

ANNUAL PROGRESS REPORT
2010 - 11,
Vellanikkara centre, Kerala.

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KERALA AGRICULTURAL UNIVERSITY
DEPARTMENT OF SOIL SCIENCE AND
AGRICULTURAL CHEMISTRY
COLLEGE OF HORTICULTURE
VELLANIKKARA-680 656, THRISSUR, KERALA.

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I. GENERAL INFORMATION

1. Project title : All India Co-ordinated Research Project for investigations on Soil Test Crop Response Correlation.
2. Sanction : F. No. 11 (4) 92- SW & DF
Dated: 7-10-1996 of ICAR
3. Reporting period : 1-4-10 to 31-3-2011
4. Report No. : 13th
5. Date of start : February, 1997
6. Date of termination : Continuing
7.
 - a. Name of Institute : Kerala Agricultural University
 - b. Division / Department / Section : Department of Soil Science and Agricultural Chemistry
 - c. Location of work : College of Horticulture Vellanikkara, Thrissur -
PIN – 680 656
8. Name of Principal Investigator : Dr. Betty Bastin
9. Technical Personnel employed :

Sl No	Post sanctioned	No. of Posts	Name of the incumbent	Date of joining	Date of leaving
1.	Soil Chemist / Professor (Agrl. Chem)		Dr. M.A. Hassan	1-2-97	20-08-10
2.	Asst. Soil Chemist / Asst Professor (Agrl. Chemistry)		Dr. P. Suresh Kumar	1-2-97	30-06-02
3.	Soil Chemist / Professor (Agrl. Chem)	1	Dr. Betty Bastin	1-7-02	Continuing
4.	Technicians (Agri)	2	Mr. M. Anantha Krishnan	29-1-97	"
			Mr. P. Ajithkumar	6-2-97	23-5-97
			Mr. Biju Kuruvilla	26-5-97	3-5-99
			Mr. P.R. Sathian	19-5-99	Continuing
5.	Lab Assistant	1	Mrs. P.K. Kamalakshy	1-1-97	15-6-99
			Mr. P.B. Sivadasan	16-6-99	5-4-00
			Mrs. P.K. Kamalakshy	6-4-00	29-4-04
			Mr. M.S. Moni	22-6-04	20-5-05
			Mr. K.A. Vinod	27-12-05	Continuing

II. ABSTRACT OF EXPENDITURE AND REMITTANCE BY ICAR FROM APRIL 2009 TO MARCH 2010

Period	Opening balance for the year brought over from the previous year Rs.	Remittance by the council during the year Rs.	Actual expenditure for the year Rs.	Council share of sanctioned grant for the year Rs.	Council share of expenditure actually incurred and audited during the year Rs.	Closing balance at the end of the year Rs.
2010-11	2,74,227/- (As per AUC)	8,48,000/-	40,08,364/- Salary - 30,22,797/- RC - 1,39,156/- NRC - 8,29,691/- TA - 16,720/- Total - 40,08,364/-	17.48 Lakhs (75% of 23.30 Lakhs)	(75% of 23,15,876) = 17,36,907/-	(-) 6,14,680/-

III. OBJECTIVES

1. To arrive at fertilizer prescription methods based on Soil Test Crop Response studies so as to enable the farmers to increase the yield of their crops for maximum profit
2. To apply fertilizers and organic manures into a soil of a particular fertility level to get a desired economic yield.

IV. DETAILS OF THE EXPERIMENTS AND RESULTS FOR THE YEAR 2010-2011

During the year 2010-11, we concentrated mainly on the following crops through the different experiments.

1. Test crop experiments on water melon (*Citrullus lanatus*)
2. Field verification trials on groundnut using IPNS equations at 4 locations
3. Field verification trials on sweet potato at 3 locations
4. Field verification trials on amaranthus at 2 locations

WATER MELON (*Citrullus lanatus*) Variety: *Sugar baby*

A complex experiment on water melon is undertaken this year. Water melon is an important summer season crop grown in Kerala.

The POP recommendation of this crop is 70:25:25 kg/ha of N, P₂O₅ and K₂O and 20-25t/ha of FYM.

Location	: Vellanikkara (Thrissur)
Type of Soil	: Laterite
Crop	: Water melon
Variety	: Sugar baby
Date of planting	: 1/02/10
Spacing	: 3m x 2m
Design	: Response surface design
No of treatments	: 24
No. of strips	: 3
No. of plots per strip	: 24
System of planting	: Dibbling in the pits
Irrigation	: Irrigated
Area of adaptability	: Laterite areas of the state

TABLE: I Treatments

Nutrient Levels	Fertilizer doses kg/ha			FYM /t/ha
	N	P	K	
0	0	0	0	0
1	35	12.50	12.50	10
2	70	25	25	20
3	140	50	50	--

The experiment was conducted after raising the gradient crop of fodder maize. during November to December 2009. After the harvest of fodder maize, the soil was analysed from all the three strips and the following data were obtained.

Table: 2

Sl. No.	Strips	Available N, kg/ha	Available P, kg/ha	Available K, kg/ha	OC %	pH	EC dS m ⁻¹
1	S0	428.47	36.31	390.85	0.55	4.26	0.12
2	S1	371.57	27.22	370.06	0.51	4.52	0.09
3	S2	389.23	29.20	393.40	0.37	4.66	0.19

The data showed desired gradient in soil fertility status. So the crop was sown.

Each strip was divided into 24 plots of 2.5m x 2m size. The 24 plots in each strip were allotted with 21-treatment combinations and 3 controls. The FYM levels were super imposed in the treatment structure.

The treatment structure was in such a way that each strip received all the treatment combinations. Each strip contained three control plots that received no FYM or fertilizers for water melon. The remaining 21 plots of each strip received either fertilizer or a combination of FYM and fertilizer.

The organic manure as per the treatments was applied in the plots along with the full doze of P, K and half doze of N as basal. The remaining half doze of N was applied in two equal splits at the time of vining and at the time of full blooming.

The plants were uprooted carefully after harvest, cleaned and the fresh weight taken and the yield was recorded and expressed as q/ha. The nutrient uptake was computed separately for the fruits and for the biomass (including vines, leaves and roots). The plant samples were analysed separately for the contents of N, P and K after harvest. The total uptake of N, P and K were computed from the nutrient contents and dry weight of plant parts and expressed as kg/ha. The soil samples were analysed for pH, EC, organic carbon and available N, P and K. The fertilizer prescription equations were developed based on the data of soil test values, fruit yield and the nutrient uptake by the water melon crop.

The data generated below were utilized for the formulation of fertilizer prescription equations for specific yield targets.

Table: 3 Soil test values, yield and uptake of nutrients in the S0 strip of the experiment on water melon

