

# Studies on Yield Limiting Meteorological Factors for Production of Rabi Pigeonpea in W B

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# Background

- **Over exploitation of Ground water due to expansion of *Boro* rice. Area under ground water scheme is 5.86 lac ha against surface water 1.70 lac ha**
- **Even uplands are not spared**
  - **This is a threat to sustainability and environment**
  - **Farmers are not getting good return (but less risk involved)**
- **Diversification of cropping system is the need of hour**
  - **Water conservative farming practices**
  - **Expansion of pulse crop in the upland regions**

# Objective of the study

- **Define the impact of meteorological factors on performance of rabi pigeonpea**
  - **Phenological development**
  - **Yield performance**
- **Determine the suitable period for cultivation of rabi pigeon pea to fit in the cropping system**
  - **As a substitute to boro rice**  
**Particularly in the upland region**

# Study area & Methodology

## Location :

**Instructional Farm, BCKV, Gangetic alluvial zone (22°93'N lat., 88°30'E long. & 9.75 m above MSL)**

**Climate :** *Moist sub-humid tropical.*

**Max. Temp. 19 to 37 °C and Min. 3.5 to 22 °C – Hot summer, Moderately cool winter. Chance of rain during Mar-April (*Kal Baisakhi*)**

**Study Period :** Winter (*rabi*) season of 2003 – 06 Mid Sep/Oct to April

## The Field Experiment

**Pigeon pea (Winter variety RA-120 ) was grown under different dates of sowing for three years 2003-06. The phenological development and crop performance was studied.**

# Results

**Table-1: Year wise yield variation under different sowing dates**

<b>Yr – I (2003-04)</b>		<b>Yr – II (2004-05)</b>		<b>Yr – III (2005-06)</b>	
<b>D-1 (20-Sep)</b>	<b>20.13</b>	<b>D-1 (17-Oct)</b>	<b>17.42</b>	<b>D-1 (12-Oct)</b>	<b>15.53</b>
<b>D-2 (1-Oct)</b>	<b>13.10</b>	<b>D-2 (25-Oct)</b>	<b>11.89</b>	<b>D-2 (2-Nov)</b>	<b>10.09</b>
<b>D-3 (13-Oct)</b>	<b>9.03</b>	<b>D-3 (02-Nov)</b>	<b>8.79</b>	<b>D-3 (9-Nov)</b>	<b>8.04</b>
<b>D-4 (24-Oct)</b>	<b>5.03</b>	<b>D-4 (09-Nov)</b>	<b>7.64</b>	<b>D-4 (16-Nov)</b>	<b>5.79</b>
<b>Delayed sowing decreased the yield</b>		<b>D-5 (16-Nov)</b>	<b>--</b>	<b>D-5 (23-Nov)</b>	<b>4.46</b>
		<b>D-6 (23-Nov)</b>	<b>--</b>	<b>D-6 (30-Nov)</b>	<b>1.67</b>
		<b>D-7 (30-Nov)</b>	<b>--</b>	<b>No rain during Flowering to pod formation</b>	
		<b>D-8 (07-Dec)</b>	<b>--</b>		
		<b>Flowering to pod formation stage coincided with unusually heavy rain</b>		<b>But, Yield reduced severely when sown in Nov. or afterwards</b>	

Fig-1 : Weather conditions during developmental phases (2003-04)

