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Soil Analysis of Pidugurala Mandal villages, Guntur District, Andhra Pradesh, India for the Determination of Nitrogen (N), Phosphorus (P), and Potassium (K), pH and Organic Carbon.

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ABSTRACT

Soil analysis of Piduguralla Mandal villages, Guntur district, Andhra Pradesh, India for the determination of nitrogen (N), phosphorus (P), and potassium (K), pH and Organic Carbon is conducted. The farmers found it extremely difficult to know the proper type of fertilizer, which would match his soil. In using a fertilizer he must take into account the requirement of his crops and the characteristics of the soil. The basic objective of the soil-testing project is to give farmers a service leading to better and more economic use of fertilizers and better soil management practices for increasing the agricultural production. High crop yields cannot be obtained without applying sufficient fertilizers to overcome existing deficiencies.

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1. Introduction

Efficient use of fertilizers is a major factor in any project designed to bring about an economic increase in agricultural production. The farmers involved in such a project will have to use increasing quantities of fertilizers to achieve the desired yield levels. However the amounts and kinds of fertilizers required for the same crop vary from soil to soil, even field to field on the same soil.

2. Materials and Methods

The soil testing programme involves collection of soil samples, chemical analysis of samples, calibration and interpretation of the results of chemical analysis and recommendations.

Collection of Soil Samples:

As it is well known. 'The analysis can be no better than the sample'. The analysis performed very preciously becomes meaningless, if the soil sample is not collected properly duly following the procedure. Therefore, the collection and preparation of soil sample should be done with perfection. The soil sample collected should be truly representative of the area sampled not more than 5-10 acres (2-4ha). A field can be treated as a single sampling unit only. It is appreciable, uniform in all respects. Variation in slope, texture, color, crops grown and management levels followed should be taken into account. Separate sets of composite samples need to be collected from each such area. For field crops, a sampling depth of 15-20 cm is desired. For deep-rooted crop like sugarcane, horticultural crops, etc., sub-soil should be from different depths or layers for every one feet, up to six feet, may be needed and sampled separately.

In saline-alkali soils, salt crust (visible or suspected) on the soil surface should be sampled separately. Where crops have been planted in lines, sampling may be done between the lines. Recently fertilized plots, bunds, channels, marshy tracts and spots near tree, wells etc., must be avoided during sampling. Under intensive cultivation, sampling should be done every year. If one crop/year is raised sampling once in 3 years is sufficient. Sampling should be done at the same time each year. The proper sampling tool should be used. Samples can be satisfactorily taken with a soil/probe/tube, an auger, a spade,

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shovel or pick axe and clean the tools before taking another sample. A composite sample has to take from each area. After scrapping the surface litter, a uniform slice of soil from the surface to plough depth (15 to 22cm deep). If a spade is used, a V-shaped cut may be first made up to the plough layer and a uniform 1.5 cm thick slice taken out. Individual slices should be collected in a clean container/bucket. All lumps should be broken and mixed well in the container or on a clean cloth. The size of the composite sample should be reduced by successive quartering to about half a kilogram to one kilogram. The sample should be dried in shade before putting it into the cloth bag and dispatch it to the nearest soil testing laboratory by enclosing the information sheet.

Determination of Nitrogen:

Measure 5c. c of soil in the soil measuring tube and transfer into 100 ml conical flask. Add 25 ml of nitrogen reagent (50% H2SO4) into the soil and shake for 5-10 min. Add a pinch of decolouriser (activated carbon) into the soil mixture and again mix well. Then filter into the color developing bottle by using a funnel and filter paper. To the clear filtrate, add 2 drops of nitrogen reagent (nesslers reagent) and mix well. Wait 1-2 min for color development. The color that forms are compared with a nitrogen color chart.

Determination of Phosphorous:

Measure 5c.c of soil in the soil measuring tube and transfer into 100 ml conical flask. Add 25 ml of Phosphorous reagent (0.5M sodium bi-carbonate) into the soil and shake for 5-10 min. Add a pinch of decolorizer (activated carbon) into the soil mixture and again mix well. Then filter into the color developing bottle by using a funnel and filter paper. To the clear filtrate, add 2 drops of Phosphorous reagent (Ammonium molubdate) and mix well. Wait 1-2 min for color development. The color that forms are compared with a phosphorous color chart.

Determination of Potassium:

Measure 5 c.c of soil in the soil measuring tube and transfer into 100 ml conical flask. Add 25 ml of Potassium reagent (50% H2SO4) into the soil and shake for 5-10 min. Add a pinch of decolouriser (activated carbon) into the soil mixture and again mix well. Then filter into the color developing bottle by using a funnel on filter paper. To the clear filtrate, add 2 drops of Potassium reagent (Tartaric acid) and mix well. Wait 1-2 min for color

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development. The color that forms are compared with a Potassium color chart.