Sl No.	OC %	pH	EC d Sm	Yield q/ha	Total up take of N kg/ha	Total Up take of P kg/ha	Total up take of K kg/ha	Avail N kg/ha	Avail P kg/ha	Avail K Kg/ha	Treatment structure			F Y M t/ha
											N	P ₂ O ₅	K ₂ O	
											Kg/ha			
1	0.62	4.00	0.03	131.60	3.99	0.22	4.16	464.12	28.00	506.40	0.00	0.00	0.00	0.00
2	0.49	5.20	0.06	225.70	30.30	1.68	57.63	319.87	38.08	425.60	35.00	25.00	25.00	0.00
3	0.74	4.40	0.59	331.80	40.33	2.04	62.55	423.60	36.73	495.60	140.00	50.00	12.50	0.00
4	0.80	3.80	0.21	248.40	30.92	2.35	62.17	363.77	36.73	492.12	70.00	25.00	25.00	0.00
5	0.52	4.32	0.11	236.50	8.48	0.39	7.24	406.09	34.54	421.18	70.00	0.00	25.00	0.00
6	0.58	4.50	0.06	324.70	71.39	3.75	84.76	392.00	33.37	358.40	140.00	25.00	25.00	0.00
7	0.60	4.30	0.12	232.80	24.30	1.79	38.98	435.90	44.57	336.00	70.00	12.50	25.00	0.00
8	0.82	4.30	0.17	253.20	33.61	2.49	47.98	435.90	34.94	392.00	70.00	50.00	25.00	0.00
9	0.41	4.50	0.09	303.20	46.73	3.02	87.34	432.76	14.33	403.20	70.00	25.00	12.50	10.00
10	0.54	3.70	0.04	413.80	51.27	2.46	102.82	554.72	49.22	257.60	140.00	25.00	12.50	10.00
11	0.45	3.70	0.06	389.60	19.31	1.25	20.52	435.90	25.98	201.60	70.00	25.00	50.00	10.00
12	0.54	4.26	0.11	229.20	14.80	1.71	42.51	420.49	35.52	427.40	35.00	12.50	12.50	10.00
13	0.54	4.26	0.11	276.04	37.52	1.77	69.23	420.49	35.52	427.40	0.00	0.00	0.00	10.00
14	0.47	4.80	0.07	343.60	39.98	2.30	48.16	435.90	33.60	218.00	70.00	25.00	0.00	10.00
15	0.43	3.80	0.05	368.80	49.03	3.12	52.29	439.04	52.19	470.40	70.00	12.50	12.50	10.00
16	0.54	4.26	0.11	248.12	34.33	2.11	49.73	420.49	35.52	427.40	35.00	25.00	12.50	10.00
17	0.49	4.20	0.08	402.80	52.43	3.27	79.95	445.31	38.75	470.40	0.00	25.00	25.00	20.00
18	0.52	4.00	0.05	442.40	62.36	2.81	66.05	434.12	34.94	358.40	35.00	12.50	25.00	20.00
19	0.58	4.40	0.08	459.60	61.79	4.24	112.80	467.26	40.54	587.60	70.00	50.00	50.00	20.00
20	0.58	4.40	0.05	335.80	39.20	2.38	45.15	323.00	25.31	347.20	0.00	0.00	0.00	20.00
21	0.54	3.20	0.28	438.20	57.00	3.09	98.29	457.85	25.08	235.20	140.00	25.00	50.00	20.00
22	0.58	4.70	0.05	462.60	150.23	8.95	149.23	454.72	34.94	313.60	140.00	50.00	50.00	20.00
23	0.64	3.70	0.07	332.20	63.73	1.55	116.23	439.04	57.34	313.60	140.00	12.50	12.50	20.00
24	0.52	5.50	0.12	468.80	25.63	1.51	34.11	460.99	45.69	494.00	140.00	50.00	25.00	20.00

Table: 4 Soil test values, yield and uptake of nutrients in the S1 strip of the experiment on water melon

Sl No	OC %	pH	EC d Sm	Yield q/ha	Total uptake of N kg/ha	Total Up take of P kg/ha	Total up take of K kg/ha	Avail N kg/ha	Avail P kg/ha	Avail K Kg/ha	Treatment structure			F Y M U/ha
											N	P ₂ O ₅	K ₂ O	
											Kg/ha			
1	0.70	4.50	0.08	454.14	44.65	2.32	97.26	376.32	17.92	358.40	140.00	50.00	25.00	20.00
2	0.43	4.70	0.12	463.94	89.11	6.41	129.36	338.68	29.34	470.40	0.00	25.00	25.00	20.00
3	0.17	4.60	0.02	439.72	59.03	2.78	72.56	373.18	24.41	403.20	35.00	12.50	25.00	20.00
4	0.68	4.60	0.07	541.44	94.15	4.24	162.77	348.09	20.83	380.80	70.00	50.00	50.00	20.00
5	0.68	4.30	0.13	354.30	38.25	2.89	39.97	388.86	28.67	448.00	0.00	0.00	0.00	20.00
6	0.31	4.60	0.07	466.70	65.63	6.23	90.37	370.09	40.32	425.60	140.00	25.00	50.00	20.00
7	0.54	4.30	0.08	443.78	73.51	5.78	145.83	401.40	28.89	358.40	140.00	50.00	50.00	20.00
8	0.58	4.60	0.12	472.86	86.40	3.41	168.42	360.64	25.76	403.20	140.00	12.50	12.50	20.00
9	0.35	4.80	0.20	362.36	27.83	1.31	57.67	354.36	34.27	448.00	70.00	50.00	25.00	0.00
10	0.56	4.30	0.07	415.88	49.10	3.26	98.15	319.87	20.16	291.20	140.00	50.00	12.50	0.00
11	0.51	3.80	0.06	164.24	31.78	1.84	63.32	335.55	41.66	358.20	0.00	0.00	0.00	0.00
12	0.60	4.70	0.07	232.46	33.72	1.61	34.71	395.13	34.49	448.00	35.00	25.00	25.00	0.00
13	0.51	5.40	0.04	360.40	69.83	2.90	123.83	406.68	23.07	425.60	70.00	25.00	25.00	0.00
14	0.54	4.60	0.03	305.32	72.75	5.11	103.90	332.41	20.60	324.80	70.00	0.00	25.00	0.00
15	0.72	4.10	0.24	413.16	72.02	2.89	131.68	388.86	24.69	224.00	140.00	25.00	25.00	0.00
16	0.45	4.40	0.10	317.88	50.62	3.98	106.79	439.04	30.24	336.00	70.00	12.50	25.00	0.00
17	0.39	4.70	0.13	276.24	23.21	1.66	51.06	379.45	28.00	380.80	0.00	0.00	0.00	10.00
18	0.52	4.70	0.09	380.80	65.48	3.98	118.95	473.53	24.64	313.60	70.00	12.50	12.50	10.00
19	0.60	4.00	0.09	431.80	45.86	3.36	47.79	344.96	17.47	369.60	70.00	25.00	12.50	10.00
20	0.49	4.70	0.08	176.14	51.30	3.69	124.45	392.00	27.55	369.60	70.00	25.00	50.00	10.00
21	0.58	4.70	0.05	518.24	59.91	4.42	66.12	313.60	21.95	280.00	140.00	25.00	12.50	10.00
22	0.56	4.40	0.10	315.62	58.24	2.51	90.58	373.18	36.28	158.40	35.00	12.50	12.50	10.00
23	0.33	4.60	0.08	349.78	58.13	3.36	61.33	170.04	23.74	291.20	70.00	25.00	0.00	10.00
24	0.35	4.40	0.13	322.00	58.68	4.46	111.08	341.82	28.22	414.40	35.00	25.00	12.50	10.00

Table: 5 Soil test values, yield and uptake of nutrients in the S2 strip of the experiment on water melon

