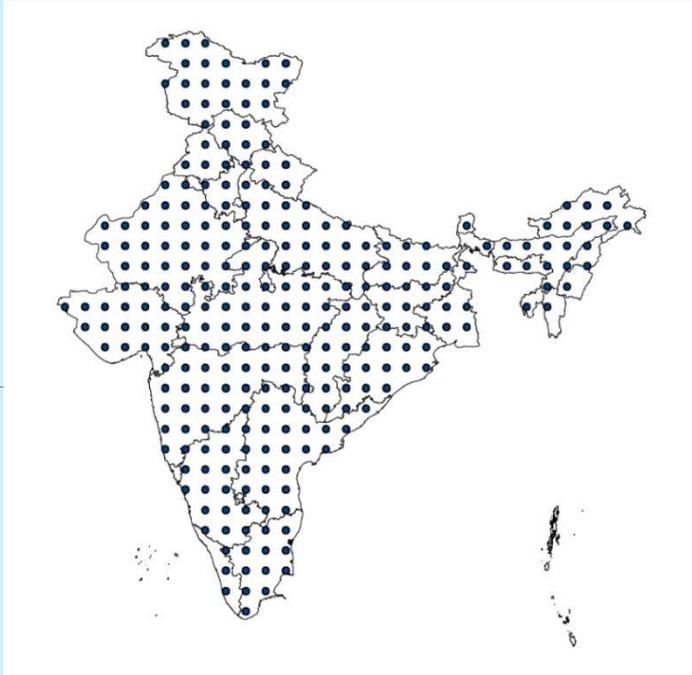


AICRIP map

- Coordinates (Longitude, Latitude) of AICRIP centers were collected
- These points were converted to Geo database using ARCCatalog.
- AICRIP centers map was generated using this database.



Climate data



- Grid wise Temperature data was collected from IMD for the period 1995-2005
- Year wise individual text files were supplied for each parameter
- Flowering period is very important stage for rice crop
- Temperatures during February and March months (Rabi season) were analysed



Methodology

A software program was developed to convert these individual text files into one single database

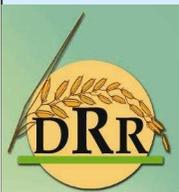
Climate data interface

Enter the path of IMD files: Select weather parameter:

Starting Year: Ending Year:

- Max. temp
- Min. temp
- Mean Temp
- RH1
- RH2
- Rainfall
- Windspeed

Field1	i_lat	i_long	i_month	i_week	Max temp	Min temp
1	8.5	76.5	2	1	31.17	21.86
1	8.5	76.5	2	2	31.64	21.78
1	8.5	76.5	2	3	31.86	22.21
1	8.5	76.5	2	4	32.09	22.23
1	8.5	76.5	3	1	32.29	22.32
1	8.5	76.5	3	2	32.65	23.00
1	8.5	76.5	3	3	32.84	23.39
1	8.5	76.5	3	4	33.05	23.92



Climate data

- Day and night temperatures were calculated by the equation for hourly temperature used in Oryza model (Bouman *et al.*, 2001)

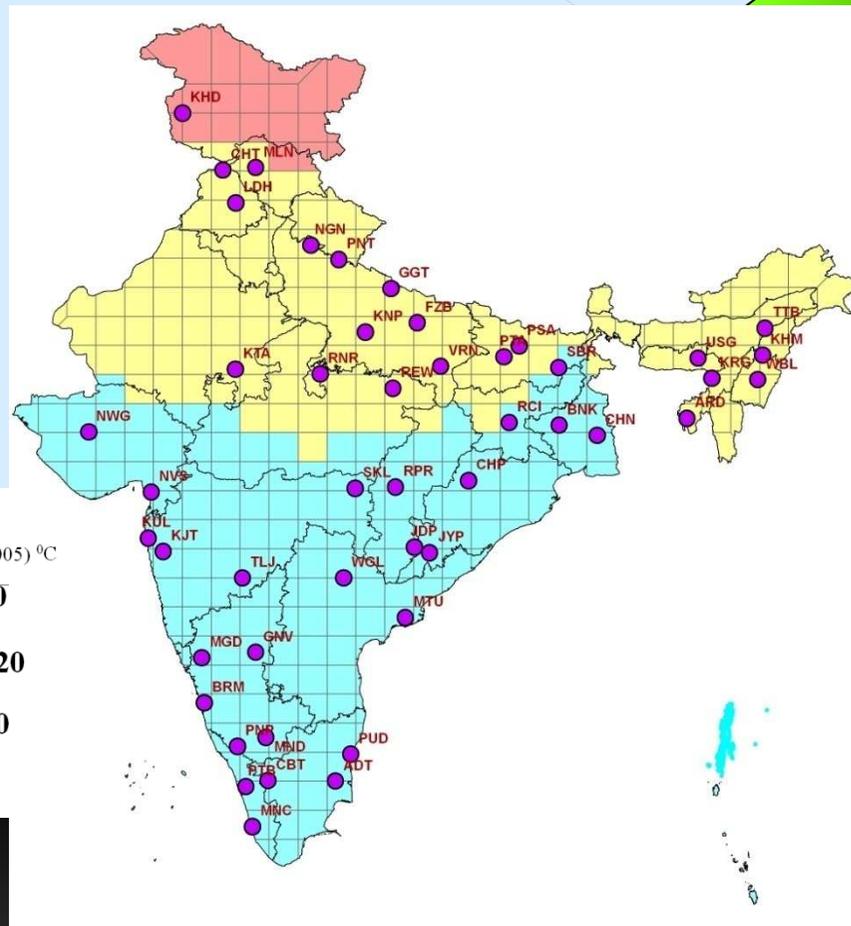
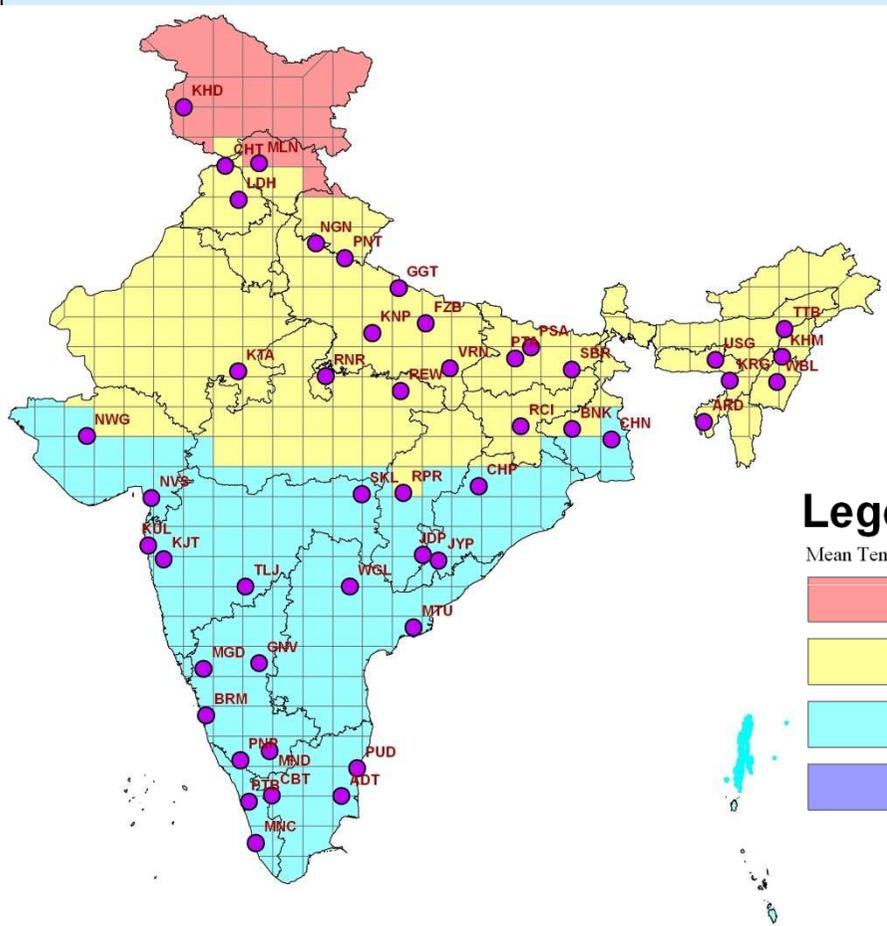
$$\text{Hourly temperature (T}_d\text{)} = (\text{T}_{\text{min}} + \text{T}_{\text{max}}) / 2 + (\text{T}_{\text{max}} - \text{T}_{\text{min}}) * \cos (0.2618 * (\text{h} - 14)) / 2$$

