

NUTRIENT STATUS OF APPLE ORCHARD SOILS OF DISTRICT KULGAM, (JAMMU & KASHMIR)

¹Shahnawaz Hassan

¹Student of Environment Science Srinagar (India)

Abstract – An experiment examining the nutrient status of Apple orchard soils of district Kulgam, Jammu and Kashmir was conducted to investigate the nutritional status of Apple orchard soils and to categorize the orchard soils on the basis of their nutritional status. Thirty surface soil samples were collected from different locations at a depth of 20cm from thirty Apple orchards under the principle Apple cultivator, Red Delicious located in district Kulgam for laboratory investigation. The available Nitrogen content was higher in surface soils ranging from 106 – 313.6 kg/ha, while as available Phosphorous in surface soils ranged from 10.6 – 162 kg /ha and available Potassium ranged from 55 – 590 kg/ha respectively. The values of available Phosphorous and Potassium in soil samples were medium to high. Soil analysis of all orchards revealed that by and large all the orchard soils were adequately supplied with Nitrogen, phosphorous and Potassium.

Keywords: Red Delicious, Nutritional Status, NPK

INTRODUCTION

Kashmir proudly known as the paradise on earth is also home to commercially most important temperate fruits like Apple (*Malus domestica* Borkh) for which the state is famous across the globe. The apple fruit was originated from central Asia and with time it spread all over the world with China being the leading producer followed by U.S.A and Turkey. In India the production of apple was estimated to be about 19, 15, 000, 00 tonnes in 2015 -2016.

In the horticulture map of India, Jammu and Kashmir has the significant position as an area of 1, 96,136 hectare is under fresh fruit, out of which 1,27,795 ha is under Apple. In J&K the production of fresh fruit is 14, 77,920 tonnes which includes 13, 11,845 tonnes of Apples. . In the observational district Kulgam the area under Apple orchards is 13,601 ha under fresh fruit including 12,342 ha under Apple, with production of 1, 06,572 tonnes and 98,625 tonnes of fresh fruit and Apple respectively. (*Digest of Statistics, Directorate of Economics, Statistics and planning, Jammu and Kashmir Srinagar pp.125 -128*). (Anonymous, 2009).

Yield of commercially cultivated Apple cultivars particularly Red Delicious per unit area is highest in the country ranging 10 – 12 tonnes / ha but it compares poorly to the yield of 40-60 tonnes/ha in advanced countries ((Nagi setal 1998).

In Kashmir production of quality Apple was previously confined to the Kerewa and Kandi areas but the high returns tempted the farmers to convert irrigated paddy lands into Apple orchards resulted in the production of low quality fruits due to imbalance of nutrition, imperfect drainage and site characteristics apart from incidence of diseases and pests

For the production of quality fruit the tree health and productions greatly influenced by soil and site characteristics. If soil characteristics are not known before hand, the judicious and balanced application of fertilises may not be of any use. The production of quality fruit is also influenced by the nutritional status of the soil, fruit mineral composition, harvesting at maturity stage and leaf fruit ratio (Hansein and Ryugo,1979). Imbalance of nutrient disorders and consequently affects the quality and yield of the fruit.

District Kulgam is located at 33. 39degN 75deg 01'E/33 .65degN75.02degE. It has average elevation of 1739(amsl)

AIMS AND OBJECTIVES

The present investigation “Nutritional Status of Apple Orchard Soils in District Kulgam” was undertaken with the following objectives:

- To study the nutritional status of Apple orchard soil in Kulgam.
- To categorise the orchard soils on the basis of their nutritional status.
- To evaluate the fertility status of soils of district.
- To predict the nutritional values needed for production.

MATERIALS AND METHODS

Field and Laboratory Analysis

- **Sample collection sites with coordinates**

sample collection site	Latitude	Longitude
Kadder	33° 41' 30.02" N	74° 59' 43.99"E
Khee	33° 41' 55.76"N	74° 59' 40.94"E
Shiganpora	33° 41' 41.30"N	74° 58' 52.80"E
Turigam	33° 41' 36.78"N	74° 58' 39.86"E
Noonmai	33° 41' 60.48"N	74° 58' 52.74"E
Katrasso	33° 41'55.76"N	74° 59' 40.94"E

- **Collection of soil samples :**

Thirty surface soil samples were collected from different locations at a depth of 20cm from thirty Apple orchards under the principle Apple cultivator, Red Delicious located in District Kulgam for laboratory investigation.

- **Preparatiaon of soil sample:**

The soil sample were dried, crushed with wooden mortar and pestle and sieved through 2mm sieve. The sieved samples were labelled and stored in Polythene bags for subsequent chemical analysis.