Sl. No.	OC %	pH	EC d Sm ⁻¹	Yield q/ha	Total up take of N kg/ha	Total Up take of P kg/ha	Total up take of K kg/ha	Avail N kg/ha	Avail P kg/ha	Avail K Kg/ha	Treatment structure			F Y M t/ha
											N	P ₂ O ₅	K ₂ O	
											Kg/ha			
1	0.33	3.50	0.45	489.42	109.81	5.93	163.08	498.27	28.00	246.40	70.00	12.50	12.50	10.00
2	0.33	4.40	0.24	484.98	123.31	5.87	192.85	348.09	39.20	313.60	140.00	25.00	12.50	10.00
3	0.27	4.30	0.21	509.66	78.97	4.74	151.91	404.54	27.10	539.20	35.00	12.50	12.50	10.00
4	0.37	5.10	0.14	559.40	87.61	4.04	147.51	392.00	32.70	403.20	70.00	25.00	0.00	10.00
5	0.60	4.90	0.07	539.62	57.49	3.77	95.92	395.13	29.56	481.60	35.00	25.00	12.50	10.00
6	0.43	4.80	0.80	630.72	106.05	7.65	152.44	338.68	32.48	481.60	70.00	25.00	50.00	10.00
7	0.47	4.40	0.16	262.60	28.78	1.78	72.88	366.91	28.08	515.20	0.00	0.00	0.00	10.00
8	0.39	4.90	0.07	607.30	101.08	6.63	212.71	454.72	25.31	369.60	70.00	25.00	12.50	10.00
9	0.25	4.60	0.09	505.78	83.90	8.82	92.30	388.86	32.70	470.40	0.00	25.00	25.00	20.00
10	0.23	4.90	0.22	539.98	93.33	5.40	164.09	385.47	30.01	246.40	35.00	12.50	25.00	20.00
11	0.25	4.20	0.32	621.26	95.63	7.46	185.57	360.64	32.92	459.20	70.00	50.00	50.00	20.00
12	0.29	5.00	0.07	340.48	65.63	5.21	104.17	310.46	28.22	224.00	0.00	0.00	0.00	20.00
13	0.27	4.80	0.22	695.18	127.83	8.51	160.45	395.13	22.84	425.60	140.00	25.00	50.00	20.00
14	0.27	4.60	0.12	721.60	121.70	7.77	295.10	344.96	25.98	403.20	140.00	50.00	50.00	20.00
15	0.43	4.30	0.26	632.28	111.19	4.84	109.02	319.87	25.08	358.40	140.00	12.50	12.50	20.00
16	0.54	4.90	0.14	696.92	92.18	4.22	118.92	360.64	21.72	470.40	140.00	50.00	25.00	20.00
17	0.39	5.00	0.23	417.30	59.35	3.28	84.35	420.24	20.83	336.00	70.00	50.00	25.00	0.00
18	0.29	5.10	0.08	361.78	67.89	2.80	95.22	476.67	30.68	369.60	70.00	12.50	25.00	0.00
19	0.39	5.20	0.06	466.70	58.81	3.14	104.27	344.96	30.46	336.00	140.00	25.00	25.00	0.00
20	0.35	4.70	0.12	351.60	36.28	1.55	83.51	366.91	31.36	313.60	70.00	0.00	25.00	0.00
21	0.54	4.90	0.14	396.78	49.52	2.57	115.10	366.91	21.05	369.60	70.00	25.00	25.00	0.00
22	0.52	4.50	0.11	460.12	58.43	2.65	109.03	476.67	38.08	459.20	140.00	50.00	12.50	0.00
23	0.49	4.30	0.04	323.80	46.97	2.20	58.13	423.46	39.64	291.20	35.00	25.00	25.00	0.00
24	0.29	4.50	0.13	199.88	17.10	0.86	26.09	401.40	26.88	358.40	0.00	0.00	0.00	0.00

Table: 6 The basic data for water melon

Basic data	N	P	K
Nutrient requirement, kg/q	0.14	0.01	0.23
Soil efficiency (%)	8.95	7.07	15.33
Fertilizer efficiency (%)	39.83	21.01	319.23
Organic Efficiency (%)	0.11	0.04	0.28

Chemical Analysis of Organics (%)		
N	P	K
0.81	0.17	0.51

The experiment was completed, the data processed and the targeted yield equations formulated are given below.

$$FN = 0.36 T - 0.22 SN - 2.66 ON$$

$$FP_2O_5 = 0.04 T - 0.34 SP - 2.12 OP$$

$$FK_2O = 0.07T - 0.05 SK - 0.88 OK$$

Table: 7 Ready Reckoner for water melon for the yield target of 20t/ha

	Min	Max	Setup
Target (q/ha)	300.00		
STV N	250.00	350.00	20.00
STV P	5.00	30.00	5.00
STV K	200.00	300.00	20.00
FYM (t/ha)	10.00		

Ready Reckoner for water melon for the yield target of 30q/ha

Sl. No.	STV N Kg/ha	STV P Kg/ha	STV K Kg/ha	N Kg/ha	P ₂ O ₅ Kg/ha	K ₂ O Kg/ha
1	250.00	5.00	200.00	30.57	7.01	7.80
2	270.00	10.00	220.00	26.07	5.32	6.84
3	290.00	15.00	240.00	21.58	3.64	5.88
4	310.00	20.00	260.00	17.08	1.96	4.92
5	330.00	25.00	280.00	12.59	0.28	3.96
6	350.00	30.00	300.00	8.09	0.00	3.00

We have laid out another test crop experiment on tomato, variety *Anagha* after the gradient crop of maize and the crop is coming up well.

FIELD VERIFICATION TRIALS ON GROUNDNUT

The field verification trials on groundnut were conducted using the variety *TAG-24* at Palakkad. The STCR-2 (target yield 3t/ha) treatments were found to be superior.

The targeted yield equations (IPNS) for groundnut

$$FN = 108.44 T - 0.616 SN - 1.56 ON$$

$$FP_2O_5 = 38.01 T - 1.577 SP - 1.87 OP$$

$$FK_2O = 71.43 T - 0.305 SK - 1.85 OK$$

We have undertaken four experiments in Palakkad district. The experiments were conducted during the period from January-February to April-May. The general recommendation for groundnut in Kerala is 10:75:75 N, P₂O₅ and K₂O kg/ha.

The treatments consisted of the following

1. Control
2. Farmers' practices.
3. General recommendation of KAU
4. STL recommendation

5. STCR-1 recommendation for a yield target of 2.5t/ha
6. STCR-2 recommendation for a yield target of 3t/ha
7. IPNS-1 recommendation for a yield target of 2.5t/ha with FYM 2t/ha
8. IPNS-2 recommendation for a yield target of 3t/ha with FYM 2.5t/ha

Table: 8 Basic fertility status of the fields of groundnut experiment in Palakkad district.

SL No	Name and address of the farmer	Available N, Kg/ha	Available P, Kg/ha	Available K, Kg/ha
1	Mohandas S. Mooper House Pattikulam Nannode P O. Palakkad	216.02	122.71	168.00
2	P Guruvayurappan, Nellimedu Kannimari P O. Chittur	245.59	67.17	224.00
3	V Prahladanayaki, Kulappurakkad, Nellimedu Palakkad	379.45	49.92	560.00
4	Maruthamuthu Nellimedu Meenakshipuram Palakkad	200.80	18.08	252.00

Table: 9 Quantity of fertilizers and FYM applied to groundnut at Pattikulam, Nannode P O , Palakkad

Details of treatments	Urea kg/ha	Rajphos kg/ha	MOP kg/ha	FYM t/ha
1	2	3	4	5
T1 - Control	0.00	0.00	0.00	0.00
T2 - FP	166.67	333.33	166.67	0.00
T3 - GRD	21.74	416.67	125.00	2.00
T4 - STL	21.09	41.67	103.75	2.00
T5 - STCR 1 2.5t/ha	300.07	208.33	212.23	0.00
T6 - STCR 2 3t/ha	417.94	208.33	271.75	0.00
T7 - IPNS 1 - 2.5t/ha (FYM 2t/ha)	293.22	208.33	142.43	2.00
T8 - IPNS 2 3t/ha (FYM 2.5t/ha)	409.38	208.33	184.50	2.50

Table: 10 Quantity of fertilizers and FYM applied to groundnut at Nellimedu Kannimari P O., Chittur, Palakkad

Details of treatments	Urea kg/ha	Rajphos kg/ha	MOR kg/ha	FYM t/ha
1	2	3	4	5
T1 - Control	0.00	0.00	0.00	0.00
T2 - FP	100.00	200.00	133.33	0.00
T3 - GRD	21.74	416.67	125.00	2.00
T4 - STL	23.04	208.33	88.75	2.00
T5 - STCR 1 - 2.5t/ha	260.47	208.33	183.76	0.00
T6 - STCR 2 - 3t/ha	378.34	45.02	0.00	0.00
T7 - IPNS 1 - 2.5t/ha (FYM 2t/ha)	253.69	208.33	160.29	2.00
T8 - IPNS 2 - 3t/ha (FYM 2.5t/ha)	369.86	42.42	213.94	2.50

