

**Phase V Report**

**On**

**Status Report on Crop Kc, Water Requirement of Cotton  
and Pigeon pea**

**For**

**A PoCRA Project on;**

**“Determination of Crop Coefficients for Major Crops by  
Lysimetric Studies”**

**at**

**Dept. of Irrigation and Drainage Engineering,**

**Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola**

**Phase - V**  
**Status Report on Crop Kc, Water Requirement of Cotton and Pigeon pea**

*“Determination of crop coefficients for major crops by Lysimetric studies”*

**Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola.**

---

**Title of the Project:** Determination of crop coefficients for major crops by Lysimetric studies” at Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola.

**Location:** Department of Irrigation and Drainage Engineering, Dr. Panjabrao Deshmukh Krishi Vidyapeeth Akola.

**Duration:** Three years.

**Total outlay:** Rs. 38.38 lakhs.

**Investigators:**

**Principal Investigator** : Dr. S.B. Wadatar, Professor and Head, Department of Irrigation and Drainage Engineering Dr. PDKV, Akola.

**Co-Principal Investigator** : Dr. A.N. Mankar, Assistant Professor, Department of Irrigation and Drainage Engineering Dr. PDKV, Akola.

Dr. M.M. Deshmukh, Associate Professor, Department of Irrigation and Drainage Engineering Dr. PDKV, Akola

**Coordinator for the project for three universities (MPKV, Rahuri; Dr PDKV, Akola and VNMKV, Parbhani)** : Dr. S.D. Gorantiwar, PI CAAST-CSAWM and Head, Deptt. of Agril. Engg., MPKV, Rahuri.

**INTRODUCTION:**

The Project is being executed at Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola. As per schedule of reporting requirements, following are the details regarding the crop coefficient of Cotton and Pigeon pea.

**DETAILS OF WORK:**

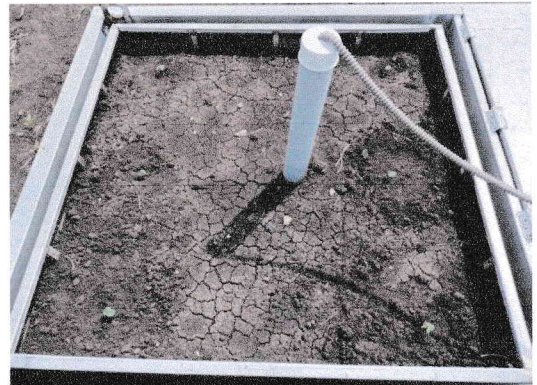
**Cultivation of Cotton and Pigeon pea:**

As it was planned to cultivate cotton and pigeon pea, the sowing of cotton (CV-PDKV JKAL-116 BG) 2022 and pigeon pea (CV-PDKV - Ashlesha) was done on 24<sup>th</sup> June 2022. Whereas, the harvesting of the cotton was done on 10<sup>th</sup> December 2022 and pigeon pea on 20<sup>th</sup> December 2022. Following images shows the different field practices done during the entire growing period of cotton and pigeon pea.





**Sowing of cotton and pigeon pea**



**Germination**



**Waterlogging due to heavy rain and pumping of water from lysimeters**

**Cultivation of Cotton and Pigeon pea**





**Cotton at 60 DAS**



**Pigeon pea at 45 DAS**



**Cotton at 90 DAS**



**Pigeon pea at 90 DAS**



**Spraying for cotton at 150 DAS**



**Pigeon pea at 150 DAS**



**Cotton at harvesting**



**Pigeon pea at harvesting**

**Cultivation of cotton and pigeon pea**



Since the start of the kharif season 2022, we witnessed heavy rainfall after the sowing of cotton and pigeon pea. Table 1 and 2 shows the weekly and monthly rainfall recorded during the monsoon 2022. Due to this heavy rainfall and waterlogging around and inside the lysimeters, crops couldn't grow well during their growing period. Due to this the growth of the plants were not normal as per their growth stage as shown in above pictures. Also, due to waterlogging inside the lysimeters, the weighing load cells of lysimeters were damaged and they were not working properly. Hence, we were unable to get the daily evapotranspiration readings. During Rabi-2023 season, the work of trenching the drains around the lysimeter field and the required modification in the lysimeter has been done to avoid the waterlogging problem inside and outside the lysimeter. The crop coefficient for the cotton and pigeon pea crops will be determined during the upcoming kharif season 2023.

**Table 1. Weekly rainfall recorded during monsoon 2022**

Weeks	Dates	RF (mm)		CRF (mm)	Rainy Days	
		Normal	Actual		Normal	Actual
22	28-3 Jun	5.3	0	1	0.4	0
23	4-10	19.3	4.4	5.4	1.3	1
24	11-17	42.2	<b>155.1</b>	160.5	1.9	3
25	18-24	44.3	56.8	217.3	2	2
26	25-1Jul	41.6	33.5	250.8	1.8	1
27	2-8	36.3	<b>167.8</b>	418.6	2.1	<b>4</b>
28	9-15	40.7	<b>104</b>	522.6	2.4	<b>5</b>
29	16-22	61.5	92.3	614.9	2.6	2
30	23-29	42.9	23.6	638.5	2.8	<b>4</b>
31	30-5 Aug	44.4	27.2	665.7	2.3	2
32	6-12	58.4	70.4	736.1	2.9	<b>5</b>
33	13-19	34.3	34.5	770.6	2	2
34	20-26	37.6	5.9	776.5	1.8	1
35	27-2 Sep	40.1	25	801.5	2.1	2
36	3-9	35	36.6	838.1	1.6	2
37	10-16	25.3	<b>102</b>	940.1	1.3	<b>5</b>
38	<b>17-23</b>	26.5	77.5	1017.6	1.7	2
39	24-30	23.7	24	1041.6	1.3	1
40	<b>1-7 Oct</b>	25.3	<b>55.7</b>	1097.3	1.2	2
41	8-14	14.5	20	1117.3	0.7	2
42	15-21	7.5	40.9	1158.2	0.5	2
43	22-28	5.9	0	1158.2	0.4	0
44	29-4 Nov	1.9	0	1158.2	0.2	0
45	5-11	3.2	0	1158.2	0.3	0
46	12-18	7.1	0	1158.2	0.3	0
47	19-25	4.5	0	1158.2	0.2	0
48	26-2 Dec	3.8	0	1158.2	0.3	0
49	3-9	2.1	0	1158.2	0.3	0
50	10-16	2	3.8	1162	0.3	1
51	17-23	2	0	1162	0.3	0
52	24-31	4.5	0	1162	0.5	0
<b>Total RF January to Dec</b>			1162			51
<b>Total RF June to Dec</b>			1161			51