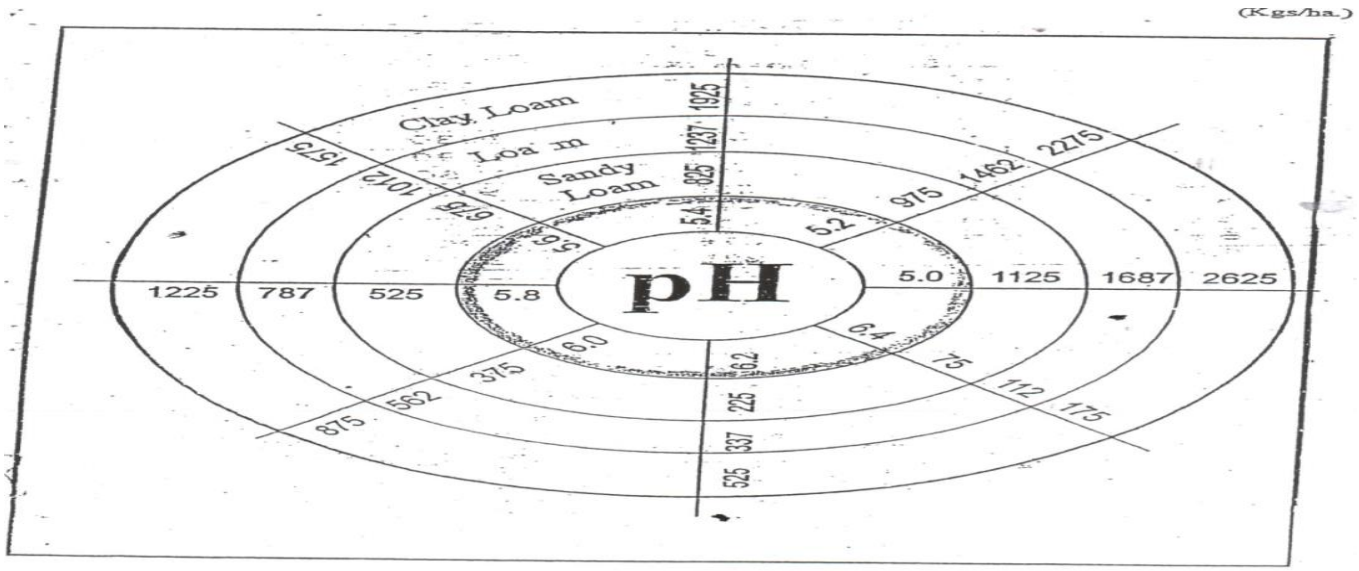
Determination of pH:

Measures out 10gms of soil in 50 ml beaker. Add 20 ml distilled water and stir for every 5 mins intermittently with a glass rod for 30 min. Determine the pH with the pH -meter.Stir the suspension with glass rod before taking the pH reading. Wash the electrode with distilled water after each determination.

Determination of Organic Carbon:

One gram of the soil sample is taken in a test tube. To this add 2ml of 1N potassium dichromate and 2 ml of conc.H2SO4. shake and keep it for about half-an-hour and allow for the completion of the oxidation. Then add 5 ml distilled water and the color developed is noted as LY, Y, O, OG, DBG.

SL.NO	COLOUR	RANGE	OC%
1	Light yellow	Very Low	<0.3
2	Yellow	Low	0.3-0.5
3	Orange	medium	0.5-0.75
4	Olive green	High	0.75-1.0
5	Bluish green	Very high	>1.0



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3. Results And Discussion:

Table. Contents in the Soil

S.no	Name of Village	Farmer name	pH	O.C	N	P	K
1	Konanki/ pataganishpadu	S.Gurvareddy	7.2	L	H	H	H
2		A.Hanimireddy	7.2	L	H	H	H
3		A.Ramireddy	6.8	L	H	H	M
4		K.Venkatareddy	6.8	M	H	M	H
5		P. Gurvareddy	8.6	L	M	H	H
6		V.Nagireddy	8.6	M	H	H	H
7		B.Narayana naik	5.2	M	H	H	H
8		Sk.Mastan vali	5.3	L	H	M	H
9		K.Hanumanthrao	7.4	L	M	H	H
10		K.pithiah	7.3	L	H	H	M
11	Piduguralla/ Chandrapulam	K.Krishnarddy	8.6	L	H	H	H
12		K.Ramireddy	5.2	L	H	H	H
13		T.Venkatareddy	5.3	M	H	H	H
14		Sk.Vali	7.2	L	M	M	H
15		S.patchiah	6.8	M	H	H	M
16		B.Lingareddy	5.3	L	H	H	M
17		G.Bramaiah	7.4	L	H	H	H
18		K.Kishore	7.3	L	H	H	H
19		G.Ramesh	7.2	M	M	M	H
20		K.Subbarao	6.8	L	H	H	H
21	Bramanapalli/ Kamepalli	R.Sambasivarao	7.1	L	H	M	M
22		V.pedda periredy	7.4	L	M	M	L
23		G.Sowrireddy	7.3	L	L	L	M
24		V.Ramireddy	7.2	L	M	M	M
25		Y.ramireddy	6.8	M	H	H	H
26		V.Ramachandrareddy	7.1	L	H	H	M
27		Y.Venkatareddy	7.2	L	M	M	M
28		A.Kotaiah	6.8	M	H	H	H
29		Y.Yogireddy	7.1	L	H	M	H
30		M.Venkaiah	6.9	L	M	H	H
31	Tummalacheruvu	J.Satyanarayana	7.4	L	M	H	L
32		M.srinivsareddy	7.3	L	L	M	L
33		K.Appireddy	7.2	M	L	M	M
34		A.Verrareddy	6.8	L	L	M	L
35		Ch.Saidareddy	7.1	M	L	H	M
36		A.Animireddy	7.2	M	L	H	L
37		m.peddiraju	8.2	M	L	H	H
38		Sd.saidavali	8.1	M	L	H	H
39		Sd.habibunbhi	7.9	M	L	H	M
40		Sd.anvar	8.3	M	L	M	L