Table 11 Quantity of fertilizers and FYM applied to groundnut at Kulappurakkad, Nellimedu, Palakkad

Details of treatments	Urea kg/ha	Rajphos kg/ha	MOP kg/ha	FYM t/ha
1	2	3	4	5
T1 - Control	0.00	0.00	0.00	0.00
T2 - FP	100.00	266.67	233.33	0.00
T3 - GRD	21.74	416.67	125.00	2.00
T4 - STL	18.26	208.33	62.50	2.00
T5 - STCP 1 - 2.5t/ha	81.21	90.56	12.96	0.00
T6 - STCR 2 - 3t/ha	199.08	196.15	72.48	0.00
T7 - IPNS 1 - 2.5t/ha (FYM 2t/ha)	71.72	84.33	62.50	2.00
T8 - IPNS 2 - 3t/ha (FYM 2.5t/ha)	187.21	188.35	14.58	2.50

Table 12 Quantity of fertilizers and FYM applied to groundnut at Nellimedu, Meenakshipuram Palakkad

Details of treatments	Urea kg/ha	Rajphos kg/ha	MOP kg/ha	FYM t/ha
1	2	3	4	5
T1 - Control	0.00	0.00	0.00	0.00
T2 - FP	133.33	333.33	166.67	0.00
T3 - GRD	21.74	416.67	125.00	2.00
T4 - STL	21.09	295.83	75.00	2.00
T5 - STCR 1 - 2.5t/ha	320.45	369.52	169.53	0.00
T6 - STCR 2 - 3t/ha	438.32	475.10	229.05	0.00
T7 - IPNS 1 - 2.5t/ha (FYM 2t/ha)	301.46	364.11	127.09	2.00
T8 - IPNS 2 - 3t/ha (FYM 2.5t/ha)	414.58	468.35	176.01	2.50

Table: 13 Quantity of fertilizers and FYM applied (average) to groundnut

Details of treatments	Urea kg/ha	Rajphos kg/ha	MOP kg/ha	FYM t/ha
1	2	3	4	5
T1 - Control	0.00	0.00	0.00	0.00
T2 - FP	125.00	283.33	175.00	0.00
T3 - GRD	21.74	416.67	125.00	2.00
T4 - STL	20.87	188.54	82.50	2.00
T5 - STCR 1 - 2.5t/ha	240.55	219.19	144.62	0.00
T6 - STCR 2 - 3t/ha	358.42	231.15	143.32	0.00
T7 - IPNS 1 - 2.5t/ha (FYM 2t/ha)	230.02	216.28	123.08	2.00
T8 - IPNS 2 - 3t/ha (FYM 2.5t/ha)	345.26	226.86	147.26	2.50

Cost of fertilizers and produce

Item	Rate Rs./kg	Item	Rate Rs./kg
Urea	6.00	Cow dung (FYM)	1.00
Rajphos	5.10	Groundnut (pod)	25.00
Muriate of Potash	5.30	Lime	2.50

Table: 14 Cost benefit analysis of groundnut crop at Pattikulam, Nannode P.O , Palakkad.

Treatments	Details of treatments	Yield of groundnut t/ha	Cost of urea Rs /ha	Cost of RP/FP Rs /ha	Cost of MOP Rs /ha	Total fertilizer cost Rs /ha	Cost of FYM Rs	Labour, seed and other cost Rs /ha	Total cultivation costs Rs /ha	Benefit Rs /ha	Actual Profit Rs /ha	B/C ratio
1	2	3	4	5	6	7	8	9	10	11	12	13
T1	Control	1.25	0.00	0.00	0.00	0.00	0.00	38000.00	38000.00	31333.33	-6666.67	0.00
T2	FP	3.44	1000.00	1700.00	883.33	3583.33	0.00	40750.00	44333.33	86000.00	41666.67	1.94
T3	GRD	2.35	130.43	2125.00	662.50	2917.93	2000.00	40750.00	45667.93	58888.89	13220.95	1.29
T4	STL	2.26	126.52	212.50	549.88	888.90	2000.00	40750.00	43638.90	56666.67	13027.77	1.30
T5	STCR – 1, 2.5t/ha	2.81	1800.41	1062.50	1124.79	3987.71	0.00	40750.00	44737.71	70444.44	25706.74	1.57
T6	STCR – 2, 3t/ha	3.29	2507.63	1062.50	1440.28	5010.41	0.00	40750.00	45760.41	82444.44	36684.04	1.80
T7	IPNS – 1, 2.5t/ha (FYM 2t/ha)	3.01	1759.31	1062.50	754.87	3576.68	2000.00	40750.00	46326.68	75333.33	29006.65	1.63
T8	IPNS – 2, 3t/ha (FYM 2.5t/ha)	3.61	2456.25	1062.50	977.87	4496.63	2500.00	40750.00	47746.63	90444.44	42697.82	1.89

Table. 15 Cost benefit analysis of groundnut crop at Nellimedu, Kannimari P O , Chittur, Palakkad

Treat-ments	Details of treatments	Yield of groundnut t/ha	Cost of urea Rs/ha	Cost of RP FP Rs/ha	Cost of MOP Rs/ha	Total fertilizer cost Rs/ha	Cost of FYM Rs	Labour, seed and other cost Rs/ha	Total cultivation costs Rs/ha	Benefit Rs/ha	Actual Profit Rs/ha	B/C ratio
1	2	3	4	5	6	7	8	9	10	11	12	13
T1	Control	1.34	0.00	0.00	0.00	0.00	0.00	38000.00	38000.00	33555.56	-4444.44	0.00
T2	FP	2.53	800.00	1020.00	706.67	2326.67	0.00	40750.00	43076.67	64666.67	21590.00	1.50
T3	GRD	2.45	130.43	2125.00	662.50	2917.93	2000.00	40750.00	45667.93	61333.33	15665.40	1.34
T4	STL	2.12	133.26	1062.50	470.38	1671.14	2000.00	40750.00	44421.14	53111.11	8689.98	1.20
T5	STCR – 1 2.5t/ha	2.92	1562.82	1062.50	973.92	3599.24	0.00	40750.00	44349.24	73111.11	28761.87	1.65
T6	STCR – 2. 3t/ha	3.53	2270.04	229.58	0.00	2499.62	0.00	40750.00	43249.62	88444.44	45194.82	2.04
T7	IPNS – 1 2.5t/ha (FYM 2t/ha)	3.40	1522.12	1062.50	849.52	3434.15	2000.00	40750.00	46184.15	85111.11	38926.96	1.84
T8	IPNS – 2 3t/ha (FYM 2.5t/ha)	3.60	2219.17	216.34	1133.90	3569.41	2500.00	40750.00	46819.41	90222.22	43402.81	1.93

Table 16 Cost benefit analysis of groundnut crop at Kulappurakkad, Nellimedu, Palakkad

