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Assessment of fertility status of soils of Sindkhed Moreshwar village in the district of Akola (Maharashtra)

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Abstract

Soils of Sindkhed Moreshwar village, Akola district of Maharashtra state were investigated for their chemical properties like pH, EC, Organic carbon, Available nitrogen, Phosphorus and Potassium. All the soils under study were slightly alkaline to moderately alkaline in reaction, EC (Electrical conductivity) value for these soils within safe limit. The organic carbon content in these soils is moderate to very high, available nitrogen is low, phosphorus range is from low to medium and potassium status is medium to high.

Keywords: fertility, Nitrogen, Phosphorus, Potassium, EC, pH, Organic carbon.

Introduction

Soil is a medium for plant growth and development that leads to crop productivity. Crop productivity depends on many factors and fertility is major amongst all. Soil fertility has direct relation with crop yields, provided other factors are in optimum level. Soil fertility must be periodically estimated as there is continuous removal of macro and micronutrients by crop intensively grown in every crop season. Continuous cropping system for periods without adequate supply of additional amount of nutrients resulted into possibility of deficiencies of essential nutrients in due course of time. The fertility problem cannot be solved merely by supply of plant food elements but there deficient management has also to be given a due thought as fertilizer being one of costliest input required, hence balanced scheduling for optimizing dose is necessary to get maximum returns. The future planning for an intensive farming will be based on the nutrient status of soil as assessed by soil testing so that the problems related to residual effect of fertilizers, compatibility of fertilizers, appropriate method and time of their application, suitability of fertilizers for various crops, soil types and fertilizer pesticide – herbicide interaction may be taken care.

The area of soil science research which is most directly related to agricultural productivity, soil fertility and fertilizer use research and this is also an area where the expectations are high. All researches in soil fertility have one common goal that is to assess nutrient supplying capacity of the soil, deficiencies of nutrient if any and to supply nutrient based on crop needs. Thus, in the game of crop production, there are three dependent and yet interdependent players the soil, the plant and fertilizers, each one of them key players (Goswami, 1999). India's population is variously projected at 1330 million to 1620 million by 2020 (16-17 million population added each year) and food grain demand by 2020 is estimated at 260-300 million tons (117 million tones of rice, 93 million tones of wheat, 28 million tones of course grain and 24 million tones of pulses). The challenge during the next millennium is to achieve and sustain growth rates high enough to feed the swelling population without degrading the environment.

Indian soils have been developed under different climatic conditions such as semiarid, tropical and sub-tropical and thus vastly differ in their properties. Research work done so far is still inadequate to decide their fertility status.

Regarding the nutrient status, all soils were slightly alkaline to moderately alkaline in reaction, EC value for these soils within safe limit. The organic carbon content in these soils is moderate to very high and soil of farms is moderately calcareous to calcareous due to presence of CaCO_3 . The average available major nutrient content in these soils shows low, low to medium status for available N and P and medium to high status for available K.

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Hypothesis

The response of every crop or a cropping system to added nutrients is depend upon the inherent capacity of soil to supply that nutrient as per the requirement of the crop. Chemical test have long been used to estimate the nutrient availability in soil to predict the probability of obtaining profitable response to applied nutrients on the basis of soil testing. Soils can be rated low, medium and high in nutrient status and suitable fertilizer amount can be recommended. Low fertile soil responds remarkably to the application of fertilizers, on the other hand, in high nutrient status soil crop may show little or no response. In medium soil, the response is intermediate. Soil testing helps in adjusting the amount of fertilizer and enhancing the efficiency of fertilizer use.

Soil testing is unique tool for monitoring the nutrient status, making precise fertilizer recommendations, assessing nutrient requirement of crop and cropping sequence and help to economize on cost of fertilizers and in increasing the fertilizer use efficiency.

The soils of Sindkhed Moreshwar village of Maharashtra have been assessed for nutrient status. This will helps to research workers to manage the farm by making efficient use of available resources and to provide base for conducting research experiments.

Importance

- Farmers know the importance of application of fertilizers on the basis of soil test.
- Awareness of soil testing regarding revision of recommended fertilizer dose in farmers.

Material and methods

Selection of farmers

Some farmers are not analyzing the soil, those farmer were selected. One hundred farmers were selected from the Village Mhaisang Dist Akola.

Sampling method

For assess the different chemical properties of soil, surface samples were collected from the farmer's field.

Preparation of soil sample

The collected samples were air dried gently grinded, sieved through 2 mm sieve and stored in properly labelled bags for chemical and analysis.

Analytical methods

The analytical methods commonly adopted in most of the laboratories for research investigations were followed. The various estimations made and the methods followed for these estimation were as under

a) Soil reaction (pH)

The soil pH was determined by digital pH meter using glass electrodes and 1:2.5 Soil: Water ratio as described by Richards (1954).

b) Electrical conductivity (EC)

It was determined with conductivity meter using 1:2.5 soil water suspension as described by Richards (1954).

c) Organic carbon

It was determined by Walkley and Blacks wet oxidation method as described by Richards (1954)

d) Available Nitrogen

It was determined by alkaline permanganate method as described by Subbiah and Asija (1956).

e) Available phosphorus

The soil was extracted with Olsen's reagent 0.5 m NaHCO₃ of pH 8.5 and from the extract available P was estimated calorimetrically as per Jackson (1973).

f) Available potassium

K (exchangeable and water soluble forms) was estimated by extracting the soil with 1 N NH₄OAc (pH 7.0) and concentration of K in extract was measured using flame photometer (Jackson, 1973).

