



# RECENT TRENDS IN CLIMATE AND IMPACT OF CLIMATE CHANGE ON FOOD SECURITY OF NORTH WEST INDIA

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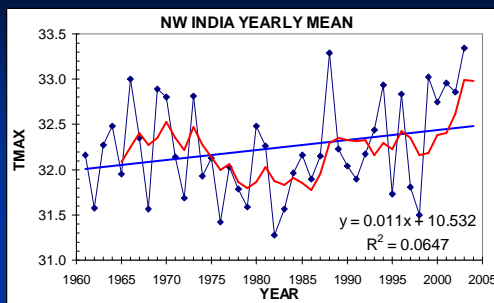
29 NOVEMBER 2006, VIGYAN BHAWAN

## MOTIVATION



- ❖ **North West India is the food bowl of the country**
- ❖ **Dominated by Rice-Wheat Cropping System**
- ❖ **Region is witnessing degradation**
- ❖ **Climate Change and variability may be partly responsible**
- ❖ **Needs to quantify the impact of climate change on crop yields in the region**

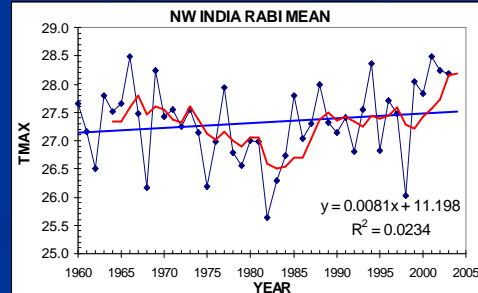
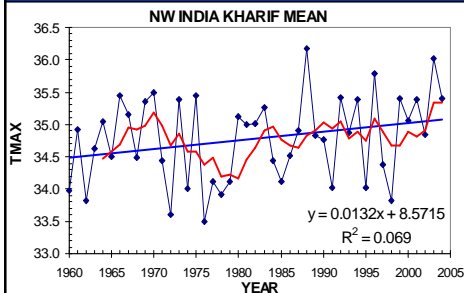
- Trends in Tmax, Tmin & RF in NW India
- Development of Yield Sensitivity Models
- Impact of Climate Change on Crop Yields