Treatments	Details of treatments	Yield of groundnut t/ha	Cost of urea Rs /ha	Cost of RP/FP Rs /ha	Cost of MOP Rs /ha	Total fertilizer cost Rs /ha	Cost of FYM Rs	Labour, seed and other cost Rs /ha	Total cultivation costs Rs /ha	Benefit Rs /ha	Actual Profit Rs /ha	B/C ratio
1	2	3	4	5	6	7	8	9	10	11	12	13
T1	Control	1.13	0.00	0.00	0.00	0.00	0.00	38000.00	38000.00	39333.33	1333.33	1.04
T2	FP	2.68	600.00	1360.00	1236.67	3196.67	0.00	40750.00	43946.67	90444.44	46497.78	2.06
T3	GRD	2.72	130.43	2125.00	662.50	2917.93	2000.00	40750.00	45667.93	84666.67	38998.73	1.85
T4	STL	2.23	109.57	1062.50	331.25	1503.32	2000.00	40750.00	44253.32	61777.78	17524.46	1.40
T5	STCR – 1, 2.5t/ha	3.03	487.29	461.87	68.68	1017.83	0.00	40750.00	41767.83	63555.56	21787.72	1.52
T6	STCR – 2, 3t/ha	3.44	1194.51	1000.34	384.16	2579.01	0.00	40750.00	43329.01	88000.00	44670.99	2.03
T7	IPNS – 1, 2.5t/ha (FYM 2t/ha)	3.44	430.31	430.08	331.25	1191.64	2000.00	40750.00	43941.64	76666.67	32725.03	1.74
T8	IPNS – 2, 3t/ha (FYM 2.5t/ha)	3.60	1123.29	960.60	77.26	2161.15	2500.00	40750.00	45411.15	91111.11	45699.96	2.01

Benefit analysis of groundnut crop at Nellimedu, Meenakshipuram, Palakkad

Treatments	Yield of groundnut t/ha	Cost of urea Rs/ha	Cost of RP/FP Rs/ha	Cost of MOP Rs/ha	Total fertilizer cost Rs/ha	Cost of FYM Rs	Labour, seed and other cost Rs/ha	Total cultivation costs Rs./ha	Benefit Rs/ha	Actual Profit Rs./ha	B/C ratio	
1	2	3	4	5	6	7	8	9	10	11	12	13
T1 Control	1.57	0.00	0.00	0.00	0.00	0.00	38000.00	38000.00	28444.44	-9555.56	0.00	
T2 FP	3.61	800.00	1700.00	883.33	3383.33	0.00	40750.00	44133.33	67111.11	22977.78	1.52	
T3 GRD	3.38	130.43	2125.00	662.50	2917.93	2000.00	40750.00	45667.93	68222.22	22554.29	1.49	
T4 STL	2.47	126.52	1508.75	397.50	2032.77	2000.00	40750.00	44782.77	55777.78	10995.01	1.25	
T5 STCR - 1 2.5t/ha	2.54	1922.70	1884.53	898.48	4705.72	0.00	40750.00	45455.72	75777.78	30322.06	1.67	
T6 STCR - 2 3t/ha	3.52	2629.92	2423.01	1213.97	6266.89	0.00	40750.00	47016.89	86000.00	38983.11	1.83	
T7 IPNS - 1 2.5t/ha (FYM 2t/ha)	3.06	1808.75	1856.98	673.58	4339.32	2000.00	40750.00	47089.32	86222.22	39132.90	1.83	
T8 IPNS - 2 3t/ha (FYM 2.5t/ha)	3.64	2487.49	2388.57	932.84	5808.89	2500.00	40750.00	49058.89	90000.00	40941.11	1.83	

Table 3. Cost-benefit analysis (average) of groundnut crop experiment at 4 different locations in Palakkad district

Treatments	Details of treatments	Yield of groundnut t/ha	Cost of urea Rs/ha	Cost of RP FP Rs/ha	Cost of MOP Rs/ha	Total fertilizer cost Rs/ha	Cost of FYM Rs	Labour, seed and other cost Rs/ha	Total cultivation costs Rs/ha	Benefit Rs/ha	Actual Profit Rs/ha	B/C ratio	
	1	2	3	4	5	6	7	8	9	10	11	12	13
T1	Control	1.32	0.00	0.00	0.00	0.00	0.00	38000.00	38000.00	33166.67	-4833.33	0.00	
T2	FP	3.08	750.00	1445.00	927.50	3122.50	0.00	40750.00	43872.50	77055.56	33183.06	1.75	
T3	GRD	2.73	130.43	2125.00	662.50	2917.93	2000.00	40750.00	45667.93	68277.78	22609.84	1.50	
T4	STL	2.27	125.22	961.56	437.25	1524.03	2000.00	40750.00	44274.03	56833.33	12559.30	1.28	
T5	STCR – 1. 2.5t/ha	2.82	1443.31	1117.85	766.47	3327.62	0.00	40750.00	44077.62	70722.22	26644.60	1.60	
T6	STCR – 2. 3t/ha	3.44	2153.52	1178.86	759.60	4088.98	0.00	40750.00	44838.98	86222.22	41383.24	1.93	
T7	IPNS – 1. 2.5t/ha (FYM 2t/ha)	3.23	1380.13	1103.01	652.31	3135.45	2000.00	40750.00	45885.45	80833.33	34947.89	1.76	
T8	IPNS – 2. 3t/ha (FYM 2.5t/ha)	3.61	2071.55	1157.00	780.47	4009.02	2500.00	40750.00	47259.02	90444.44	43185.42	1.92	

FIELD VERIFICATION TRIALS ON SWEET POTATO

We have conducted field verification trials on sweet potato using the variety *Varun* at 3 different locations of Palakkad district. In all the three locations, the IPNS-1 treatment with the target of 30t/ha recorded the maximum profit in spite of the heavy incidence of the rhizome rot. In one location, the crop was completely damaged due to the disease.

We have used the following equations developed for sweet potato for these trials.

$$FN = 3.04 T - 0.27 SN - 0.20 ON$$

$$FP_2O_5 = 1.27 T - 2.85 SP - 0.62 OP$$

$$FK_2O = 8.60 T - 0.93 SK - 0.42 OK$$

We have undertaken three experiments at different locations in Palakkad district. The experiments were conducted during the period November 2010 – February 2011. The general recommendation for sweet potato in Kerala is 75:50:75 N, P₂O₅ and K₂O kg/ha.

The treatments consisted of the following for Palakkad district:

- 1 T1 - Control
- 2 T2 - FP
- 3 T3 - GRD
- 4 T4 - STL
- 5 T5 - STCR-1, 35t/ha
- 6 T6 - STCR-2, 40t/ha
- 7 T7 - IPNS-1, 35t/ha (FYM-7.5t/ha)
- 8 T8 - IPNS-2, 40t/ha (FYM-10t/ha)

Table: 19 Basic fertility status of the fields of sweet potato at Palakkad district.

SL No.	Name and address of the farmer	Available N, kg/ha	Available P, kg/ha	Available K, kg/ha
1	Mr Rajendran. K. Kakkamperavi Mathur Agraharam, Palakkad	649.25	57.97	78.40
2	Mr Velunni K, Keezheppura Mathur Agraharam, Palakkad	454.72	43.02	182.00
3	Mr Sivaraman G. Gopal rice mill Mathur Agraharam, Palakkad	465.41	107.14	364.00

Table: 20 Cost of fertilizers, FYM and produce

Item	Rate
FYM	Rs.1.00/kg
Urea	Rs.6.00/kg
Rajpos	Rs.5.10/kg
MOP	Rs.5.40/kg
Produce	Rs.7.00/kg

Table: 21 Quantity of fertilizers and FYM applied to sweet potato at Kakkamperavi, Mathur, Agraharam, Palakkad.