T_{min}, T_{max} are minimum and maximum temperatures and h is time of day

- Difference in day and night temperatures were calculated
- Weekly maps were generated for mean temperature and difference in day and night temperature
- Thiessen polygons were generated for Grid data and overlaid with AICRIP centers



Rabi season-Mean Temp.



Legend

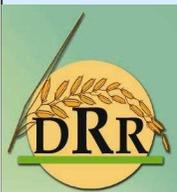
Mean Temp (1995-2005) °C

- <= 10
- 10 - 20
- 20-30
- >30

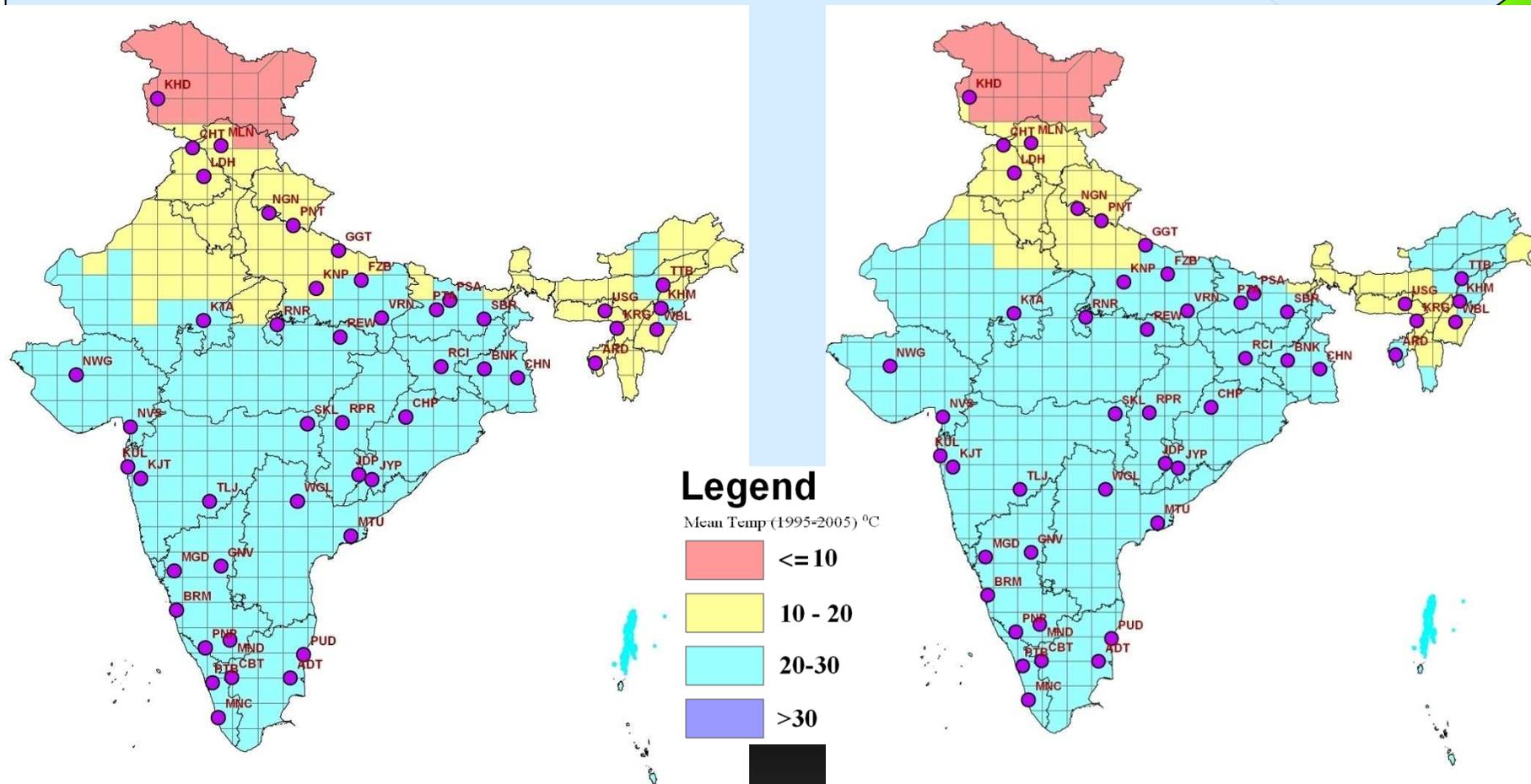
Feb 1st Week