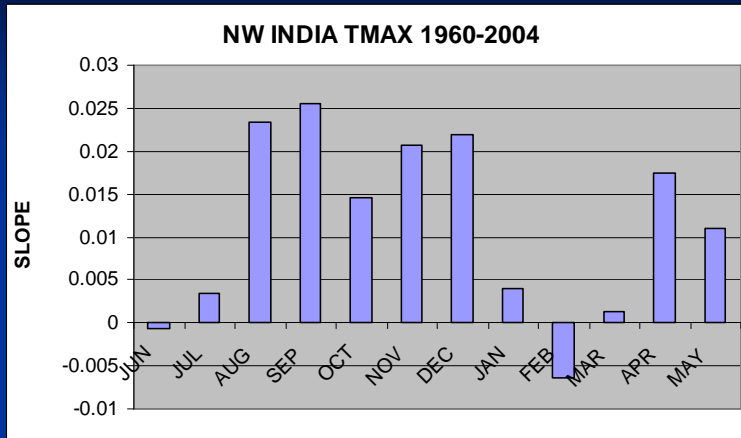
1.1 / 100yr

1.32 / 100yr

0.81 / 100yr

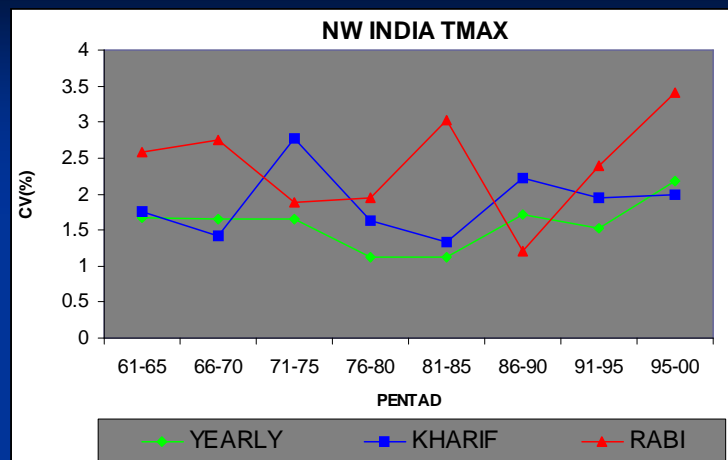


## TRENDS IN TMAX ACROSS MONTHS



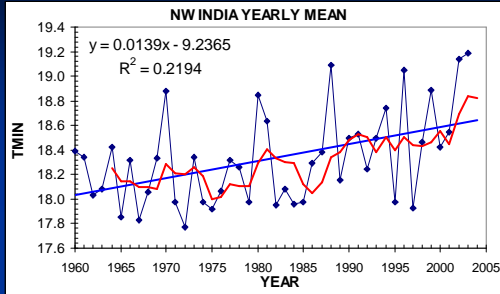
- Rate of increase is highest during August, September, November & December
- February is showing a decreasing trend
- No trend during July, January and March

## TMAX VARIABILITY (CV%)



- Tmax is becoming more variable as CV is continuously increasing
- The variability of rabi Tmax is much higher than during kharif
- The rate of increase in Tmax variability much higher in Rabi season

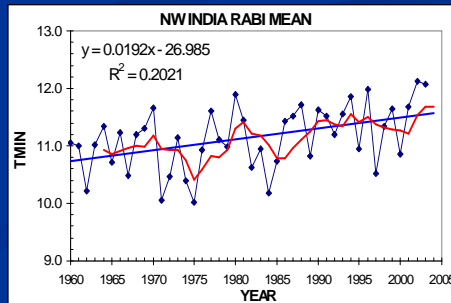
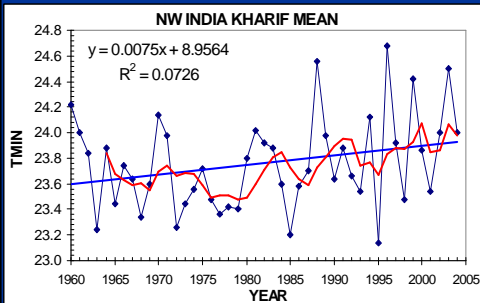
# TRENDS IN NORTH WEST INDIA TMIN



