

CHAPTER III

MATERIAL AND METHODS

M A T E R I A L A N D M E T H O D S

The details of material used , experimental procedure followed and techniques adopted during the course of investigation have been described in this chapter . Climate and edaphic conditions prevailing during the crop period have also been presented at appropriate places.

EXPERIMENTAL SITE

The experiment was laid out during the year 1994 and 1995 at the Vegetable Research Farm of Department of Horticulture, Uadi Pratap College (An Autonomous Institution) , Varanasi . Geographically this area falls under humid subtropical climate and is located between 25 15' N latitude and 60 30' E longitude about 129.23 m. above mean sea level in Gangatic alluvium of eastern Uttar Pradesh , which is subjected to the extremes of weather condition.

A sandy loam soil with neutral (6.9^H P) and average fertility was selected . Before starting the experiments , representative soil sample upto 15 cm. depth were taken for analysis. This sample was analysed for particle size distribution by International pipette method , total N by standard kjeldahl's method (Black , 1964) , N by alkalin permagnete method (Subbiah and Asija 1956) , available P by phosphomolybdate (Baack,1964), available K by flamephotometry^H , P value (1:2.5 suspension) by systronic P^H mater using glass electrode and organic carbon by Walkley and black rapid titration method (Black 1964) were

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noted in table 1.

Tab 1. Physical and Chemical properties of the soil of experimental sites.

Components	Value		Components	Value	
	1994	1995		1994	1995
Particle size			Available nutr. (kg ha ⁻¹)		
Course sand	1	1	Nitrogen	179	183
Fine sand	57	57	Phosphorus	22	24
Silt	25	24	Potassium	233	235
Clay	16	17	H P	7.2	7.1
Total N %	.042	.046	Organic carbon	0.33	0.32

CLIMATE

Varanasi humid sfalls under ubtropical region and receves mean annual precipitation 1270 mm maximum rain fall in this area is received from July to the end of September . However, occasional showers are also very common in June , December and January . The winter month are usually cool and dry. The summer is hot and dry . Western hot wind (locally known as loo) starts from April and continues till the onset of mansoon.

Table - 1 : Meteorological data at Agricultural Research Farm., B.H.U., Varanasi (1994 and 1995)

Month	Week No.	Date	Rainfall (mm)		Temperature °C				Relative humidity (%)				Ave. Sunshine (hrs)	
			1994	1995	Maximum	Minimum	1994	1995	Maximum	Minimum	1994	1995	1994	1995
JUNE	25	18-24	0.6	51.1	38.3	39.6	28.7	27.6	61.9	63.0	30.5	52.0	7.0	10.9
	26	25-01	1.4	120.2	30.7	39.6	28.1	25.5	70.0	87.0	40.0	72.0	9.5	5.3
JULY	27	2-08	2.0	26.0	41.2	36.0	28.3	27.7	55.0	85.0	29.0	74.0	5.2	6.8
	28	08-15	19.4	61.7	35.4	34.3	26.7	26.6	77.0	88.0	64.0	77.0	6.2	6.5
	29	16-22	102.6	25.5	33.7	35.6	25.4	26.6	93.0	87.0	70.0	55.0	2.0	7.3
	30	23-29	52.7	58.9	33.6	35.5	25.7	26.0	83.0	84.0	70.0	62.0	2.3	7.8
	31	30-05	49.2	16.4	33.1	33.5	25.7	26.6	82.0	82.0	76.0	68.0	2.8	6.6
AUGUST	32	06-12	164.7	13.8	31.8	32.7	25.0	25.9	91.0	83.0	78.0	65.0	4.2	3.0
	33	13-19	17.8	0.0	33.8	35.3	26.7	27.2	82.0	86.0	66.0	60.0	4.3	8.7
	34	20-26	84.4	80.6	33.6	31.2	24.4	24.8	86.0	93.0	70.0	80.0	3.3	4.0
	35	27-02	90.4	72.9	32.2	32.5	26.4	25.4	86.0	85.0	69.0	72.0	3.8	2.8
SEPT.	36	03-09	69.1	47.3	33.1	30.9	25.9	25.6	85.0	89.0	72.0	83.0	3.1	3.8
	37	10-16	26.0	99.8	30.5	32.3	24.7	24.8	85.0	88.0	77.0	79.0	4.8	4.3
	38	17-23	0.0	1.9	32.9	33.4	23.7	27.1	81.0	74.0	60.0	69.0	5.6	8.1
	39	24-30	0.0	80.2	34.1	31.6	23.7	24.8	85.0	85.0	64.0	80.0	6.0	4.1
OCT.	40	01-07	0.0	2.9	34.1	33.8	22.3	24.9	88.0	86.0	47.0	75.0	8.0	8.1
	41	08-14	33.1	5.8	32.2	33.9	23.6	24.2	88.0	87.0	59.0	74.0	8.9	8.1