Feb 1st week- Khudwani , Chata and Malan are vulnerable to low mean temperature (<10⁰ C)
 Feb 2nd week : Khudwani and Malan only are only falling into these low temperature <10⁰ C)

Feb 2nd Week



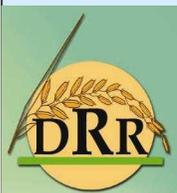
Rabi season-Mean Temp.



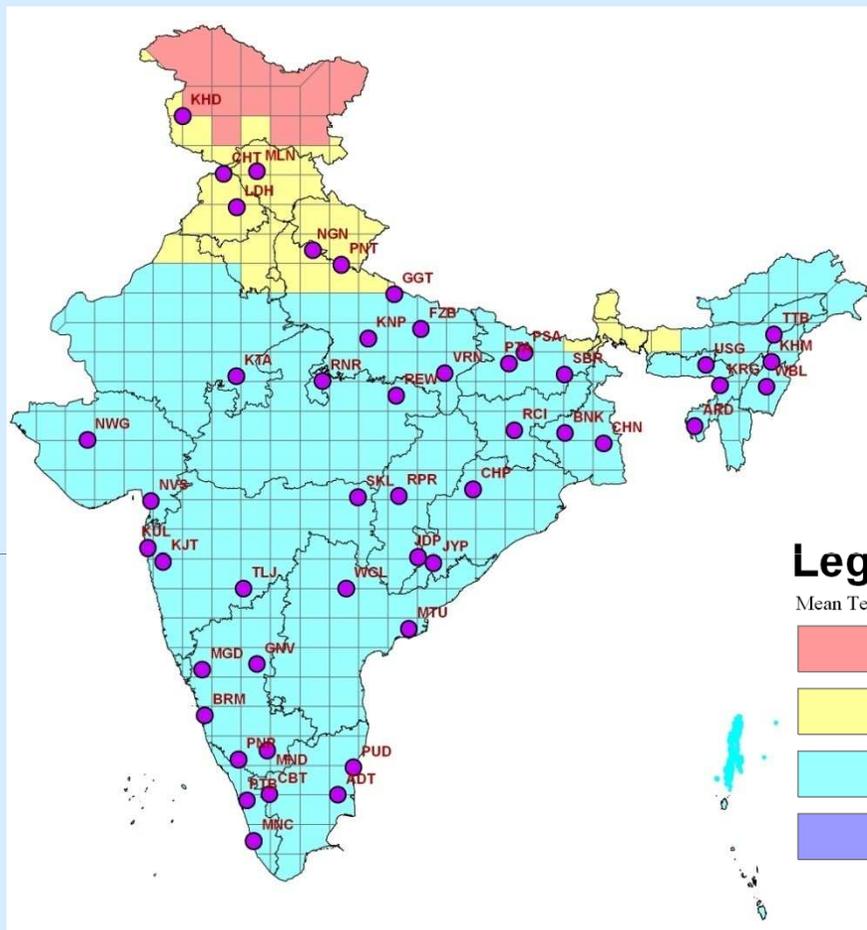
Feb 3rd Week

Feb 4th Week

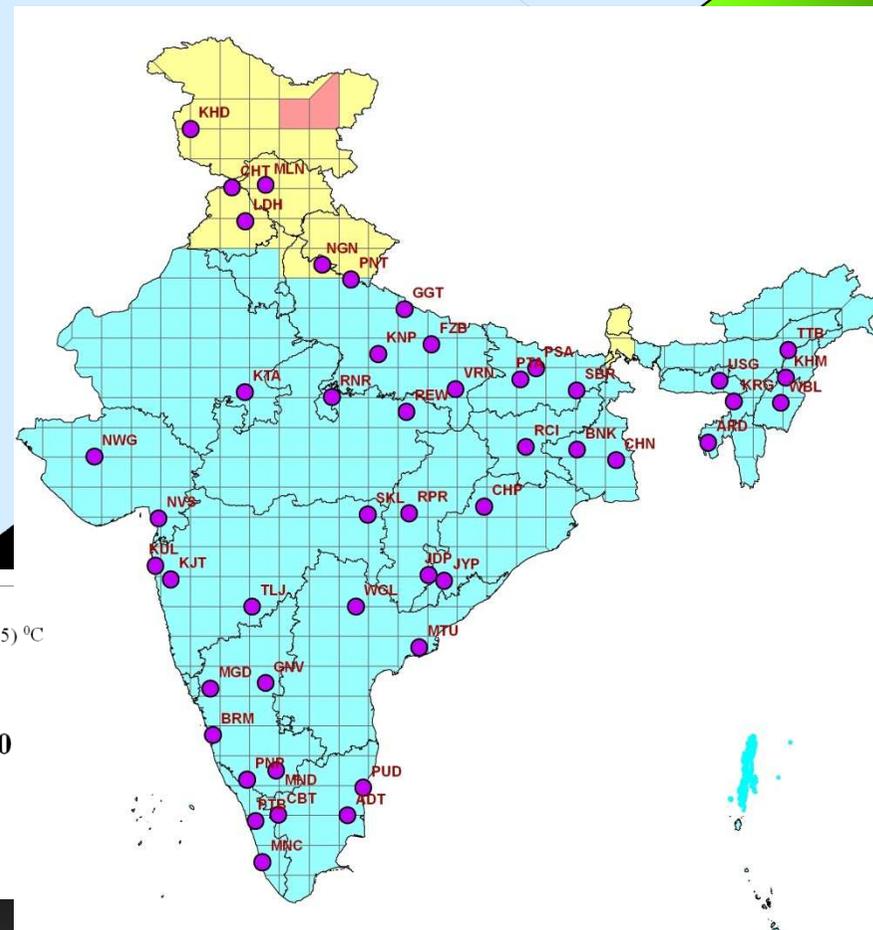
Feb 3rd week- Khudwani and Malan are vulnerable to low mean temperature (<10⁰ C)
 Feb 4th week : Khudwani only falling into these low temperature <10⁰C)



Rabi season-Mean Temp.