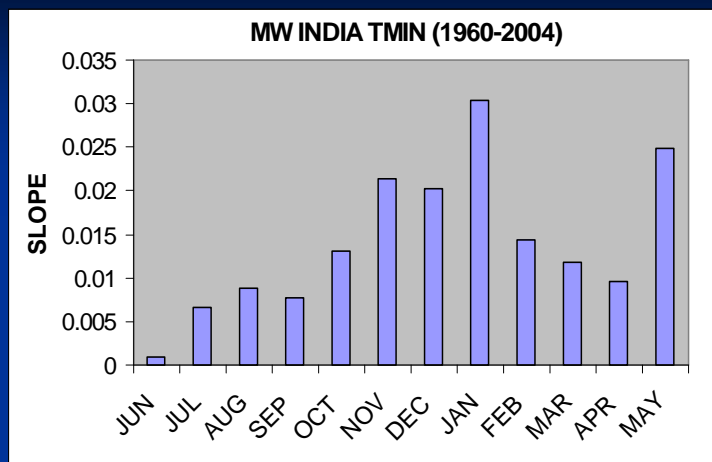
1.39 / 100yr

0.73 / 100yr

1.92 / 100yr

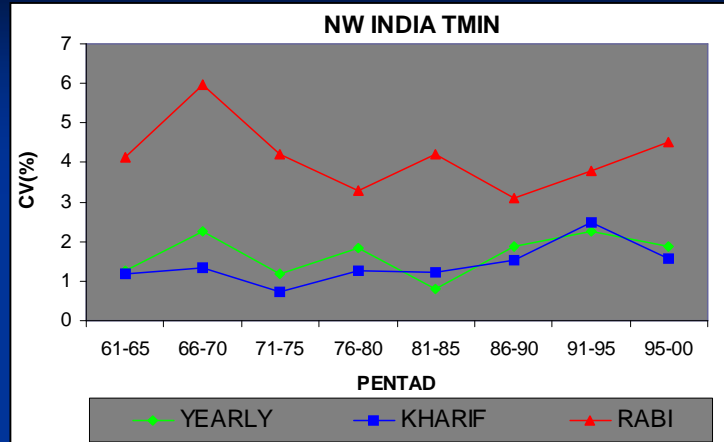


# TRENDS IN TMIN ACROSS MONTHS



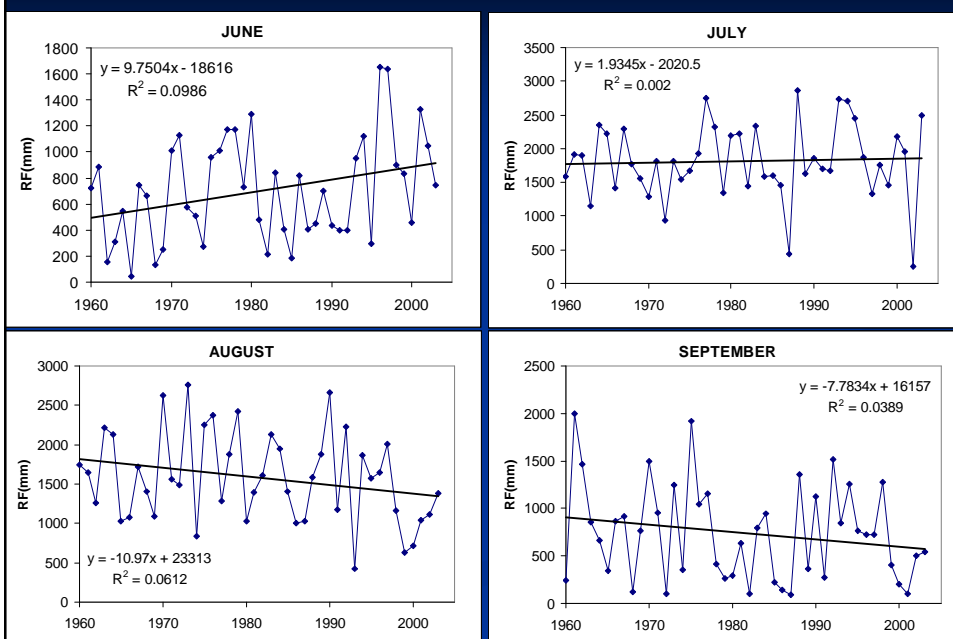
- Tmin is showing increasing trend across months
- Highest rate during January, followed by November and December
- Tmin increase is moderate during February and March

## TMIN VARIABILITY (CV%)



- Tmin variability is nearly double in Rabi than that of Kharif
- Tmin variability is increasing during Kharif and Annual time scales
- Tmin variability is showing a significant decreasing trend during Rabi