Treatments	Details of treatments	Urea Kg/ha	Rajphos Kg/ha	MOP Kg/ha	FYM t/ha
1	2	3	4	5	6
T1	Control	0 00	0 00	0 00	0 00
T2	FP	100 00	333 33	166 67	8 00
T3	GRD	163 04	277 78	125 00	10 00
T4	STL	190 76	69 44	132 50	10 00
T5	STCP-1, 35t/ha	81 33	138 89	380 15	0 00
T6	STCR-2, 40t/ha	81 33	138 89	451 81	0.00
T7	IPNS 1, 35t/ha (FYM-7.5t/ha)	81 33	138 89	353 90	7 50
T8	IPNS-2, 40t/ha (FYM-10t/ha)	81 33	138 89	416 81	10 00

Table: 22 Quantity of fertilizers and FYM applied to sweet potato at Keezheppura Mathur Agraharam Palakkad

Treatments	Details of treatments	Urea Kg/ha	Rajphos Kg/ha	MOP Kg/ha	FYM t/ha
1	2	3	4	5	6
T1	Control	0.00	0.00	0.00	0.00
T2	FP	133.33	333.33	166.67	5.00
T3	GRD	163.04	277.78	125.00	10.00
T4	STL	158.15	69.44	103.75	10.00
T5	STCR-1, 35t/ha	81.33	138.89	219.57	0.00
T6	STCR-2, 40t/ha	81.33	138.89	291.23	0.00
T7	IPNS-1, 35t/ha (FYM-7.5t/ha)	81.33	138.89	203.29	7.50
T8	IPNS-2, 40t/ha (FYM-10t/ha)	81.33	138.89	269.53	10.00

Table: 23 Quantity of fertilizers and FYM applied to sweet potato at Pulinelli Mathur Agraharam. Palakkad

Treatments	Details of treatments	Urea Kg/ha	Rajphos Kg/ha	MOP Kg/ha	FYM t/ha
1	2	3	4	5	6
T1	Control	0.00	0.00	0.00	0.00
T2	FP	200.00	320.00	160.00	8.00
T3	GRD	163.04	277.78	125.00	10.00
T4	STL	172.83	69.44	31.25	10.00
T5	STCP-1, 35t/ha	81.60	138.89	62.50	0.00
T6	STCR-2, 40t/ha	81.60	138.89	9.20	0.00
T7	IPNS-1, 35t/ha (FYM-7.5t/ha)	81.60	138.89	62.50	7.50
T8	IPNS-2, 40t/ha (FYM-10t/ha)	81.60	138.89	62.50	10.00

Table: 24 Quantity of fertilizers and FYM applied to sweet potato (average)

Treatments	Details of treatments	Urea Kg/ha	Rajphos Kg/ha	MOP Kg/ha	FYM t/ha
1	2	3	4	5	6
T1	Control	0.00	0.00	0.00	0.00
T2	FP	144.44	328.89	164.44	7.00
T3	GRD	163.04	277.78	125.00	10.00
T4	STL	173.91	69.44	89.17	10.00
T5	STCR-1, 35t/ha	81.42	138.89	220.74	0.00
T6	STCR-2, 40t/ha	81.42	138.89	250.75	0.00
T7	IPNS-1, 35t/ha (FYM-7.5t/ha)	81.42	138.89	206.56	7.50
T8	IPNS-2, 40t/ha (FYM-10t/ha)	81.42	138.89	249.62	10.00

Table 15 Cost benefit analysis of sweet potato at Kakkamperavi Mathur, Agraharam, Palakkad.

Treatments	Details of treatments	Yield of sweet potato t/ha	Cost of urea Rs/ha	Cost of RP FP Rs/ha	Cost of MOP Rs/ha	Total fertilizer cost Rs/ha	Cost of FYM Rs	Labour, and other costs Rs/ha	Total cultivation cost Rs/ha	Benefit Rs/ha	Actual Profit Rs./ha	B/C ratio	
	1	2	3	4	5	6	7	8	9	10	11	12	13
T1	Control	9.58	0.00	0.00	0.00	0.00	0.00	50000.00	50000.00	63544.44	13544.44	1.27	
T2	FP	20.91	600.00	1700.00	883.33	3183.33	8000.00	52000.00	63183.33	146377.78	83194.44	2.32	
T3	GRD	9.80	978.23	1416.67	682.50	3057.43	10000.00	52000.00	65057.43	137433.33	72375.91	2.11	
T4	STL	16.47	1144.67	354.17	702.25	2200.98	10000.00	52000.00	64200.98	115266.67	51065.68	1.80	
T5	STCR – 1, 35t/ha	18.68	488.00	708.33	2014.78	3211.11	0.00	52000.00	55211.11	130744.44	75533.33	2.37	
T6	STCR – 2, 40t/ha	15.83	488.00	708.33	2394.61	3590.94	0.00	52000.00	55590.94	110833.33	55242.39	1.99	
T7	IPNS – 1, 35t/ha (FYM-7.5t/ha)	21.80	488.00	708.33	1875.65	3071.99	7500.00	52000.00	62571.99	152833.33	90261.35	2.44	
T8	IPNS – 2, 40t/ha (FYM-10t/ha)	25.72	488.00	708.33	2209.11	3405.44	10000.00	52000.00	65405.44	180055.56	114650.11	2.75	

Table 26 Cost benefit analysis of sweet potato at Keezheppura Mathur Agraharam, Palakkad

Treatments	Details of treatments	Yield of sweet potato t/ha	Cost of urea Rs/ha	Cost of RP FP Rs/ha	Cost of MOP Rs/ha	Total fertilizer cost Rs/ha	Cost of FYM Rs	Labour, and other costs Rs/ha	Total cultivation cost Rs./ha	Benefit Rs./ha	Actual Profit Rs/ha	B/C ratio
1	2	3	4	5	6	7	8	9	10	11	12	13
T1	Control	9.47	0.00	0.00	0.00	0.00	0.00	50000.00	50000.00	66266.67	16266.67	1.33
T2	FP	18.32	800.00	1700.00	683.33	3383.33	5000.00	52000.00	60383.33	131755.56	71372.22	2.18
T3	GRD	21.60	978.26	1416.67	662.50	3057.43	10000.00	52000.00	65057.43	152600.00	87542.57	2.35
T4	STL	15.37	948.91	354.17	549.88	1852.95	10000.00	52000.00	63852.95	107566.67	43713.71	1.68
T5	STCR - 1, 35t/ha	16.61	488.00	708.33	1163.70	2360.04	0.00	52000.00	54360.04	116277.78	61917.74	2.14
T6	STCR - 2, 40t/ha	17.02	488.00	708.33	1543.54	2739.87	0.00	52000.00	54739.87	119155.56	64415.69	2.18
T7	IPNS - 1, 35t/ha (FYM-7.5t/ha)	23.90	488.00	708.33	1077.45	2273.78	7500.00	52000.00	61773.78	167300.00	105526.22	2.71
T8	IPNS - 2, 40t/ha (FYM-10t/ha)	25.67	488.00	708.33	1428.53	2624.86	10000.00	52000.00	64624.86	179666.67	115041.81	2.78

Table 27 Cost benefit analysis of sweet potato at Pulinelli, Mathur Agraharam, Palakkad.

Treatments	Details of treatments	Yield of sweet potato t/ha	Cost of urea Rs/ha	Cost of RP FP Rs/ha	Cost of MOP Rs/ha	Total fertilizer cost Rs/ha	Cost of FYM Rs	Labour, and other costs Rs./ha	Total cultivation cost Rs/ha	Benefit Rs/ha	Actual Profit Rs/ha	B/C ratio
1	2	3	4	5	6	7	8	9	10	11	12	13
T1	Control	9.27	0.00	0.00	0.00	0.00	0.00	50000.00	50000.00	64866.67	14866.67	1.30
T2	FP	24.04	1200.00	1632.00	848.00	3680.00	8000.00	52000.00	63680.00	170411.11	106731.11	2.68
T3	GRD	26.11	978.26	1416.67	662.50	3057.43	10000.00	52000.00	65057.43	182777.78	117720.35	2.81
T4	STL	16.69	1036.96	354.17	165.63	1556.75	10000.00	52000.00	63556.75	116822.22	53265.47	1.84
T5	STCR – 1, 35t/ha	17.34	489.60	708.33	331.25	1529.18	0.00	52000.00	53529.18	121411.11	67881.93	2.27
T6	STCR – 2, 40t/ha	15.39	489.60	708.33	43.76	1246.69	0.00	52000.00	53246.69	107722.22	54475.53	2.02
T7	IPNS – 1, 35t/ha (FYM-7.5t/ha)	19.31	489.60	708.33	331.25	1529.13	7500.00	52000.00	61029.18	135177.78	74148.59	2.21
T8	IPNS – 2, 40t/ha (FYM-10t/ha)	22.30	489.60	708.33	331.25	1529.18	10000.00	52000.00	63529.18	156100.00	92570.82	2.46