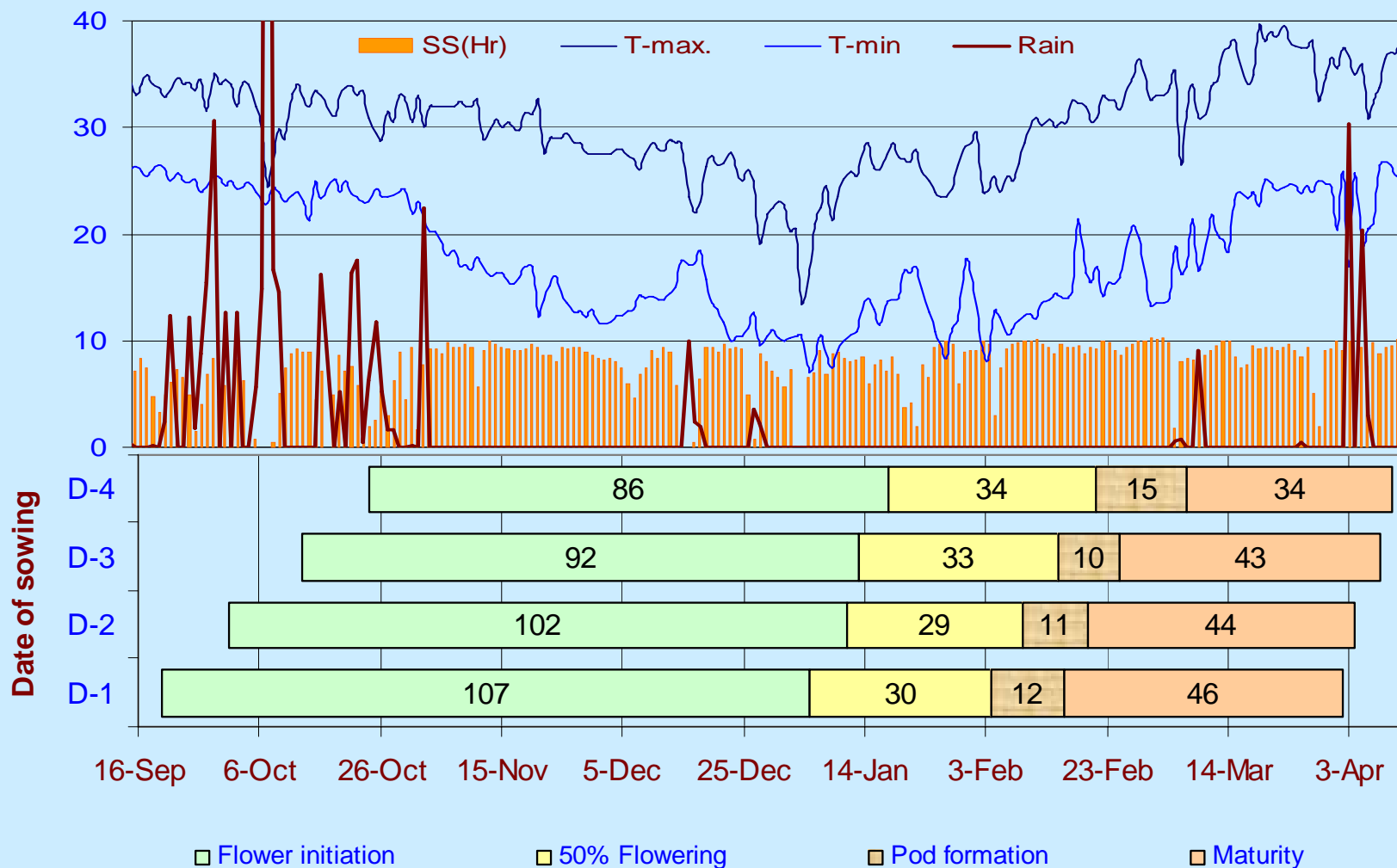


Fig-2 : Weather conditions during developmental phases (2004-05)