## TRENDS IN MONTHLY RAINFALL NW INDIA

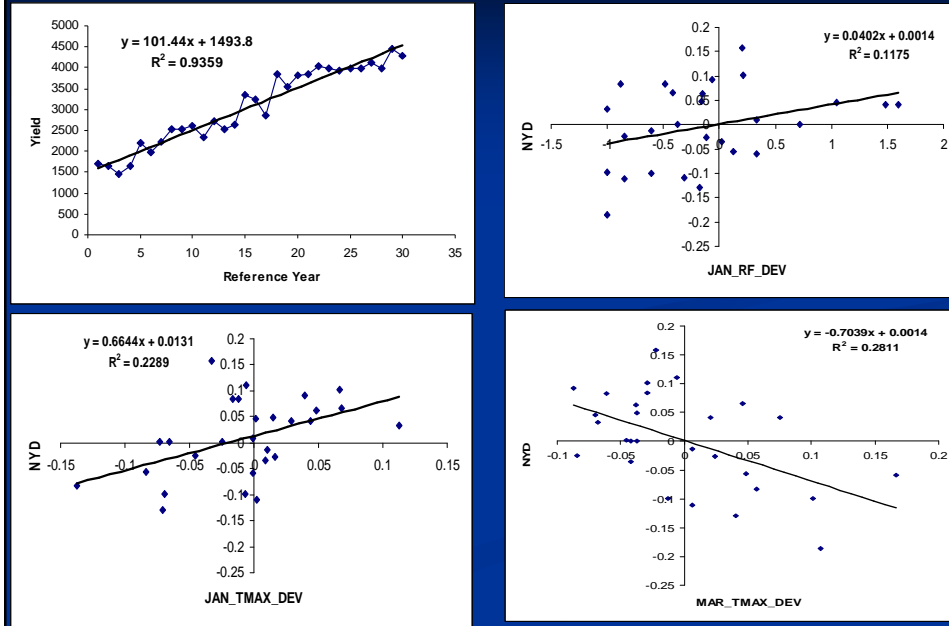


# MODELLING YIELD SENSITIVITY AND CLIMATE CHANGE IMPACT

## STUDY AREA AND CROPS

DISTRICT	CROPS	DATA USED	
		Rabi crops	Kharif Crops
Ludhiana	Wheat, Rice, Potato, Maize	1972-2000	1971-2000
Hissar	Wheat, Gram, Rapeseed & Mustard, Rice	1972-2001	1971-2001
Karnal	Wheat, Rice	1984-1999	1983-1999
Pantnagar	Rice, Wheat, Maize, Sugarcane	1981-2000	1980-2000
Jodhpur	Pearlmillet		1971-1997
Kanpur	Rice, Wheat	1976-2001	1975-2001
Gaziabad (Delhi)	Wheat	1978-2003	

## Sensitivity of Yield to Trend in Weather Parameters Hissar (Wheat)



## YIELD SENSITIVITY MODELS



### (1) PANTNAGAR RICE

$$\text{NYD} = -2.15 + 0.042 \cdot \text{TMIN\_JUNE} + 0.037 \cdot \text{TMAX\_SEPT} - 0.00018 \cdot \text{RFALL\_JULY}$$

Adj. R Square = 0.64

### (2) HISSAR WHEAT

$$\text{NYD} = -0.189 + 0.0139 \cdot \text{NOV\_TMIN} + 0.027 \cdot \text{JAN\_TMAX} - 0.017 \cdot \text{MAR\_TMAX}$$