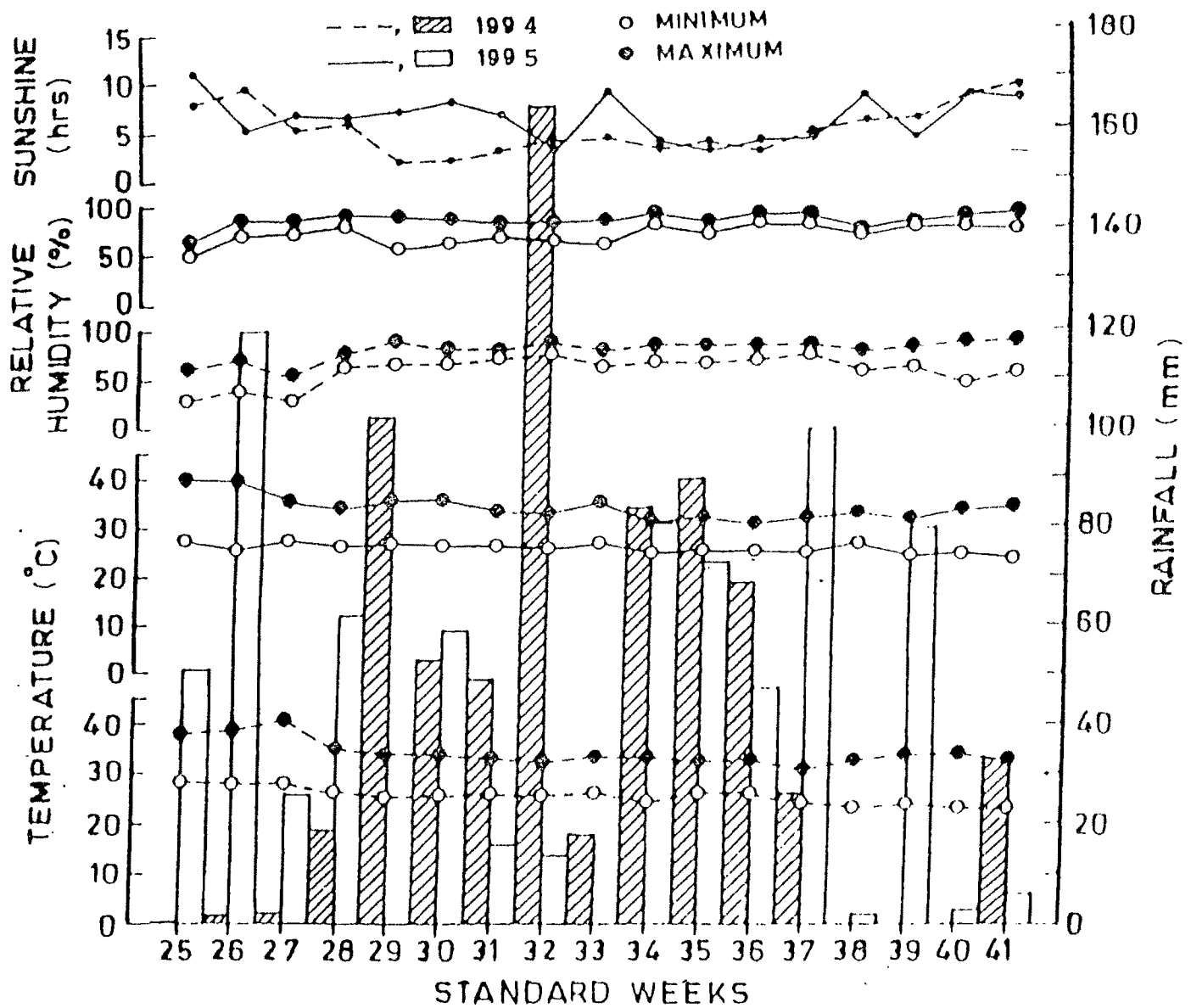


Fig. 1 Meteorological data at Agricultural Farm B H.U. Varanasi during years 1994 & 1995

Monthly distribution of rainfall , minimum and maximum temperature , mean relative humidity , sunshine hours from June 1994 to Oct. 1994 and June 1995 to Oct. 1995 are presented in table 2a and 2b also depicted in fig-1.