- **Methods of Analysis:**

The analytical procedure followed is as under:

pH

The pH of the soil samples were measured in 1:2.5 soil water suspension with the help of expanded pH meter

Electrical conductivity:

The electrical conductivity of soil water extract was read with the help of conductivity Meter.

Organic Carbon

Organic carbon was determined by Walkly and Black rapid titration method as given by Pepper (1996)

Nitrogen

The available Nitrogen was estimated by Alkaline Potassium Permanganate method (Subiah and Asija, 1956).

Phosphorus

The available Phosphorus was determined by Olson's method as described by Jacken (1973)

Potassium

The available Potassium was determined by Flame Photometer meter.

EXPERIMENTAL RESULTS

Table 1: Critical limits of available nutrient elements in soils (ppm)

Nutrient element	Soil fertility Status			
	Low	Medium	High	References
OC	0.5	0.5 – 1.0	1.0	Bhandari and Tripathi
N	125	125 – 240	250	FAO.1977
P	4	4 – 11	11	FAO.1977
K	44	44 – 125	125	FAO 1977

Table 2: Physico – Chemical parameters of Apple orchard soils of district Kulgam.

Sample	pH	Ec(dsm ⁻¹)	OC %	Soil fertility status
01	5.9	0.90	1.3	High
02	6.43	0.01	1.24	High
03	5.77	0.79	1.45	High
04	4.86	0.06	1.27	High
05	4.84	0.08	1.78	High
06	5.08	0.12	2.35	High
07	5.70	0.13	1.51	High
08	6.0	0.12	1.86	High
09	6.24	0.21	1.45	High
10	5.24	0.04	1.29	High
11	5.32	0.04	1.2	High
12	5.46	0.12	0.97	Medium
13	6.43	0.16	1.26	High
14	5.67	0.08	1.1	High
15	5.67	0.11	1.86	High
16	5.26	0.08	0.94	Medium
17	5.32	0.08	0.63	Medium
18	7.26	0.16	1.7	High
19	6.23	0.08	1.35	High
20	5.22	0.34	1.87	High
21	5.54	0.21	1.83	High
22	5.50	0.16	2.1	High
23	5.25	0.54	1.0	High
24	4.25	0.09	2.6	High
25	6.87	0.14	1.78	High
26	5.88	0.16	1.41	High
27	5.47	0.05	1.0	High
28	4.52	0.10	1.44	High
29	6.86	0.09	1.1	High
30	7.06	0.14	1.41	High

Table 3: Nutrient Status of Apple orchard soils of district Kulgam

Sample	N of kg/ha	Soil fertility status
01	280	High
02	313.6	High
03	313.6	High
04	179.2	Medium
05	179.2	Medium
06	190.0	Medium
07	140	Medium
08	145.6	Medium
09	106.4	Low
10	156.8	Medium
11	207.2	Medium
12	145.6	Medium
13	134.4	Medium
14	134.4	Medium
15	151.2	Medium
16	240.8	Medium
17	156.8	Medium
18	201.6	Medium
19	123.2	Low
20	173.6	Medium
21	222.4	Medium
22	145.6	Medium
23	162.4	Medium
24	145.6	Medium
25	132.2	Low
26	179.2	Medium
27	130.1	Medium
28	123.2	Low
29	140.0	Medium
30+	128.6	Medium

Table 4: Nutrient status of Apple orchard Soils of district Kulgam

Sample	Kg of K/ha	Soil fertility status
01	420	High
02	485	High
03	590	High
04	90	Medium
05	165	High
06	110	Medium
07	230	High
08	75	Medium
09	335	High
10	100	Medium
11	55	Medium
12	205	High
13	330	High
14	185	High
15	115	Medium
16	105	Medium
17	335	High
18	190	High
19	590	High
20	165	High
21	160	High
22	225	High
23	140	High
24	490	High
25	540	High
26	205	High
27	80	Medium
28	125	High
29	395	High
30	280	High