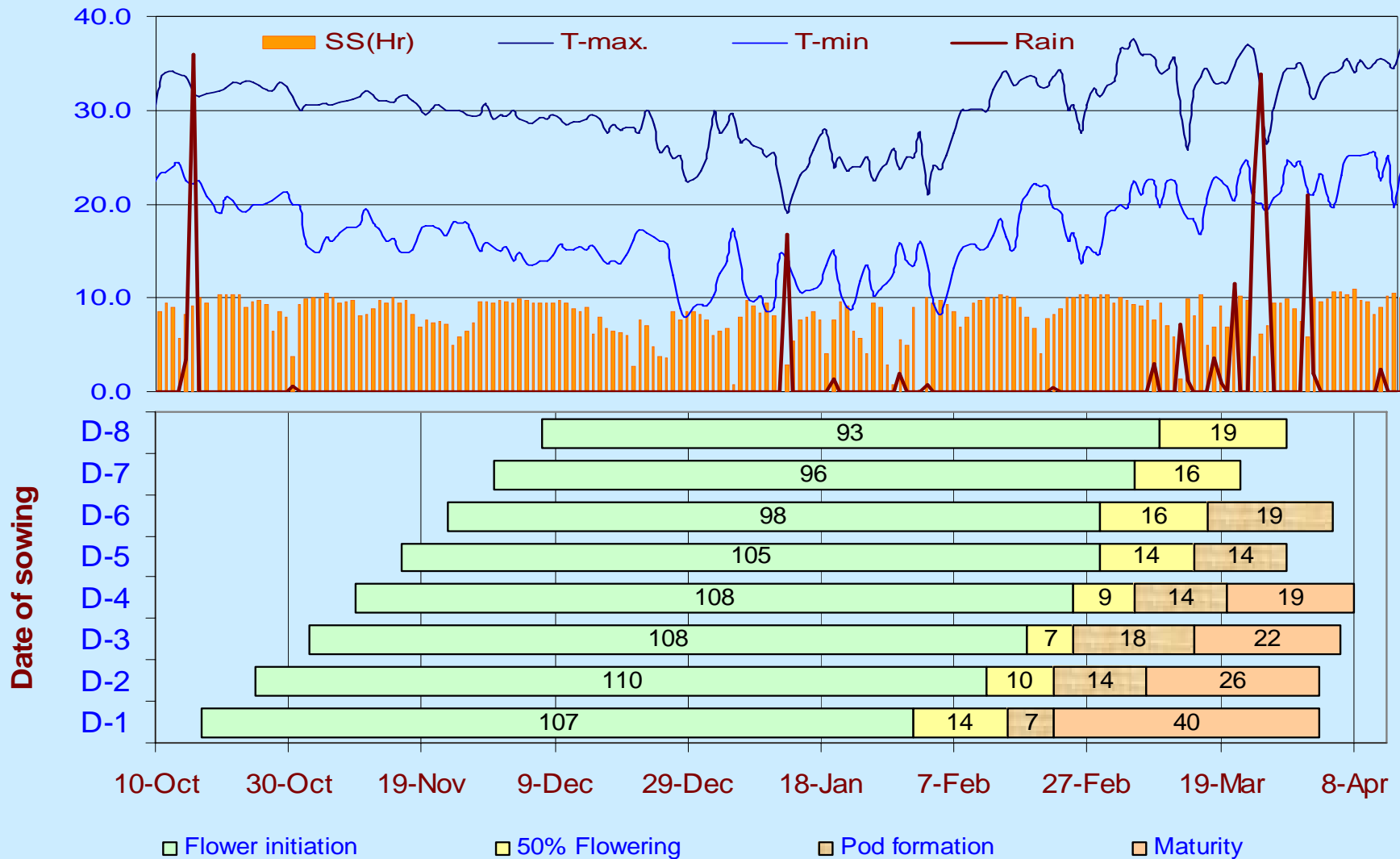
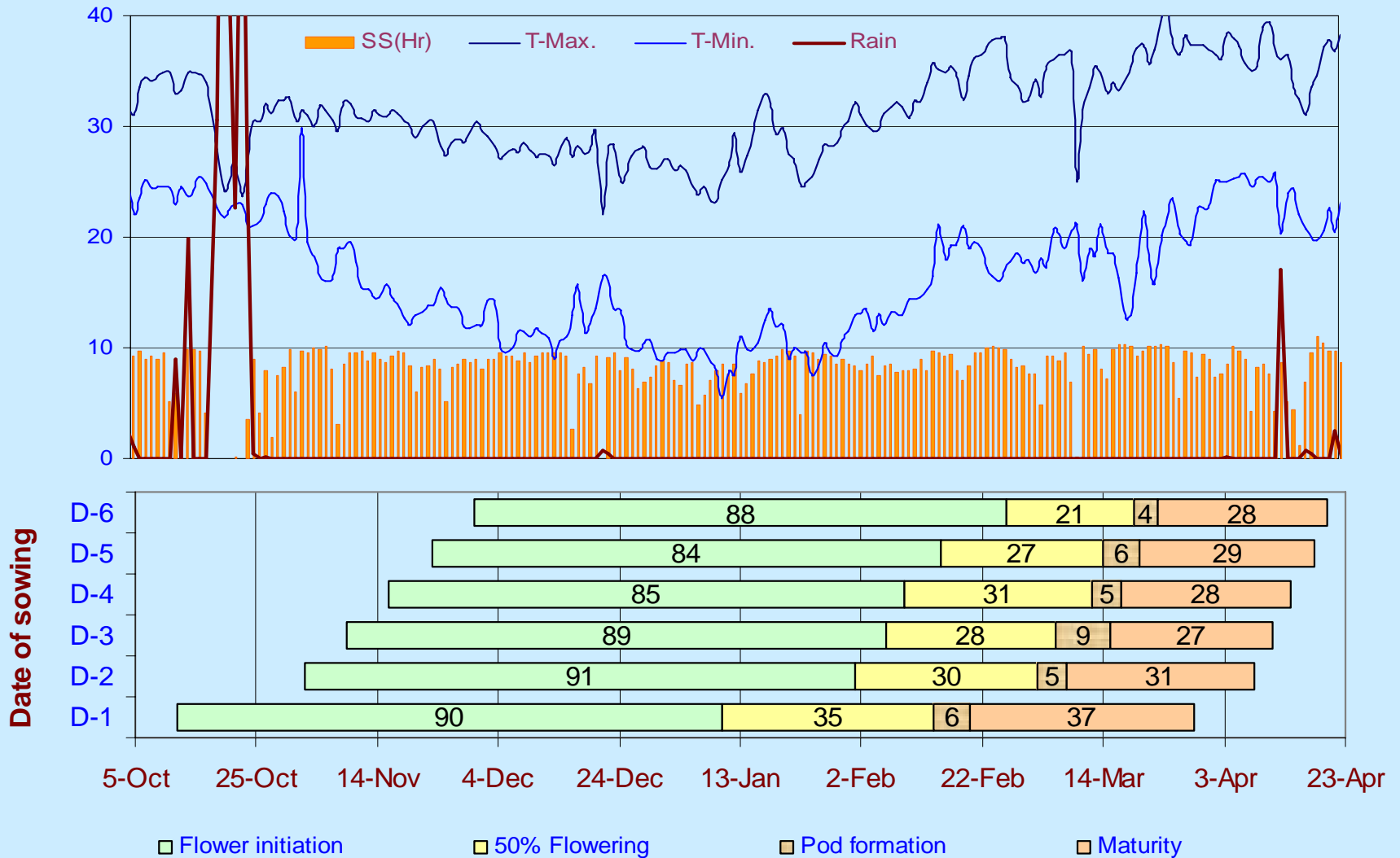
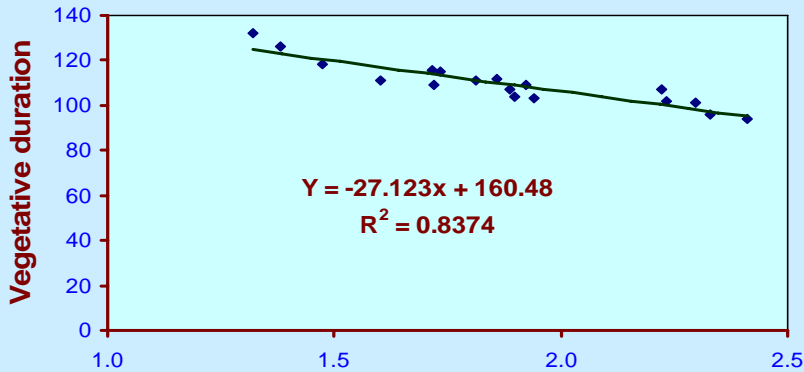