Table 28 Cost benefit analysis (average) of sweet potato experiment at 3 different locations in Palakkad district

Treatments	Details of treatments	Yield of sweet potato t/ha	Cost of urea Rs/ha	Cost of RP/FP Rs/ha	Cost of MOP Rs/ha	Total fertilizer cost Rs/ha	Cost of FYM Rs	Labour, and other costs Rs/ha	Total cultivation cost Rs./ha	Benefit Rs/ha	Actual Profit Rs/ha	B/C ratio
	2	3	4	5	6	7	8	9	10	11	12	13
T1	Control	9.27	0.00	0.00	0.00	0.00	0.00	50000.00	50000.00	64892.59	14892.59	1.30
T2	FP	21.36	866.67	1677.33	871.56	3415.56	7000.00	52000.00	62415.56	149514.81	87099.26	2.39
T3	GRD	22.51	978.26	1416.67	662.50	3057.43	10000.00	52000.00	65057.43	157603.70	92546.28	2.42
T4	STL	16.17	1043.48	354.17	472.58	1870.23	10000.00	52000.00	63870.23	113218.52	49348.29	1.77
T5	STCR - 1, 35t/ha	17.54	488.53	708.33	1169.91	2366.78	0.00	52000.00	54366.78	122811.11	68444.33	2.26
T6	STCR - 2, 40t/ha	16.08	488.53	708.33	1328.97	2525.84	0.00	52000.00	54525.84	112570.37	58044.53	2.06
T7	IPNS - 1, 35t/ha (FYM-7.5t/ha)	21.68	488.53	708.33	1094.78	2291.65	7500.00	52000.00	61791.65	151770.37	89978.72	2.46
T8	IPNS - 2, 40t/ha (FYM-10t/ha)	24.56	488.53	708.33	1322.96	2519.83	10000.00	52000.00	64519.83	171940.74	107420.91	2.66

The results of the verification trials on sweet potato proved the superiority of STCR treatments (T7 and T8) along with FYM application to produce the highest B/C ratios

FIELD VERIFICATION TRIALS ON AMARANTHUS

We have also test verified the IPNS equations in amaranthus at 2 locations and the STCR treatments were found to be better in all the two locations in Thrissur and Palakkad districts.

We have developed the following equations for amaranthus

N	= 3.50 T – 0.10 SN – 0.19 ON
P ₂ O ₅	= 1.44 T – 2.58 SP – 0.30 OP
K ₂ O	= 1.35 T – 0.60 SK – 0.13 OK

We have undertaken two experiments at Thrissur and Palakkad districts. The experiments were conducted during the period from February-March to April-May 2011. The general recommendation for amaranthus in Kerala is 100:50:50 N, P₂O₅ and K₂O kg/ha.

The treatments consisted of the following

T1	Control
T2	FP
T3	GRD
T4	STL
T5	STCR yield target 20t/ha
T6	STCR yield target 25t/ha
T7	IPNS yield target 20t/ha with FYM 40t/ha
T8	IPNS yield target 25t/ha with FYM 60t/ha

Table: 29 Basic fertility status of the amaranthus fields.

SL No.	Name and address of the farmer	Available N, kg/ha	Available P, kg/ha	Available K, kg/ha
1	Mr. Premadasn, Kadampuzha house, Vellanikkara, Thrissur	558.21	16.68	560.00
2	Mr. Sivaraman.G, Gopal rice mill Mathur Agraharam, Palakkad	465.41	107.14	364.00

Cost of fertilizer, organics and produce

Item	Cost
FYM	Rs.1.00/kg
Urea	Rs.6.00/kg
Rajphos	Rs.5.10/kg
MOP	Rs.5.30/kg
Amaranthus leaf	Rs.15.00/kg
Amaranthus seed	Rs.100.00/100g

Table: 30 Quantity of fertilizers and FYM applied to amaranthus at Vellanikkara, Thrissur.

Treatments	Details of treatments	urea kg/ha	RP kg/ha	MOP kg/ha	FYM t/ha
1	2	3	4	5	6
T1	Control	0 00	0 00	0 00	0 00
T2	FR	187 50	312 50	75 00	20 00
T3	GRD	217 39	277 78	83 33	50 00
T4	STL	182 61	230 56	41 67	50 00
T5	STCR - 1 20t/ha	30 82	138 89	41 67	0 00
T6	STCR - 2 25t/ha	68 87	138 89	41 67	0 00
T7	IPN'S 1 20t/ha (FYM 40t/ha)	108 70	138 89	41 67	40 00
T8	IPN'S 2 25t/ha (FYM 60t/ha)	108 70	138 89	41 67	60 00

Table 31 Quantity of fertilizers and FYM applied to amaranthus at Mathur Agraharam, Palakkad.

Treatments	Details of treatments	urea kg/ha	RP kg/ha	MOP kg/ha	FYM t/ha
1	2	3	4	5	6
T1	Control	0.00	0 00	0.00	0.00
T2	FP	166.67	416.67	208.33	20.00
T3	GRD	217.39	277.78	83.33	50.00
T4	STL	210.87	102.78	41.67	50.00
T5	STCR - 1 20t/ha	51.00	138.89	8.60	0.00
T6	STCR - 2 25t/ha	89.04	138.89	19.85	0.00
T7	IPNS - 1 20t/ha (FYM 40t/ha)	108.70	138.89	41.67	40.00
T8	IPNS - 2 25t/ha (FYM 60t/ha)	4.78	138.89	41.67	60.00

Table 32 Quantity of fertilizers and FYM applied to amaranthus (average of two locations)

Treatments	Details of treatments	urea kg/ha	RP kg/ha	MOP kg/ha	FYM t/ha
1	2	3	4	5	6
T1	Control	0.00	0 00	0 00	0 00
T2	FP	177.08	364.58	141.67	20.00
T3	GRD	217.39	277.78	83.33	50.00
T4	STL	196.74	166.67	41.67	50.00
T5	STCR - 1 20t/ha	40.91	138.89	25.13	0.00
T6	STCR - 2 25t/ha	78.95	138.89	30.76	0.00
T7	IPNS - 1 20t/ha (FYM 40t/ha)	108.70	138.89	41.67	40.00
T8	IPNS - 2 25t/ha (FYM 60t/ha)	56.74	138.89	41.67	60.00

Table: 33 Cost benefit analysis of amaranthus at Vellanikkara, Thrissur.

Treatments	Details of treatments	Yield of amaranthus t/ha	Cost of urea Rs/ha	Cost of RP FP Rs/ha	Cost of MOP Rs/ha	Total fertilizer cost Rs/ha	Cost of FYM Rs/ha	Labour and other costs Rs/ha	Total cultivation cost Rs/ha	Benefit Rs/ha	Actual Profit Rs./ha	B/C ratio
	2	3	4	5	6	7	8	9	10	11	12	13
T1	Control	5.7222	0.00	0.00	0.00	0.00	0.00	52750.00	52750.00	68666.67	15916.67	1.30
T2	FP	16.1898	1126.00	1593.75	397.50	3116.25	20000.00	52750.00	75866.25	194277.78	118411.53	2.56
T3	GRD	16.6458	1304.35	1416.67	441.67	3162.68	50000.00	52750.00	105912.68	199750.00	93837.32	1.89
T4	STL	14.7685	1095.65	1175.83	220.83	2492.32	50000.00	52750.00	105242.32	177222.22	71979.90	1.68
T5	STCR - 1 (20t/ha)	15.5213	184.94	708.33	220.83	1114.11	0.00	52750.00	53864.11	191055.56	137191.45	3.55
T6	STCR - 2 (25t/ha)	17.1574	413.20	708.33	220.83	1342.37	0.00	52750.00	54092.37	205888.89	151796.52	3.81
T7	IPNS - 1 (20t/ha) (FYM 40t/ha)	17.6736	652.17	708.33	220.83	1581.34	40000.00	52750.00	94331.34	212083.33	117751.99	2.25
T8	IPNS - 2 (25t/ha) (FYM 60t/ha)	19.1481	652.17	708.33	220.83	1581.34	60000.00	52750.00	114331.34	229777.78	115446.44	2.01