Results and discussion

pH

One hundred farmers were selected from the Sindkhed Moreshwar Village, Dist Akola for analyze the pH of surface soil. The results are indicated that soils are in slightly alkaline to moderate alkaline in nature (Table 1).

EC (dSm⁻¹)

Same as pH Electrical conductivity of soil also analyzed and results are showed that EC of soils is within safe limit (Table 1).

Organic carbon (%)

As pH and EC, Organic carbon also analyzed for the fertility status of soils of Sindkhed Moreshwar village of Akola district (Maharashtra). The results are indicated that the organic carbon content of soil is moderate to very high in nature (Table 1).

Available nitrogen (kg/ha)

The soils of Sindkhed Moreshwar village of Maharashtra having available nitrogen range is low (<280 kg/ha) (Table 1).

Available phosphorus (kg/ha)

The soils of Sindkhed Moreshwar village having available phosphorus range is from low (<10kg/ha) to medium (10-25 kg/ha) (Table 1).

Available potassium (kg/ha)

The potassium content of Sindkhed Moreshwar village of Maharashtra is generally medium (110 to 280 kg/ha) to high (>280 kg/ha) in nature (Table 1).

Table 1

S. No	Name of the farmer	pH	EC (dSm ⁻¹)	OC (%)	Available nitrogen (kg/ha)	Available phosphorus (kg/ha)	Available potassium(kg/ha)
1	Ramesh Takjhure	8.1	0.57	0.33	81	12.4	462
2	Virendra Hanumante	8.12	0.33	0.66	94	14	490
3	Umesh Kataphale	8.2	0.35	0.32	82	10.2	421
4	Satish Hnaumante	8.43	0.34	0.21	76	12.7	367
5	Gopal Nale	8.12	0.58	0.5	144	15	432

6	Prashant Tapre	8.0	0.29	0.62	150	17	411
7	Motiram Navalkar	8.28	0.31	0.6	119	14.8	476
8	Vithal Navalkar	8.64	0.33	0.64	138	15.7	432
9	Haribhau Navalkar	8.23	0.48	0.49	132	13	501
10	Dadarao Navalkar	8.07	0.21	0.41	118	12.8	509
11	Moreshwar Nawalkar	8.0	0.24	0.52	125	14.8	401
12	Ramdas Dange	8.06	0.39	0.68	94	13	354
13	Nitin solanke	8.22	0.24	0.34	119	12.7	356
14	Anil Ingle	7.98	0.35	0.62	163	11	507
15	Laxman Topre	8.36	0.31	0.38	125	10.7	569
16	Shehrav Thetkar	8.39	0.24	0.26	94	10	441
17	Rajendra Wagh	8.42	0.2	0.5	82	12.3	473
18	Mahadev Chikte	8.12	0.3	0.46	163	17.6	448
19	Prakash Agarkar	8.11	0.24	0.68	182	13	501
20	Vinayak Wagh	8.17	0.22	0.54	76	11.9	321
21	Nandgopal Agarkar	8.29	0.23	0.54	115	16.7	190
22	Sadashiv Tale	8.33	0.25	0.48	87	19.7	112
23	Jayant Wagh	8.03	0.26	0.46	125	18.6	134
24	Suresh Ingle	8.13	0.3	0.78	62	15	179
25	Mahadev Wasatkar	8.2	0.39	0.74	83	16.1	224
26	Santosh Divate	8.11	0.39	0.7	113	13.8	134
27	Shrikrushna Kale	8.09	0.22	0.83	137	18	235
28	Sunil Tapre	8.08	0.49	0.64	137	16.2	190
29	Haribhau Agarkar	7.99	0.72	0.52	125	11.9	201
30	Narayan Navalkar	7.92	0.38	0.89	150	10	246
31	Motiram Wagh	8.23	0.42	0.85	150	12	212
32	Sankarrao Gawande	7.96	0.24	0.72	106	16.3	212
33	Ganesh Korde	8.06	0.35	0.42	115	14	189
34	Devendra Gawande	7.92	0.25	1.01	118	15.4	268
35	Manohar Hage	8.34	0.23	1.01	175	17	302
36	Gopal Bhaltilak	7.99	0.23	0.79	175	15	246
37	Vishwanath Bhakare	7.96	0.26	0.72	125	13.2	268
38	Digambar Thaturkar	8.34	0.23	0.34	156	14	302
39	Vasandrao Agarkar	8.05	0.18	0.76	137	16	235
40	Niranj Tale	8.07	0.22	0.68	156	14	168
41	Gajanan Taleq	8.43	0.2	0.56	143	15	313
42	Prashant Zadokar	8.08	0.25	0.33	118	11	189
43	Shankar Korde	7.88	0.27	1.26	137	12	235
44	Gopal Pandav	7.89	0.26	0.66	106	10.1	235
45	Ramdas Thaturkar	8.31	0.2	0.93	112	9.7	201
46	Vasant Gorale	8.16	0.19	0.72	118	10	289
47	Suresh Wagh	8.1	0.29	0.68	112	10.4	156
48	Mahesh Gawande	8.18	0.17	0.66	168	12.9	145
49	Umesh Gawande	7.82	0.21	0.46	150	11.6	358
50	Shankar Gawande	8.33	0.24	0.54	112	14.7	145
51	Sadanshiv Avadut	8.29	0.37	0.72	137	13	302
52	Naryan Nale	8.44	0.16	1.02	181	19	369
53	Bhaskar Bhakre	8.5	0.48	0.89	168	17.8	201
54	Kishor Gawande	7.9	0.24	0.79	175	16.1	313
55	Pandurang Gawande	7.82	0.2	0.48	181	16.9	145
56	Chandrakant Khune	8.12	0.28	0.29	131	14.2	168
57	Ajit Khune	8.05	0.18	0.79	150	17.2	156
58	Vithal Wagh	8.17	0.27	0.76	125	12.6	180
59	Pradeep Dharaskar	8.12	0.38	0.68	143	14.2	257
60	Vinaykrao Hanumante	8.0	0.37	0.76	137	12.2	168
61	Sudhakar Wankhade	7.98	0.25	0.62	131	11.9	544
62	Rameshwar Wankhade	7.99	0.31	0.81	156	15	523
63	Uttamrao Tapre	8.08	0.29	1.07	162	17.2	561
64	Gajanan Kukalkar	8.19	0.3	0.64	131	13.8	431
65	Dulsha Sardar Sha	8.19	0.26	1.01	168	15.3	476
66	Ramdas Kokade	8.08	0.41	0.46	162	19.7	342
67	Shivdas Kokade	7.99	0.2	0.76	125	17.9	401
68	Shravan Kokade	8.13	0.26	0.79	175	18.6	324
69	Baban Solanke	8.0	0.26	1.03	150	21.7	367
70	Suresh Wankhade	7.84	0.21	1.2	175	14.9	387
71	Shriram Bharsakle	7.92	0.22	0.89	187	20.4	397
72	Gopal Patil	8.07	0.17	0.44	181	22.7	467
73	Gajanan Tale	8.09	0.34	0.42	187	11.9	561
74	Narayan Sarap	8.34	0.46	1.26	150	18.3	481