**Table 2. Monthly rainfall recorded during Monsoon 2022**

Month	RF (mm)		Percent Variation	CRF (mm)	Rainy Days	
	N	A			N	A
JUNE, 2022	142.6	249.3	74.8	250.3	6.8	7
JULY, 2022	200.7	404.0	101.3	654.3	10.8	16
AUGUST, 2022	189.7	123.8	-34.7	778.1	9.9	9
SEPTEMBER, 2022	123.2	263.5	113.9	1041.6	6.5	12
OCTOBER, 2022	53.9	116.6	116.3	1158.2	2.9	6
NOVEMBER, 2022	18.8	0.0	-100.0	1158.2	1.1	0
DECEMBER, 2022	11.5	3.8	-67.0	1162.0	1.6	1
Total	740.4	1161.0	56.8	1162.0	39.6	51.0

(N = Normal Rainfall, 1981-2010) (A = Actual Rainfall in 2022)

### Plant Protection Measures

Following are the details of insecticides, fungicides and pesticides applied during the growth period for healthy growth of cotton and pigeon pea.

**Table 3. Plant Protection Measures in Cotton**

Sr. No.	Date of Application	Weedicide/ Insecticide/ Fungicide/ Pesticide	Quantity (Per 10 lit. water)	Purpose
1	25-06-2022	Pendimethiline 38.7% CS	40 ml	Preemergence Weedicide
2	18-08-2022	Ulala	3 gm	Sucking Pests
3	23-08-2022	Hitweed Max	30 ml	Herbicide
4	29-08-2022	Chloropyriphos 20% EC	25 ml	Mili bug
5	07-09-2022	Tata Manik - Acetamipaid 20% SP	1 gm	Sucking Pests
6	28-09-2022	Confidor- Imidaclopaoid 30.5%	2 ml	Sucking Pests
7	02-11-2022	Tychi - Terphenpyroid	20 ml	Sucking Pests
8	15-11-2022	Prixor - Fluxapyroxod + Pyraclosrobin	6 ml	Fungicide - Dahiya

**Table 4. Plant Protection Measures in Pigeon pea**

Sr. No.	Date of Application	Weedicide/ Insecticide/ Fungicide/ Pesticide	Quantity	Purpose
1	25-06-2022	Pendimethiline 38.7% CS	40 ml/10 lit. water	Preemergence Weedicide
2	25-07-2022	Imazithyper 10% SL	25 ml/10 lit. water	Herbicide
3	23-08-2022	Imazithyper 10% SL	25 ml/10 lit. water	Herbicide
4	26-08-2022	Quinolphos	25 ml/10 lit. water	Insecticide
5	23-11-2022	Propinophos	20 ml/10 lit. water	Insecticide

### Plant Growth and Yield Observations

Plant growth and yield observations were made for 6 plants form the lysimeter and 10 plants outside the lysimeter at different intervals i.e., for both cotton and pigeon pea at 30 days after sowing, 60 days after sowing, 90 days after sowing, 120 days after sowing and at the time of harvest. The overall observations were focused around height of crop, number of branches, number of leaves, number of flowers, number of capsules/pods and


yield. Following table illustrates an overall detail about the growth parameters of cotton and pigeon pea during the growing period.

**Table 5. Plant growth and yield parameters of cotton**

Parameters (Average)	30 DAS	60 DAS	90 DAS	120 DAS	At Harvest
Height (cm)	14.5	30.9	48.7	66.3	86.2
Branches	0	2.9	6.4	12.6	12.9
Leaves	15.3	28.4	47.2	42.8	27.6
Flowers	0.0	8.2	18.6	15.3	6.3
Capsules	0.0	0.0	12.9	19.8	21.6
Avg. Yield					2.89 q/ha

**Table 6. Plant growth and yield parameters of pigeon pea**

Parameters (Average)	30 DAS	60 DAS	90 DAS	120 DAS	At Harvest
Height (cm)	33.2	65.3	102.8	141.2	173.8
Branches	0.0	2.2	3.8	7.9	10.6
Leaves	56.4	132.4	193.5	268.6	197.4
Flowers	0.0	0.0	0.0	39.5	0.0
Capsules	0.0	0.0	0.0	27.8	127.9
Avg. Yield					21.07 q/ha




**Dr. A. N. MANKAR.**



**Dr. M. M. DESHMUKH.**

Co-Principal Investigator  
PoCRA Project on Lysimetric Studies  
Deptt. of Irrigation and Drainage Engg.  
Dr. P.D.K.V., Akola



**Dr. S. B. WADATKAR.**  
Principal Investigator  
PoCRA Project on Lysimetric Studies  
Deptt. of Irrigation and Drainage Engg.  
Dr. P.D.K.V., Akola