The total rainfall recorded during 1098.90 and 976.93 mm. in 1994 and 1995 respectively in rainy crop from June to Oct. Rainy season maximum temperature ranged from 26.5 to 43 C in first year and 26.8 to 40.2 in second year. The minimum temperature ranged from 11.6 to 27 C and 11.2 to 29.3 in 94 and 95 respectively in rainy season crops. Maximum relative humidity was observed in July and Aug. in either year.

Exp. (I&II) for rainy season 1994&1995

FACTOR

(A) Herbicides

Notation

1. Unweeded (check)	T
2. Two weeding at 20 & 40 D A S	T 1
3. Weed free	T 2
4. Dual @ 0.75 kg ha ⁻¹	T 3
5. Dual @ 1.00 kg ha ⁻¹	T 4
6. Dual @ 0.75 kg ha ⁻¹ + 1 hand weeding at 40 DAS	T 5
7. Dual @ 1.00 kg ha ⁻¹ + 1 hand weeding at 40 DAS	T 6
8. Basalin @ 0.50 kg ha ⁻¹	T 7
9. Basalin @ 0.75 kg ha ⁻¹	T 8
10. Basalin @ 0.50 kg ha ⁻¹ + 1 hand weeding at 40 DAS	T 9
	10

11. Basalin @ 0.75 kg ha + 1 hand weeding at 40 DAS T
11

(B) Sowing Dates

- 1. 15th June D
1
- 2. 30th June D
2
- 3. 15th July D
3

TREATMENT COMBINATION

- 1. T D
1 1
- 2. T D
2 1
- 3. T D
3 1
- 4. T D
4 1
- 5. T D
5 1
- 6. T D
6 1
- 7. T D
7 1
- 8. T D
8 1
- 9. T D
9 1
- 10. T D
10 1
- 11. T D
11 1
- 12. T D
1 2
- 13. T D
2 2
- 14. T D
3 2
- 15. T D
4 2
- 16. T D
5 2
- 17. T D
6 2
- 18. T D
7 2
- 19. T D
8 2
- 20. T D
9 2
- 21. T D
10 2
- 22. T D
11 2
- 23. T D
1 3
- 24. T D
2 3
- 25. T D
3 3
- 26. T D
4 3
- 27. T D
5 3
- 28. T D
6 3
- 29. T D
7 3
- 30. T D
8 3
- 31. T D
9 3
- 32. T D
10 3
- 33. T D
1 3

DETAILS OF LAY OUT PLAN

1. Design of Experiment	R B D
2. No. of Treatment	33
3. No. of Replication	3
4. Total No. of Plot	(33x3) 99
5. Size of Experimental field	(27.0x19.2) m.
6. Size of plot	(2.4x1.3) m.
7. Main irrigation channel	1.0 m.
8. Sub irrigation channel	0.5 m.
9. Block border	.75 m.
10. Plot border	.30 m.
11. Field border	.60 m.
12. Cultivar	Parbhani kranti

Preparation of the Experimental field

The experimental plot were ploughed and planked by tractor to obtain a fine tilth suitable for good seed germination of the okra . The estimated experimental field was than marked and plots ere prepared in diffrent blocks according to the plan of lay out.