Adj. R Square = 0.47

### (3) JODHPUR PEARL MILLET

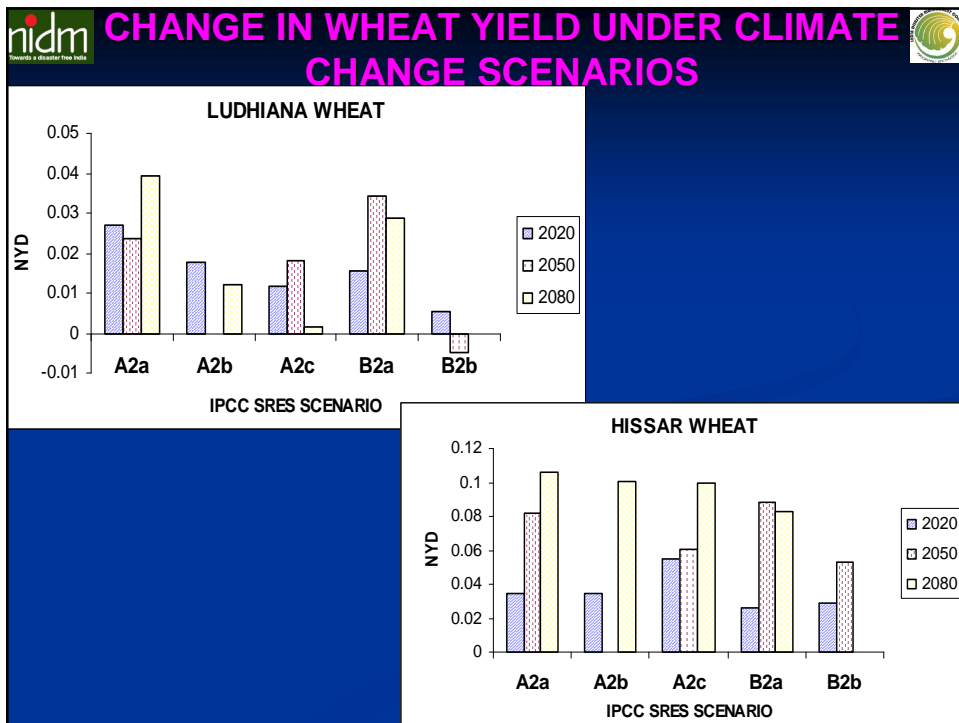
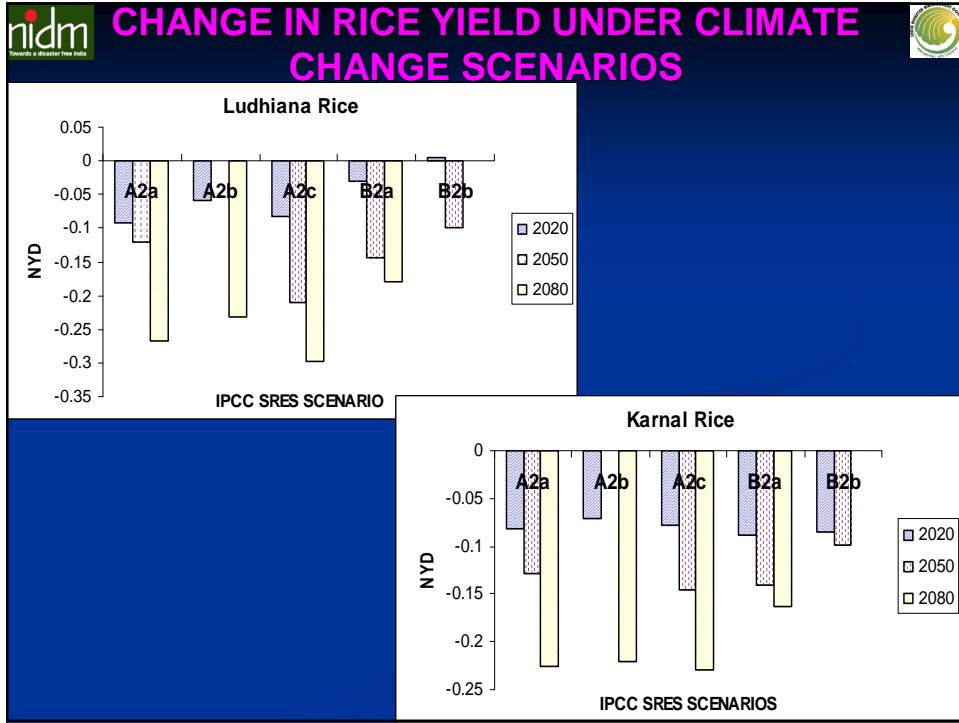
$$\text{NYD} = 8.72 + 0.0174 \cdot \text{RF\_JUNE} - 0.385 \cdot \text{TMIN\_SEPT}$$