Fig-3 : Weather conditions during developmental phases (2005-06)

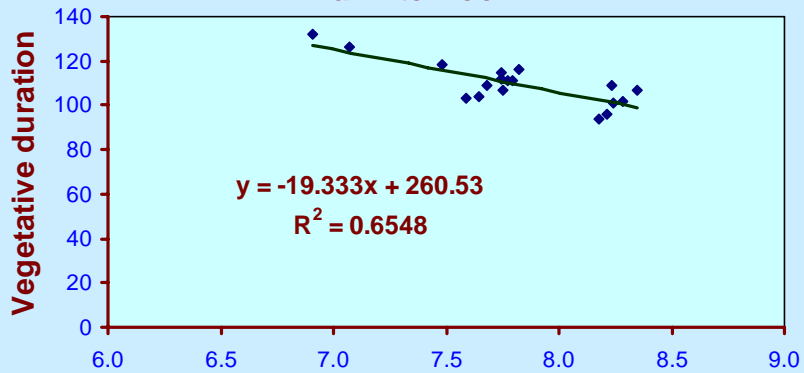


**Table-2: Accumulated Meteorological Indices for phenophasic development**

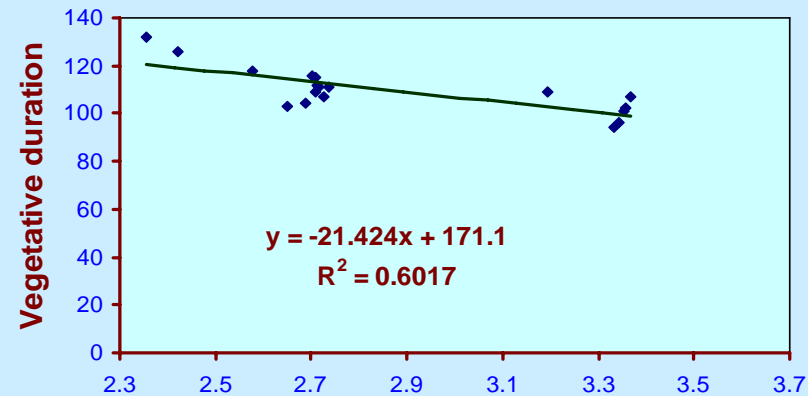
Year and dates of sowing		Accumulated Met. Indices			Duration
		GDD	HTU	PTU	
For vegetative duration	Mean	1810.6	14124.5	20244.3	109.6
	Std. Dev.	180.7	637.5	2034.2	9.6
	C.V. (%)	9.98	4.51	10.05	8.77
For Reproductive duration	Mean	938.67	8090.13	11202.4	42.14
	Std. Dev.	159.85	1516.18	1820.08	8.82
	C.V. (%)	17.03	18.74	16.25	20.93



