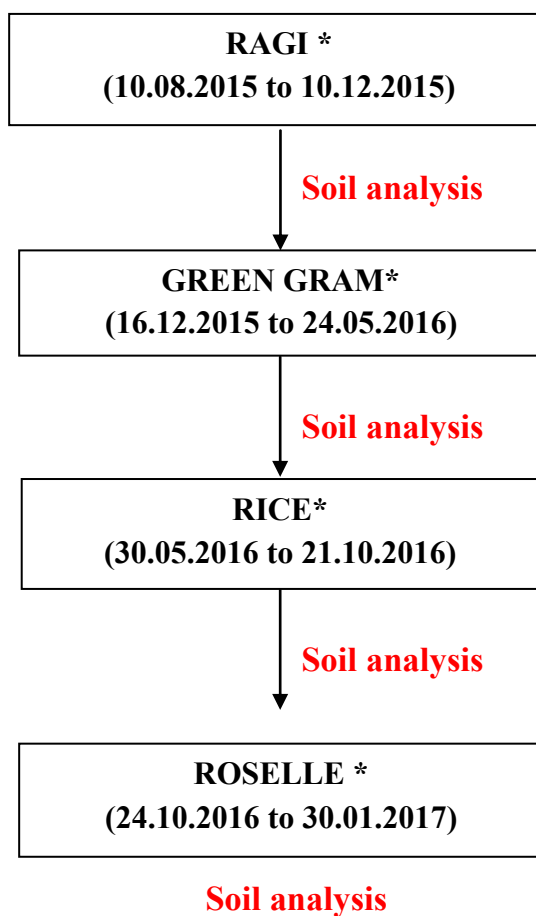


CHAPTER-IX

SOIL ANALYSIS

Soil fertility is an important aspect in agriculture and also in the environmental perspective. Indiscriminate use of chemical fertilizers and pesticides not only reduces soil fertility but also the physicochemical properties like the soil pH and water holding capacity which directly effects the plant growth and development. The organic matter, macronutrient and micronutrient content of the soil also directly affect the yield and thereby profit. Therefore, in the present study the soil was analyzed before and after cultivation of each crop for the physicochemical properties, macronutrient and micronutrient content of the soil. The outline of the cultivation duration is given in fig 1. Proper crop rotation is one of the important cultural practice to retain the soil fertility and to vile away the pathogens. Therefore, in the present study crop rotation was done with two cereal crops interspersed with one nodulated leguminous crop and one non-nodulated non-leguminous vegetable crop of the two cereal crops one was a millet type with least requirements and the other one is paddy that needs maximum irrigation and fertilization.

Fig. 1 Crop Rotation

***Treatment sprayed were once in 15 d duration**

Material and Methods

Random soil samples from the field area were collected to a depth of 0-15 cm before and after each crop. The soil analysis was done in Horticulture department of Tamil Nadu, Thiruvallur District. Soil sample was analyzed for physicochemical properties like electrical conductivity, pH, water-holding capacity and the organic carbon content. The macronutrients namely nitrogen potassium, and phosphorous content was estimated. The micronutrient content of the soil namely iron, manganese, zinc and copper was estimated.

RESULTS

Physico-chemical Properties of Soil

The soil pH was analyzed before and after the cultivation of crops. Before the cultivation, the soil pH (Table 18) was 6.2 which was neutralized to 7 in panchakavya treatment and also control during the cultivation of both ragi and green gram. After paddy cultivation the pH dropped in almost all the treatments measuring 6.4 for control and 7 for all the other treatments. Cultivation of roselle did not affect the pH to any greater effect. Electrical conductivity before cultivation was $0.2 \text{ ds}^{\text{m}^{-1}}$ which increased to $0.4 \text{ ds}^{\text{m}^{-1}}$ in almost all the panchakavya treatment, while control and chemical it was $0.2 \text{ ds}^{\text{m}^{-1}}$. The water holding capacity of the soil prior to cultivation was measured as 2.86% whereas the organic fertilizers increased the water holding capacity of the soil. After cultivation of 4 crops the water holding capacity of control was 4.8% whereas panchakavya + neem cake showed the maximum water holding capacity of 25.94%. All the panchakavya treatment and vermicompost showed increased water holding capacity which was nearly 5 times that of the control and chemical treatment. The calcium carbonate and organic carbon content was nil before and after cultivation of the crops.

Macro-Nutrient Content of the Soil

The amount of macronutrients (Table 19) namely nitrogen, phosphorus and potassium were compared before and after cultivation of the crops namely ragi, green gram, paddy and roselle in all the 7 treatments namely control, chemical, panchakavya, panchakavya +plants, panchakavya +animal waste,

panchakavya +neem cake and vermicompost. The panchakavya +animal waste treated soil showed higher concentration of nitrogen content which was 176 mg/Ht, whereas before cultivation it was only 38 mg/Ht. Phosphorous content was higher in panchakavya + animal waste treatment which was 5.3 mg/Ht. In panchakavya +animal waste treatment, potassium content before cultivation was 75 mg/Ht and after cultivation it increased to 269 mg/Ht. In panchakavya treated soil the NPK content almost double when compare to chemical fertilizer treated soil.

Micro-Nutrient Content of the Soil

The amount of micro-nutrients (Table 20) in panchakavya treated soil was observed to increase in content when compared to control and chemical treatment. Iron content was 3.26 mg/Ht before cultivation which increased in panchakavya treated soil. It was maximum in panchakavya + animal waste treated soil which was 5.9 mg/Ht. Manganese content was higher in the soil were panchakavya + animal treatment was done which was 5.7 mg/Ht while before cultivation the content was only 0.83 mg/Ht. In panchakavya + animal waste treated soil, zinc content showed an increase of 2.6 mg/Ht after cultivation, when compared to 0.23 mg/Ht before cultivation of the crops. The copper content was higher in panchakavya +animal waste treatment which was 1.2 mg/Ht, before cultivation it was only 0.36 mg/Ht. The Boron was nil in all the 7 treatments before and after cultivation of soil. The fertility of the soil increased on all the panchakavya treatments but specifically the panchakavya + animal waste treatment showed the maximum advantage over other adjuvants and to control and chemical treatments.