Basal Nutrition

Farm yard manure 20 tonnes per ha. was applied one week before sowing Nitrogen @ 100 kg ha⁻¹ , Phasphorous 60 kg per ha. and

M A I N I R R I G A T I O N C H A N N E L

T101	S	T102	S	* T1101	S	T1102	S	* T1103	S	T1101	T1102	S
	U		U	* T1001	U	T1002	U	* T903	U	T901	T902	U
T201	B	T202	B	* T901	B	T902	B	* T803	B	T801	T802	B
				* T801		T802		* T703		T701	T702	
T301	I	T302	I	* T601	I	T602	I	* T603	I	T601	T602	I
	R		R	* T501	R	T502	R	* T403	R	T401	T402	R
T401	R	T402	R	* T401	R	T402	R	* T403	R	T501	T502	R
	I		I	* T301	I	T302	I	* T303	I			I
T501	G	T502	G	* T201	G	T202	G	* T203	G	T401	T402	G
	A		A	* T103	A	T102	A	* T103	A			A
T601	T	T602	T	* T103	T	T602	T	* T103	T	T101	T103	T
	I		I	* T501		T502		* T403				
T701	O	T702	O	* T401	O	T402	O	* T303	O	T201	T202	O
	N		N	* T401		T402		* T303				
T801		T802		* T301		T302		* T603		T301	T302	
	C		C	* T201		T202		* T703				
T901	H	T902	H	* T103	H	T102	H	* T103	H	T601	T602	H
	A		A	* T103		T102		* T103				
T1001	N	T1002	N	* T103	N	T102	N	* T103	N	T701	T702	N
	N		N	* T103		T102		* T103				
T1101	E	T1103	E	* T103	E	T102	E	* T103	E	T1001	T1002	E
	L		L	* T103		T102		* T103				

L A Y O U T P L A N

- | | | | | |
|-----------------------|------------|-----------------|---------|---|
| 1. Total no. of plot | 99 | 5. S-I.C. | 0.50 m. | N |
| 2. Size of exp. field | 27*19.2 m. | 6. Block border | 0.75 m. | ^ |
| 3. Size of plot | 2.4*1.3 m. | 7. Plot border | 0.30 m. | |
| 4. M.I.C. | 1.00 m. | | | |

Potassium at the rate of 40 kg per ha. were applied as basal dressing . Reamaining quantity of N was given in two split application , half after 30 days of sowing and 45 days sowing.

Sowing of seed

The seeds of okra cv. Prabhani kranti were sown according to the sowing dates viz. 15th June , 30th June and 15th July. Two or three seeds were sown at the place in order to ensure germination.

Thinning

After complete germination thining was done keeping one healthy plants at a place.

Irrigation

Why) The frist light irrigation was given to the experimental plots after germination . The subsequent irrigation were given once in every week.

Selection of plants for study

In the present investigation , plants were tagged at random numbered . Frist observation on various charracters was taken 30 DAS subsequent observation were recorded at an interval of 30 days.

OBSERVATIONS

The following parameters were recorded during the experiment from tagged plants except germination percentage and yield q ha⁻¹.

1. Germination percentage (50%)

Germination percentage (50%) were counted from each plot .

2. Plant height (cm.)

Height of the plant in centimeter was recorded at 30th , 60th , 90th days after sowing. This plant height was measured from the base to the growing tip with the help of meter scale.

3. Number of branches plant⁻¹

The number of branches plant⁻¹ was counted from the plants at 30th , 60th , 90th days after sowing.

4. Number of leaves plant⁻¹

The number of leaves plant⁻¹ was recorded from the plants at 30th , 60th , 90th days after sowing.

5. Fresh Weight of leaves plant⁻¹

The fresh weight of plant⁻¹ was recorded from pick out the all leaves and weighted by physical balance in laboratory.

6. Dry weight of Leaves plant⁻¹

The dry weight of leaves plant⁻¹ was recorded from all green leaves baked in oven then weighed by physical balance in laboratory.

7. Fresh Weight of Plant ⁻¹

The fresh weight of plant ⁻¹ was recored from the plant and weighed by physical balance in laboratory.

8. Dry Weight of plant ⁻¹

The dry weight of plant ⁻¹ was recored from picked out and baked in oven then weighed by physical balance in laboratory.

9. Area of leaves plant ⁻¹

The area of leaves plant ⁻¹ was recored graph pepper and noted the area occuiped by plant leaves.

10. Node at which first flower appear

The number node at which first flower appeared was counted.

11. Days of first flower appear

Days counted from sowing to first flowering and recored.

12. Number of flower plant ⁻¹

flowers from tagged plant were counted to find out the number of flowers plant ⁻¹.