From the above result: L indicates: Low, M indicates: Medium H indicates: High Recommendations:

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Reclamation of Acidic soils –Lime Application				
		Lime Application KGS/ACRE		
S.No	Soil pH	Sandy Loam(SL)	Sandy Clay Loam(SCL)	Clay(CL)
1	4.0	690	1125	1750
2	4.2	630	1035	1610
3	4.4	570	945	1470
4	4.6	510	855	1330
5	4.8	450	765	1190
6	5.0	390	675	1050
7	5.2	330	585	910
8	5.4	270	495	770
9	5.6	210	405	630
10	5.8	150	395	490
11	6.0	90	225	350

Reclamation of Alkaline soils – Gypsum Application				
		GYPSUM Application TONS/ACRE		
S.No	Soil pH	Sandy Loam(SL)	Sandy Clay Loam(SCL)	Clay(CL)
1	8.7	0.2	0.2	0.3
2	8.8	0.2	0.6	1.0
3	8.9	0.4	0.8	1.0
4	9.0	0.6	1.2	2.0
5	9.1	0.8	1.6	2.4
6	9.2	1.0	2.0	2.8
7	9.3	1.4	2.4	3.4
8	9.4	1.6	2.8	3.4
9	9.5	2.0	3.2	4.4
10	9.6	2.2	3.6	4.8
11	9.7	2.4	4.0	5.2
12	9.8	2.7	4.4	5.6
13	9.9	2.7	4.8	6.0
14	10.0	3.2	5.2	6.4

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Recommendations for Organic Carbon:

S.NO	RANGE	OC %	Recommended Organic manure
1	Low	0.0-0.5	4 TONS/ACRE
2	Medium	0.5-0.75	2 TONS/ACRE
3	High	> 0.75-1.0	1 TONS/ACRE

Recommendations for Nitrogen:

Amount of available Nitrogen in soil	Kg/Acre
Low	< 100 Kg/Acre
Medium	100-200 Kg/Acre
High	>200 Kg/Acre

Nitrogen Fertilizers (commonly used) :

1. Urea 2. Ammonium Nitrate

Low: Add 25% more than the recommended dose of nitrogen fertilizer

Medium: Add the recommended dose

High: Add 25% less than the recommended dose of nitrogen fertilizer

Recommendations for Phosphorous:

Amount of available Phosphorous in soil	Kg/Acre
Low	< 4Kg/Acre
Medium	4-10 Kg/Acre
High	>10Kg/Acre

Phosphorous Fertilizers (commonly used) :

1. Super Phosphate

Low: Add 25% more than the recommended dose of Phosphorous fertilizer

Medium: Add the recommended dose

High: Add 25% less than the recommended dose of Phosphorous fertilizer

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Recommendations for Potassium:

Amount of available Potassium in soil	Kg/Acre
Low	< 50Kg/Acre
Medium	50-120 Kg/Acre
High	>120Kg/Acre

Potassium Fertilizers (commonly used) :

1. Muriate of Potash 2. Sulphate of Potash
Low: Add 25% more than the recommended dose of Potassium fertilizer
Medium: Add the recommended dose
High: Add 25% less than the recommended dose of Potassium fertilizer

Conclusion:

The soil samples collected from the farmers fields the soil analysis results showed low and high quantity of pH, Organic Carbon, Nitrogen, Phosphorous and Potassium. From that result suggested to the farmers how much fertilizer is required to yield high production at low cost investment. Based on our suggestion farmers followed the application of organic manure to increase the organic carbon content in the soil due to the presence of agricultural waste and earth worms which make the soil porous and nutrient rich. Due to this, the plants absorb the nutrients from the soil effectively and the agricultural production is increased. So the formers gain more income with less input. It has been advised how much quantity of each fertilizer is used for different type of crop and they use that much only. Due to this suggestion they had avoided the unnecessary fertilizers and pest sides. So the cost of the expenditure is decreased and at the same time the yield of the paddy is increased remarkably. Therefore, the investment in farming is decreased and income on yield is increased.

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