Table 5: Nutrient Status of Apple orchard soils of district Kulgam

Sample	(P) Kg/ha	Soil fertility status	Texture
01	68.4	High	Silt
02	66.0	High	Loam
03	71.6	High	Silt Loam
04	35.1	High	Silt Loam
05	99.0	High	Loam
06	25.9	High	Silt Loam
07	105.8	High	Silt Loam
08	33.8	High	Silt
09	104.5	High	Silt
10	53.2	High	Silt
11	10.6	Medium	Silt Loam
12	29.3	High	Silt Loam
13	107.6	High	Silt Loam
14	33.3	High	Loam
15	84.2	High	Silt Loam
16	55.2	High	Silt Loam
17	130.2	High	Silt Loam
18	108.0	High	Silt Loam
19	84.2	High	Loam
20	73.0	High	Loam
21	104.0	High	Silt Loam
22	36.3	High	Loam
23	47.1	High	Loam
24	162	High	Silt Loam
25	16.0	High	Silt Loam
26	93.6	High	Silt Loam
27	23.5	High	Loam
28	81.3	High	Silt Loam
29	49.6	High	Silt Loam
30	10.6	Medium	Silt Loam

DISCUSSION

pH

The pH value (table2) in the surface layers ranged from 5.24 to 7.2. All these soils exhibited acidic to alkaline pH. The PH showed significant differences among the locations. The pH of the orchard soils in the studied area is best suited for Apple cultivation.

EC:

The EC values (table 2) ranged from 0.01 to 0.90 dsm^{-1} in the surface layers. The EC values of these samples were found within normal limits and varied significantly among the locations.

Organic Carbon:

The value of OC ranged from 0.63 to 2.6 percent (table2) in the surface soils. The soils in general were found to be high in organic carbon despite significant variations in contents among these locations. The medium to high content organic carbon in the area can be attributed to low mineralisation rate due to low temperatures.

Nutrient Status

Available Nitrogen: The available Nitrogen content in the surface soils varied from 106 to 313.6 kg/ha (table3). The Nitrogen content was higher in surface soils and significant differences were observed among the soil samples. The high content of Nitrogen in the surface soils is due to addition of organic matter by way of fallen leaves addition of farm yard manure (FYM).

Available Phosphorus: The content of available Phosphorus ranged from 10.6 to 162 kg/ha (table 5) in the surface soils and showed significant variations among the locations. The orchardists are habitual of using higher doses of Phosphorus through DAP in addition to organic manure.

Available Potassium: The content of available Potassium varied from 55 to 590 Kg/ha (table4) in the surface soils. The contents of available Potassium among these Apple orchard soils exhibit significant variations among the locations. Most of the orchardists are applying Potash fertilisers though these soils have Illitic minerals.

SUMMARY AND CONCLUSION

The salient findings observed during the investigation entitled “Nutritional status of Apple orchard soils in District Kulgam” are summarised as:

- The soils in general were loam and silt loam in texture.
- The soils were neutral in reaction
- The available Nitrogen content was higher in surface soils, while the available Phosphorus and Potassium were medium to high.

From the foregoing summarised results of investigation, it is concluded that the soil analysis of Apple orchard soil samples revealed that by and large all these soil samples were adequately supplied with N, P and K etc.

REFERENCES

1. Antoo M.H. (2000) “*Studies on the soils of Command area of Zangier canal Sopore*”, district Baramulla M.Sc (agri) thesis, SKUAST Kashmir India
2. Dar. M.A. (1996) “*Nutrient status of Cherry orchards of Srinagar district*”, .M.Sc (agri) thesis, SKUAST, Kashmir, India.
3. Farida. A. (1997) “*Evaluation of Sulphur in some paddy growing soils of Kashmir*”, M.Sc (agri) thesis, SKUAST, Kashmir, India
4. Hansein, P. and Ryugo K. (1979) “*Translocation and metabolism of Carbohydrate fractions of C4 Photosynthates on fresh prune (Prunus domestica)*”, journal of American Society for Horticulture sciences.
5. Mir. G.A. (1994) “*Studies on Almond orchard soils of Kashmir*”, M.Sc thesis SKUAST, Kashmir India.
6. Muskhi.G.M. (1994) “*Studies on Apple orchard soils of Kashmir*” M.Sc (agri) thesis, SKUAST, Kashmir, India.
7. Nagi. J.P Mitra L and Dabons.H.K.(1998) “*India Horticulture data base*”, National Horticulture Board
8. Najar. G.R. (2002) “*Studies on paedogenesis and nutrient indexing of Apple (Red Delicious) growing soils of Kashmir*”, PhD thesis, SKUAST Kashmir, India.
9. Sidhu.G.Rani,K.C.P.Walia, C.S.Mahapatra, S.K., Tarseem.Lal(1999)”*Characterisation and classification of some dominant soils of Jammu region for land use planning(Agropedology)*”.
10. Wani. M.A (1994) “*Distribution and forms of micro nutrient cations in some Saffron growing soils of Kashmir*”, M.Sc (agri) , thesis SKUAST , Kashmir , India.