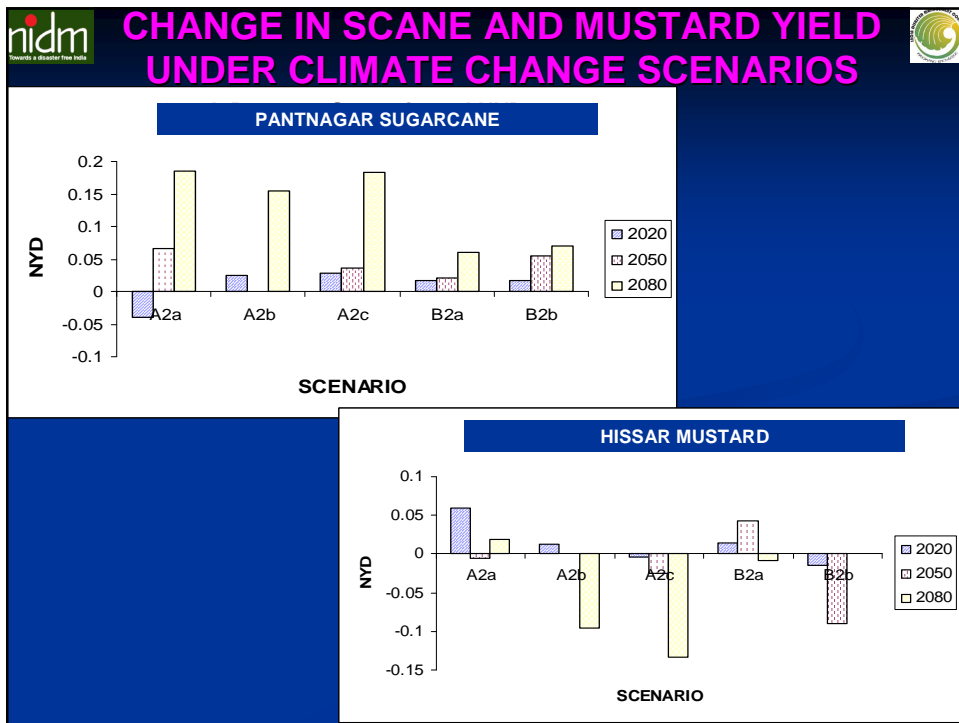
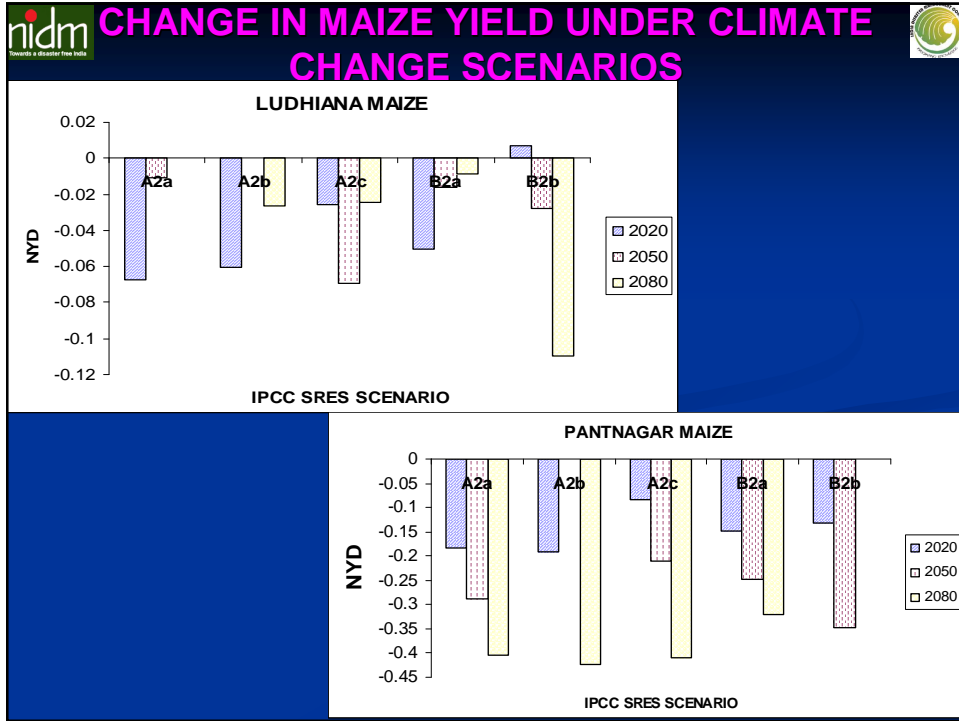
Adj. R Square = 0.56

### (4) SUGARCANE PANTNAGAR

$$\text{NYD} = -2.0782763 + 0.0654328 \cdot \text{TMAX\_SEPT}$$

Adj. R Square = 0.38





## CONCLUSIONS



- Tmax , Tmin showing increasing trend and increase in variability
- Climate Change will adversely affect Kharif crops than rabi crops



# THANKS

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