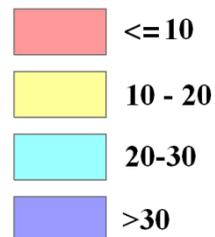
Mar 1st Week



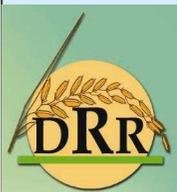
Mar 2nd Week

Legend

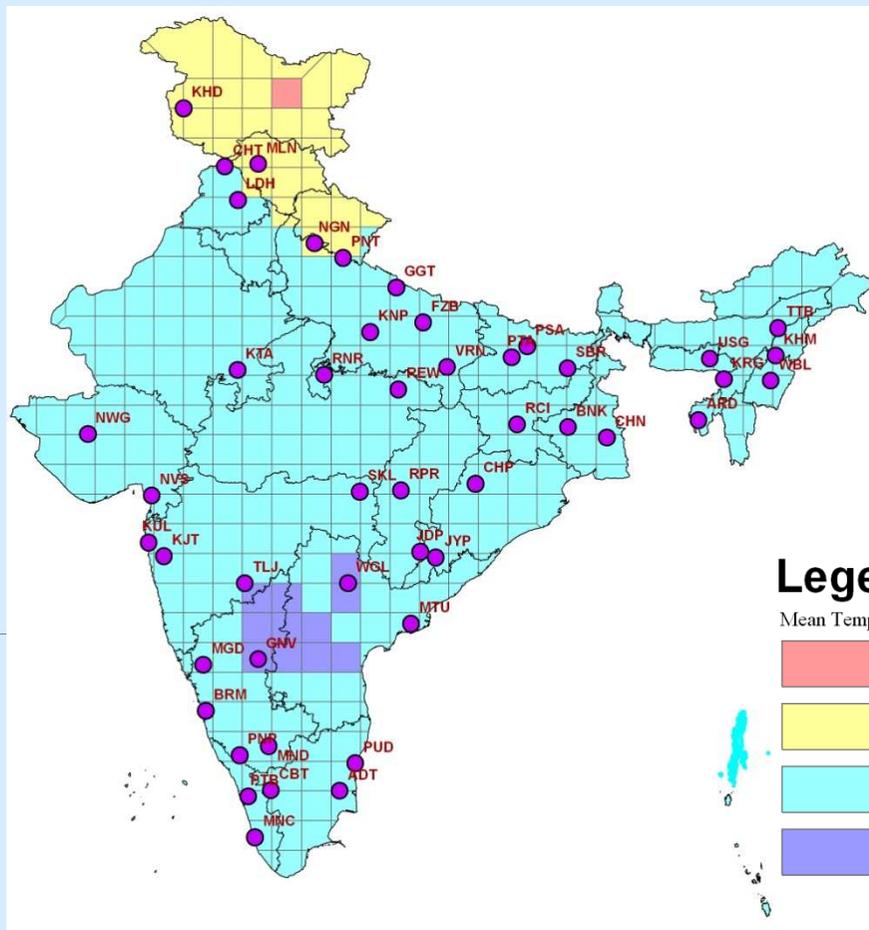
Mean Temp (1995-2005) °C



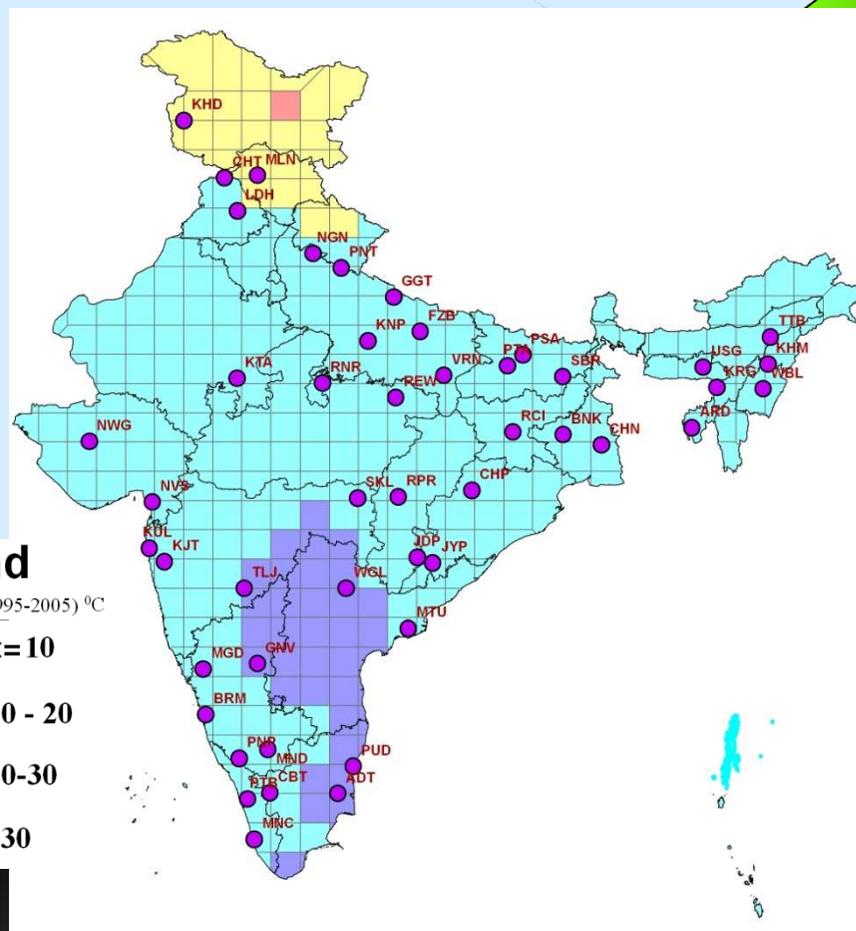
Mar 1st week- Khudwani center only vulnerable to low mean temperature (<10°C)



Rabi season-Mean Temp.