75	Raju Hanumante	8.39	0.38	0.93	187	12.9	502
76	Vijay Hanumante	7.91	0.2	1.07	162	11.2	403
77	Santosh Patond	8.06	0.35	0.44	163	19.4	507
78	Kisan Vasatkar	8.12	0.31	0.99	163	18.3	489
79	Samadhan Kardate	8.22	0.15	0.56	163	19.3	432
80	Gangadhar Navalkar	8.11	0.37	0.85	118	16.3	512
81	Shivdas Kogade	8.23	0.81	0.79	112	18.3	302
82	Lalithbhai Kardate	8.01	0.34	0.79	106	16.3	224
83	Shravan Kogade	8.2	0.23	0.93	137	14.8	280
84	Hirsa Topre	8.29	0.27	0.07	112	19.3	224
85	Raju Topre	8.12	0.2	0.68	156	16.7	358
86	Ganpatrao Mahalle	8.0	0.36	1.03	162	17.4	168
87	Manik Mahalle	8.17	0.31	0.89	175	13.9	436
88	Sachin Dhore	8.11	0.31	0.29	187	17	212
89	Premnath Chavan	8.0	0.22	0.11	162	16.3	291
90	Shrikrishan Wagh	8.08	0.14	0.25	162	17.2	212
91	Mahukar Dhande	8.23	0.28	0.97	194	16	23
92	Sau Kalyani Sonone	8.23	0.31	0.89	190	15.3	280
93	Pundlik Nage	8.0	0.35	0.89	106	17.8	212
94	Rajaram Navalkar	8.0	0.21	0.83	187	13	347
95	Mahadev Gawande	8.12	0.31	1.01	194	19.3	302
96	Ganpat Mahalle	8.03	0.28	0.93	175	16.5	268
97	Vivek Wagh	7.97	0.41	0.19	181	16.2	156
98	Ramkrishan Kutaphale	7.9	0.26	1.06	156	18.3	302
99	Ramesh Takzare	7.93	0.33	0.56	178	16.4	224
100	Ruparao Vaidya	8.05	0.31	0.7	181	17.6	179

Conclusions

In the light of results summarized above, it observed that the soils of Sindkhed Moreshwar village Akola district, Maharashtra having soil reaction is slightly alkaline to moderate alkaline in nature, electrical conductivity is having safe limit, organic carbon is moderate to very high, available nitrogen is low, phosphorus is low to medium and potassium is medium to high in nature.

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