13. No of pods plant ⁻¹

Matured pods from plants were harvested and counted to find out the total number of maruted pods plant ⁻¹.

14. Fresh weight of pods plants ⁻¹

Matured pods from tagged plants were harvested and weighted lab recording the fresh weight of pods per plant.

15. Dry weight of pods plant

Matured pods were placed in oven and weighing was done by physical balance in laboratory to record the dry weight.

16. weed intensity

The weed intensity was recorded per sqm and noted the occupied area of weed.

17. Fresh weight of weed

Picked out the weeds from plot and weighed by physical balance in laboratory.

18. Dry weight of weed

weeds were kept in oven and weighed by physical balance in laboratory.

19. Yield of pods bed

All the picked pods from tagged plants were weighed and to obtain the weight of pods bed .

20. Yield @ ha

The total pods yield plots was recorded and there by the total yield q ha was calculated.

21. Fibre percentage

Air dried fruits were finally powdered and weighed amount (2 kg) was taken in a beaker 200 ml. of 1.25% sulphuric acid (25 ml. of 10% H_2SO_4 + 175 ml. of water) was added and boiled for half an hour . Filtrated and washed to make it free sulphat , The residue was throughly tranferred to the beaker and 200 ml. of 1.25 NaOH (25 ml. 10% NaOH + 175 ml. water) was added . The

content was again boiled for half an hour and filtered, to make the residue alkali free, it was washed three times with acetone to remove fully material. The residue was thoroughly transferred to a dish and dried in a hot air oven at 100 + 5 c for over night and weighted. Residue was ignited to ash and then cooled in a dissector to take dry weight, crude fiber content of pods was then calculated as given below

$$\text{Crude Fibre \%} = \frac{\text{Weight of dried residues} - \text{weight of ash} \times 100}{\text{Weight of sample taken}}$$

22. Protein content of pods

Protein content of pods in terms of percentage was determined on the basis of their N content, for the purpose 0.5 or dried powder sample was taken and digested through apply commercial grade concentrate sulphuric acid. Nitrogen was thus determined calorimetrically jellowing micro - kjddah's method as proposed by (AOAC, 1980). The protein content of pods was calculated as

$$\text{Protein \%} = \text{Nitrogen} \times 6.25$$

23. Carbohydrate content of pods

The carbohydrate was present in Okra crop as form of Ascorbic acid, the determination of ascorbic acid is oxidized to dehydroascorbic acid by shanking with 'Norit' or activated charcoal in the presence of acetic acid. After coupling with 2,4-D, the solution is treated with sulphuric acid to produce a red colour is measure.

- a. Grind 10 gr. sample of fruit and 450 ml water . filter and stree cool discard after 10 days.
- b. Filter to a 15 ml. aliquot of the filtrate add .75 g of acid - washed 'Norit' .
- c. Filter to a 4 ml. aliquot of the filtrate in tube add 1 drop of 10% thiourea solution and 1 ml. of 2,4-dinitrophenylhydrazine reagent (2 g of reagent in 100 ml. of H_2SO_4 and filter) place the tube at 37° c water bath for exactly 3 hr. keep an appropriate blank with out the reagent.
- d. Cool in ice add drop wise 5 ml. 85% H_2SO_4 (to 100 ml. H_2O add 900 ml. con. H_2SO_4) with stirring now add the reagent to the blank.
- e. Read the colour
- f. A calculation curve is made with ascorbic acid in the range 0.25m-15 ml per ml , carried out through the procedure.

24. Vit. A

The calculation of Vit. A by saponification method and calculate by this formula

U.S.P. unit per ml unknown = $\frac{\text{corrected opt. dens. unknown}}{\text{opt. dens. known} + \text{unknown} - \text{opt. dens. unknown} \times \text{concn. of standard (U.S.P. unit / ml.)}}$

Vit. a / g = $\frac{\text{U.S.P. unit / ml. unknown final volume}}{\text{sample weight}}$

25. Economics

Economic is recored in trum of benefit : cast ratio of various treatment were worked out to evaluate their efficiency in production of Okra pods.

STATISTICAL ANALYSIS

The statistical analysis of the data was done by the method of "Analysis of Variance" Fisher and Yates (1949) . Comparison of treatments were done with the help of critical difference.