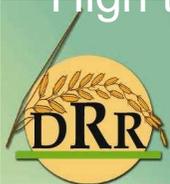


Mar 3rd Week

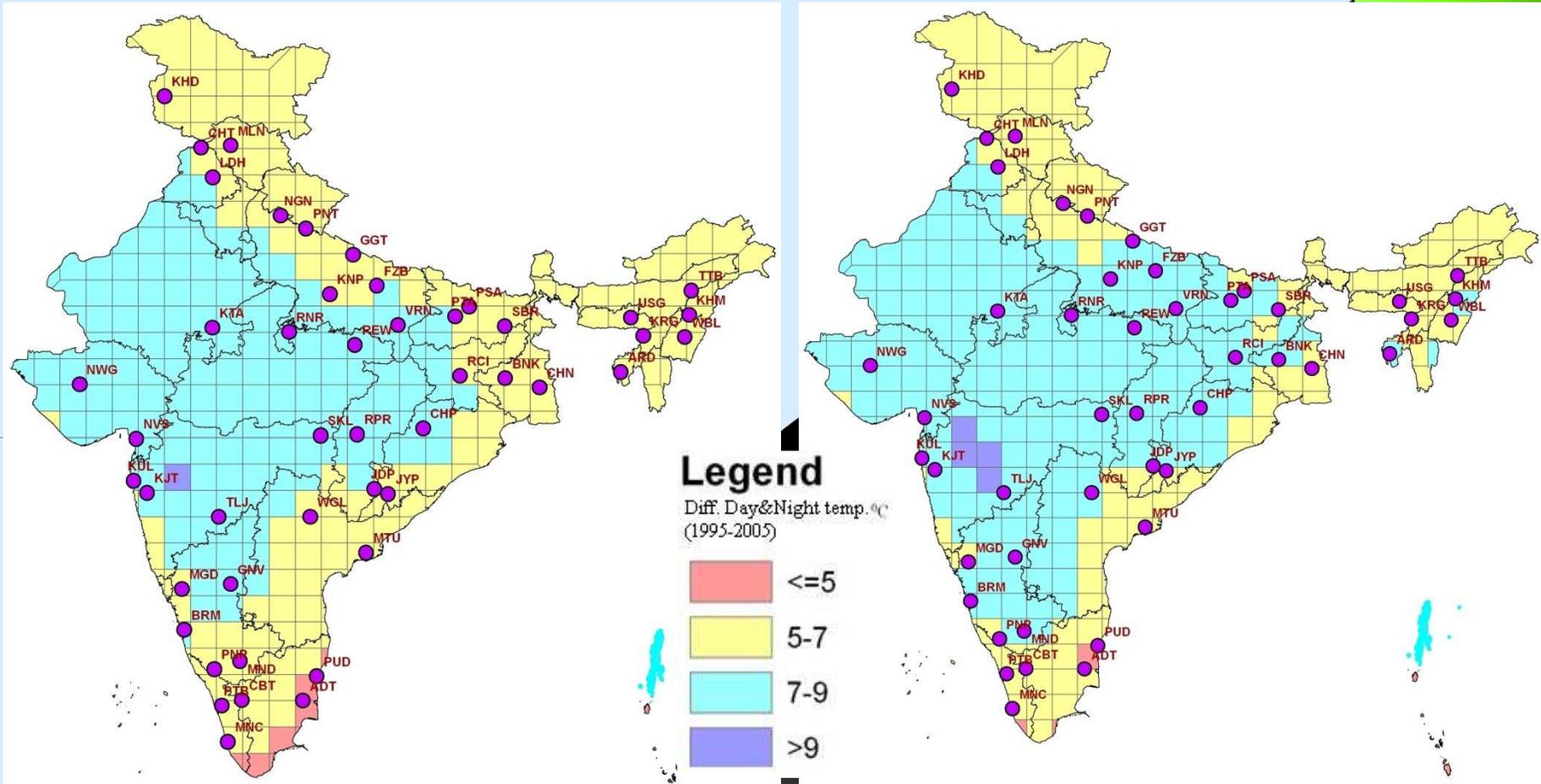


Mar 4th Week

Warangal and Gangavati are vulnerable to High mean temperature (>30) during 3rd and 4th weeks of March and Tuljapur, Puducherry and Aduthurai Centers are vulnerable to High temperature during 4th week of March