Table 34 Cost benefit analysis of amaranthus at Mathur Agraharam, Palakkad

Treatments	Details of treatments	Yield of amaranthus t/ha	Cost of urea Rs/ha	Cost of RP FP Rs/ha	Cost of MOP Rs/ha	Total fertilizer cost Rs/ha	Cost of FYM Rs/ha	Labour, and other costs Rs/ha	Total cultivation cost Rs/ha	Benefit Rs/ha	Actual Profit Rs/ha	B/C ratio
1	2	3	4	5	6	7	8	9	10	11	12	13
T1	Control	9.95	0.00	0.00	0.00	0.00	0.00	52750.00	52750.00	119358.97	66608.97	2.26
T2	FP	17.87	1000.00	2125.00	1104.17	4229.17	20000.00	52750.00	76979.17	214471.15	137491.99	2.79
T3	GRD	13.50	1304.35	1416.67	441.67	3162.68	50000.00	52750.00	105912.68	162035.26	56122.58	1.53
T4	STL	12.31	1265.22	524.17	220.83	2010.22	50000.00	52750.00	104760.22	147676.28	42916.06	1.41
T5	STCR - 1 20t/ha	16.85	305.99	708.33	45.58	1059.90	0.00	52750.00	53809.90	202248.93	148439.03	3.76
T6	STCR - 2 25t/ha	18.10	534.25	708.33	105.21	1347.79	0.00	52750.00	54097.79	217206.20	163108.41	4.02
T7	IPNS - 1 20t/ha FYM 40t/ha	18.29	652.17	708.33	220.83	1581.34	40000.00	52750.00	94331.34	219471.15	125139.81	2.33
T8	IPNS - 2 25t/ha (FYM 60t/ha)	21.30	28.68	708.33	220.83	957.85	60000.00	52750.00	113707.85	255560.90	141853.05	2.25

Table 35 Cost benefit analysis (average) of amaranthus experiment at 2 different locations in Thrissur and Palakkad districts

Treatments		Yield of amaranthus t/ha	Cost of urea Rs/ha	Cost of RP/FP Rs/ha	Cost of MOP Rs/ha	Total fertilizer cost Rs/ha	Cost of FYM Rs/ha	Labour, and other costs Rs/ha	Total cultivation cost Rs/ha	Benefit Rs/ha	Actual Profit Rs/ha	B/C ratio
1	2	3	4	5	6	7	8	9	10	11	12	13
T1	Control	7.23	0.00	0.00	0.00	0.00	0.00	52750.00	52750.00	94012.82	41262.82	1.78
T2	FP	17.00	1062.60	1859.38	750.83	3672.71	20000.00	52750.00	76422.71	204374.47	127951.76	2.67
T3	GRD	15.37	1304.35	1416.67	441.67	3162.69	50000.00	52750.00	105912.68	180892.63	74979.95	1.71
T4	STL	13.54	1180.43	850.00	220.83	2251.26	50000.00	52750.00	105001.27	162449.25	57447.98	1.55
T5	STCR - 1 (20t/ha)	16.33	245.47	708.33	133.21	1087.01	0.00	52750.00	53837.01	196652.24	142815.24	3.65
T6	STCR - 2 (25t/ha)	17.63	473.73	708.33	163.02	1345.08	0.00	52750.00	54095.08	211547.54	157452.46	3.91
T7	IPNS - 1 (20t/ha FYM 40t/ha)	17.38	652.17	708.33	220.83	1581.34	40000.00	52750.00	94331.34	215777.24	121445.90	2.29
T8	IPNS - 2 (25t/ha FYM 60t/ha)	20.22	340.43	708.33	220.83	1269.59	60000.00	52750.00	114019.59	242669.34	128649.74	2.13

The results of the experiments proved that the STCR treatments (T5 and T6) produced the best results. The B/C ratio was found to be less in the case of IPNS treatments probably due to the high cost of the large amount FYM applied.



Test crop
experiment
on water melon
at College of
Horticulture,
Vellanikkara

View of the
field verification
trial on groundnut
at Kulappurakkad,
Palakkad.



View of the
field verification
trial on groundnut
At Pattikulam,
Palakkad.





View of the field verification trial on groundnut at Nellimed, Palakkad.

View of the field verification trial on groundnut at Meenakshipuram, Palakkad.



View of the field verification trial on sweet potato at Kollad, Palakkad. The local Agricultural Officer and Panchayath member discuss about STCR experiments



View of the field verification trial on Sweet potato at Pulinelli, Palakkad.



View of the field verification trial on Sweet potato at Mathur, Palakkad.



View of the field verification trial on amaranthus at Mathur, Palakkad.

EXTENSION AND OTHER ACTIVITIES

1. Co operated with NIC, Pune in the formulation of Decision Support System of STCR during February 2011.
2. Attended the workshops of 33rd Zonal Research and Extension Advisory Committee Meeting at Mannuthy (ARS) and Pattambi (RARS) and linkage initiated for the adoption of STCR recommendation.
3. Monitored and guided M. Sc. Project work of Mr. Danish Tamuly "Nutrient management for sustainable rice production in the black soils of Kerala" in Chittur black soil. This project work will help to undertake STCR studies for paddy in this problem soil of nutrient imbalance.
4. Purchased instruments worth Rs.7.00lakhs and improved the laboratory facilities.
5. Attended seminar on Improving Soil Health at TNAU, Coimbatore during March 2011.

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ANNUAL TECHNICAL PROGRAMME FOR THE PERIOD 2011-2012 (KERALA)

The Soil Test Crop Response Project, Vellanikkara, Kerala, proposes the following technical programme for the period 2011-2012.

1. Test crop experiment.
Tomato
2. Test verification experiments in farmers' fields will be conducted at four locations using the IPNS equations developed by the centre for the following crop.
Bhindi
3. Front Line Demonstration trials (FLD)
 - (a) Amaranthus
 - (b) Cucumber (*cucumis melo*)

Test crop experiments: 2011- 2012

(a) Tomato

The test crop experiment of Tomato will be conducted from October-November

Treatment levels

Nutrient levels	Fertilizer dose kg/ha			FYM t/ha
	N	P ₂ O ₅	K ₂ O	
0	0	0	0	0
1	35	20	12.50	20
2	70	40	25	30
3	140	80	50	--

Seed rate, spacing and other operations will be carried out as per the Package of practices recommendation of KAU. Variety - *Anagha*

The prescription equations developed by the centre will be test verified in four or five locations for amaranth and cucumber (*Cucumis melo*) through FLD.

Test verification trials, the treatments are as follows:

1. Control
2. Farmer' Practices
3. General recommended dose
4. STL recommendation
5. STCR recommendation for a yield target – 1
6. STCR recommendation for a yield target – 2
7. IPNS recommendation for a yield target – 1
8. IPNS recommendation for a yield target – 2

The crops will be grown in the usual season.

Plant protection measures and all other operations will be done as per the POP of KAU.

Front Line Demonstration trials

The treatments are as follows

1. Control
2. Farmers' Practices
3. General recommended dose
4. STL recommendation
5. STCP Target – 1 or 2
6. IPNS Target – 1 or 2

Front line demonstration trials, on amaranth and cucumber (*Cucumis melo*) using IPNS equations, will be laid out in four or five locations in Palakkad and Thrissur districts.

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