Table:18 Physico-chemical properties of the soil before and after cultivation

S.no	Treatments	Physico-chemical properties																						
		Calcium carbonate					Organic Carbon %					pH					Electrical conductivity(ds ^{m-1})					Water holding capacity %		
		BC	RA	G	P	RO	BC	RA	G	P	RO	BC	RA	G	P	RO	BC	RA	G	P	RO			
1	Control	-	-	-	-	-	-	-	-	-	-	6.2	7.0	7.0	6.4	6.4	0.2	0.2	0.2	0.1	0.2	4.80		
2	Chemical	-	-	-	-	-	-	-	-	-	-	6.2	7.3	7.4	7	7.1	0.2	0.3	0.3	0.2	0.2	9.20		
3	Panchakavya	-	-	-	-	-	-	-	-	-	-	6.2	7.5	7.6	7.4	7.5	0.2	0.4	0.4	0.4	0.4	20.66		
4	Panchakavya + plants	-	-	-	-	-	-	-	-	-	-	6.2	7.4	7.5	7.2	7.3	0.2	0.4	0.4	0.4	0.4	19.84		
5	Panchakavya + animal waste	-	-	-	-	-	-	-	-	-	-	6.2	7.5	7.7	7.6	7.6	0.2	0.4	0.4	0.4	0.4	22.94		
6	Panchakavya + neem cake	-	-	-	-	-	-	-	-	-	-	6.2	7.4	7.5	7.2	7.2	0.2	0.3	0.4	0.4	0.4	25.94		
7	Vermicompost	-	-	-	-	-	-	-	-	-	-	6.2	7.4	7.5	7.1	7	0.2	0.3	0.4	0.3	0.4	21.99		

BC- Before Cultivation; RA-after cultivation of ragi, G- green gram, P- paddy, RO- roselle

Table 19 Macro-nutrient content of the soil before and after cultivation

S.No	Treatments	Macro-nutrients														
		Nitrogen mg /ht					Phosphorus mg /ht					Potassium mg /ht				
		BC	RA	G	P	RO	BC	RA	G	P	RO	BC	RA	G	P	RO
1	Control	38	49	59	72	67	4.2	3.6	3.7	3.4	3	75	70	80	70	60
2	Chemical	38	115	120	126	130	4.2	4.4	4.5	4.6	4.7	75	100	115	117	119
3	Panchakavya	38	147	165	167	170	4.2	4.7	4.8	4.9	5	75	189	212	214	216
4	Panchakavya + plants	38	135	149	152	157	4.2	4.5	4.6	4.9	4.9	75	165	170	4.7	180
5	Panchakavya + animal waste	38	150	170	174	176	4.2	4.9	4.9	5.3	5.3	75	235	261	5.2	269
6	Panchakavya + neem cake	38	139	146	150	154	4.2	4.4	4.6	4.9	4.9	75	155	160	4.7	170
4	Vermicompost	38	133	145	147	148	4.2	4.3	4.6	4.7	4.8	75	125	145	147	151

BC- Before Cultivation; RA-after cultivation of ragi, G- green gram, P- paddy, RO- roselle

Table - 20 Micro-nutrient content of the soil before and after cultivation

S.No	Treatments	Micro-nutrients																						
		Iron mg /ht					Manganese mg /ht					Zinc mg /ht					Copper mg /ht					Bmg /ht		
		BC	RA	G	P	RO	BC	RA	G	P	RO	BC	RA	G	P	RO	BC	RA	G	P	RO	RA, G,P,R		
1	Control	3.26	3.70	3.82	2.69	2.39	0.83	0.18	0.21	0.19	0.22	0.23	0.24	0.30	0.27	0.22	0.36	0.18	0.20	0.18	0.17	-		
2	Chemical	3.26	4.4	4.5	4.9	4.9	0.83	2.8	3.1	3.2	1.1	0.23	0.64	1.1	1.2	1.1	0.36	0.70	1.0	1.1	1.2	-		
3	Panchakavya	3.26	4.64	5.2	5.6	5.7	0.83	4.49	5.1	5.3	2.4	0.23	1.1	2.2	2.2.4	2.4	0.36	1.2	1.7	1.9	2.5	-		
4	Panchakavya +plants	3.26	4.12	4.64	5.1	5.2	0.83	4.25	4.64	4.36	4.46	0.23	0.85	1.0	1.6	1.8	0.36	0.96	1.1	1.4	1.9	-		
5	Panchakavya +animal waste	3.26	8.36	5.6	5.8	5.9	0.83	4.61	5.6	5.6	5.7	0.23	1.2	2.2	2.6	2.6	0.36	1.3	1.7	2.0	2.5	-		
6	Panchakavya +neem cake	3.26	4.24	4.20	5	5.3	0.83	4.25	4.20	4.33	4.34	0.23	0.72	1.0	1.4	1.4	0.36	0.93	1.1	1.2	1.2	-		
7	Vermi-ompost	3.26	4.31	4.24	4.26	4.30	0.83	4.20	4.26	4.30	1.2	0.23	0.92	1.0	1.1	1.2	0.36	0.82	1.1	1.2	1.2	-		

BC- Before Cultivation; RA-after cultivation of ragi, G- green gram, P- paddy, RO- roselle