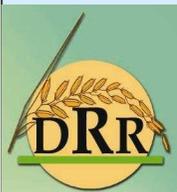


Rabi season-Difference in day and Night Temperatures

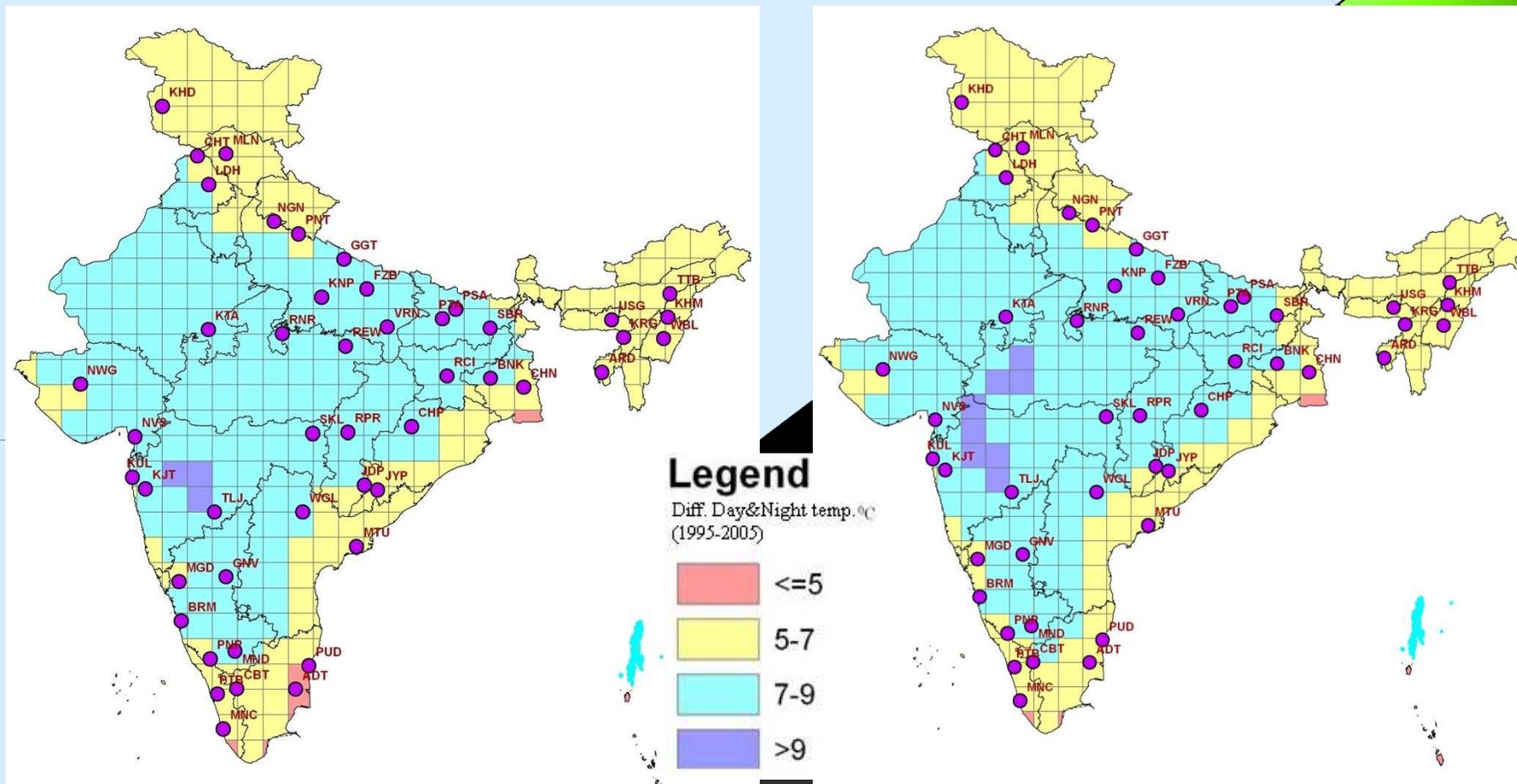


Feb 1st Week

Feb 2nd Week

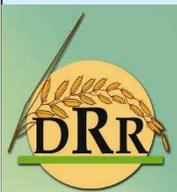


Rabi season-Difference in day and Night Temperatures

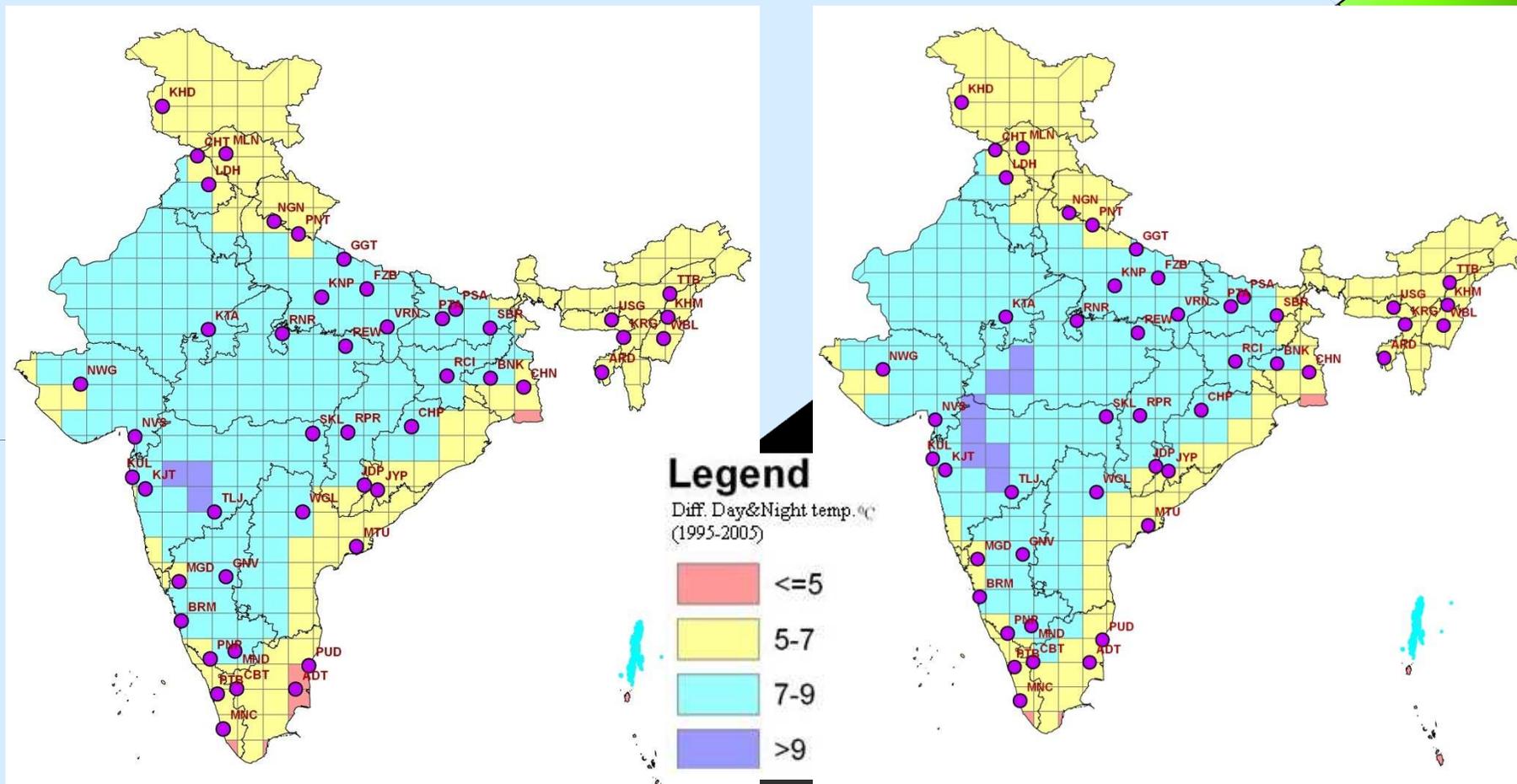


Feb 3rd Week