4.a- Afternoon VPD



4.b- Bright sun shine hour

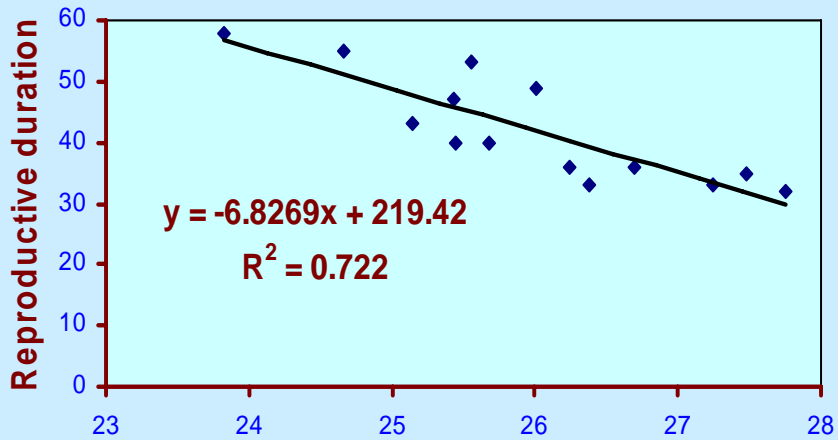


4.c- Diurnal variation in temperature (°C)

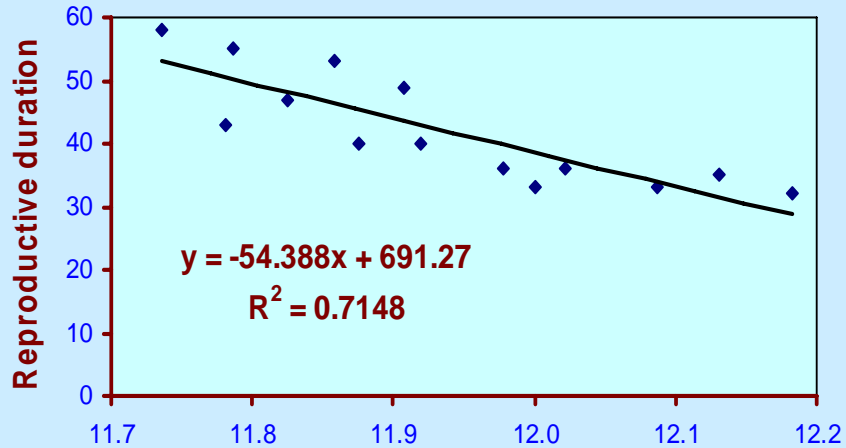
**Fig-4 :**  
**Relation between weather parameters and vegetative duration**

Strong negative relation between Vegetative duration with VPD

Negative relation with BSH and DVT



5.a- Nycto temperature (deg. C)



5.b- Daylength (hour)

**Fig-5 :**  
**Relation between weather parameters and reproductive duration**

Strong negative relation between Reproductive duration with night temperature

Negative relation with Day length

**Table-2: Correlation of Meteorological factors with Yield**

Developmental phase	Average meteorological parameters					
	Photo temp	Nycto temp	Diurnal variation of Temp.	Day-length	Bright sunshine hour	Afternoon VPD
<b>Vegetative phase</b>	<b>0.169</b>	<b>0.471</b>	<b>-0.523</b>	<b>-0.17</b>	<b>-0.579</b>	<b>-0.614</b>
<b>Reproductive phase</b>	<b>-0.809</b>	<b>-0.885</b>	<b>0.185</b>	<b>-0.856</b>	<b>0.548</b>	<b>-0.172</b>

# Salient Findings

- Vegetative duration was inversely correlated to the afternoon VPD ( $r = -0.71$ ) and BSH ( $r = -0.655$ ). Dry condition with bright sunny days hastened flowering.
- **Increasing day and night temp. and day length shortened the reproductive duration. Night temp. and day length had stronger correlation ( $r = -0.85$  and  $-0.845$  respectively) than day temperature**
- Rabi pigeon pea is sensitive to rainfall particularly at seedling and harvesting stage

## ***Conditions for rabi pigeon pea cultivation***

- Dry October (Early withdrawal of monsoon), so that crop can be sown early
- **Bright sunny days prevailed during Oct to Jan, so that flowering is not delayed**
- No frequent rain during March-April, so that there will be good pod setting and less pod borer damage



**Thank you** for patient listening