Feb 4th Week

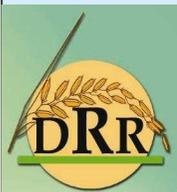


Rabi season-Difference in day and Night Temperatures

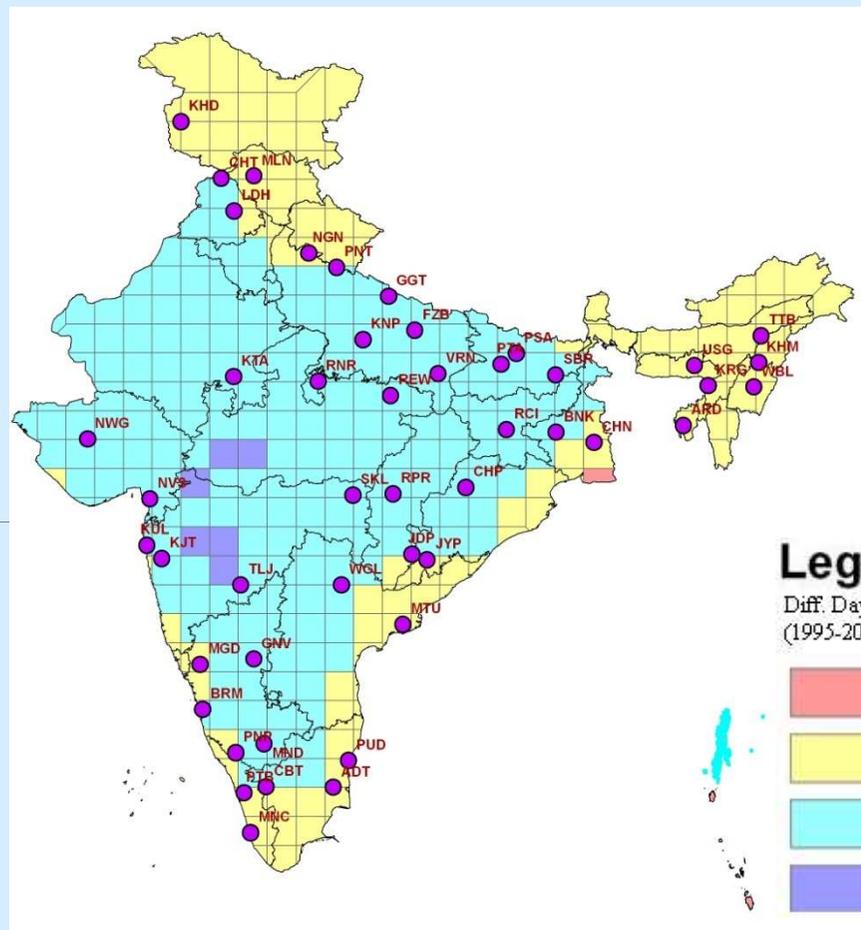


Feb 3rd Week

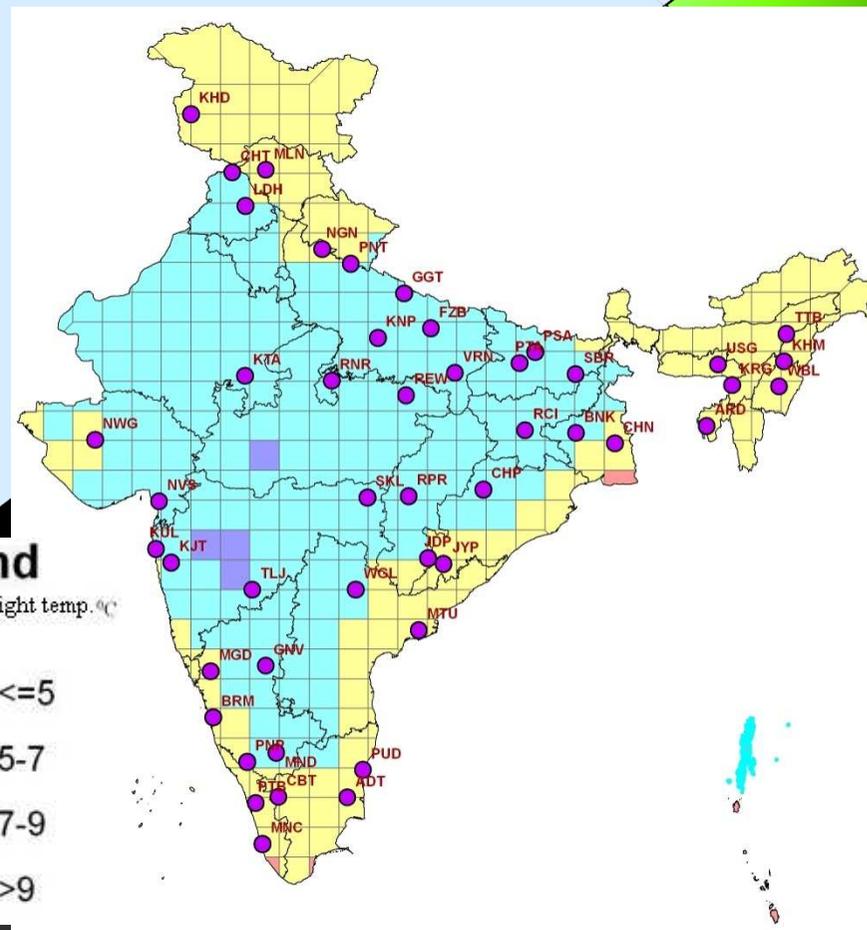
Feb 4th Week



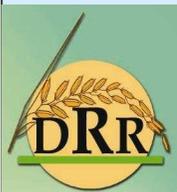
Rabi season-Difference in day and Night Temperatures



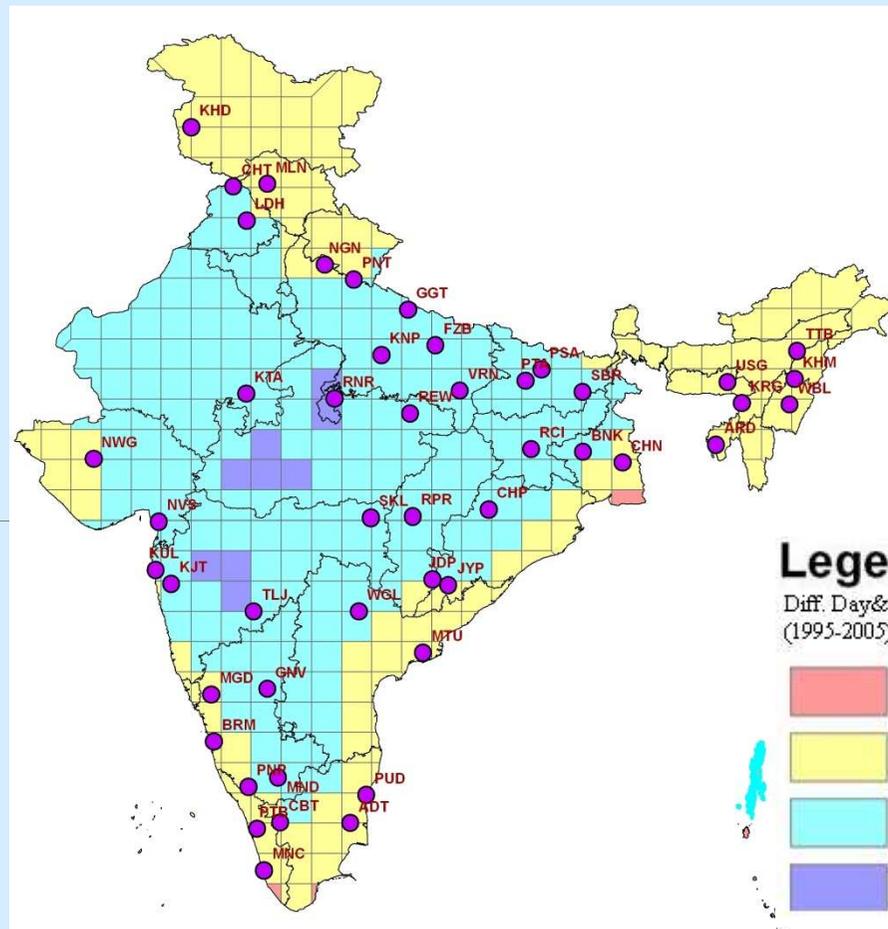
Mar 1st Week



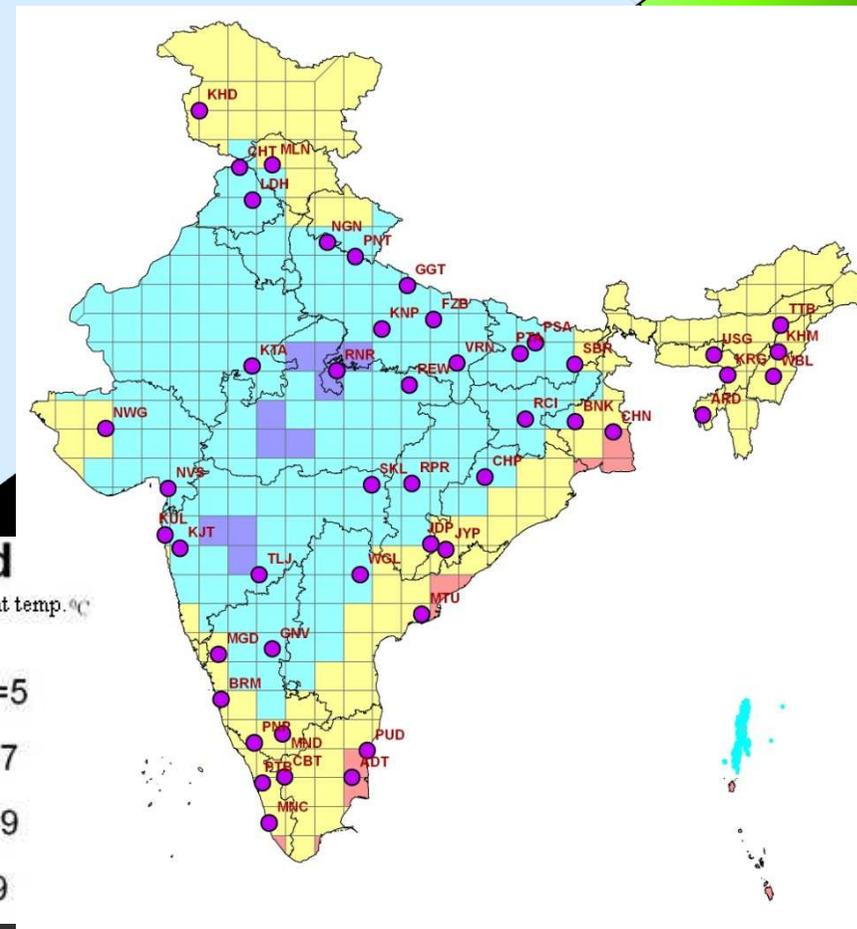
Mar 2nd Week



Rabi season-Difference in day and Night Temperatures



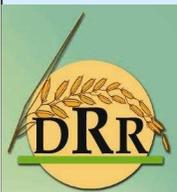
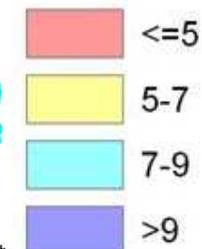
Mar 3rd Week



Mar 4th Week

Legend

Diff. Day&Night temp. (°C)
(1995-2005)

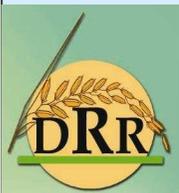


Conclusion

These results are useful for recommending the suitable rice genotypes and crop management practices

These maps have been already used in identifying the suitable locations for seed production

Further, planning to analyze 30 years climate data and develop model to predict the high and low temperature zones in India



Thank You All

