Karnataka J. Agric. Sci.,21(2) : (280-281) 2008

A Survey of Soil Fertility Status and Index Tissue Analysis of Vineyards*

Grape *(Vitis vinifera* L.) is an important fruit crop of northern parts of Karnataka and it is now grown over 8,500 ha. The area under grape is on an increase due to its excellent returns obtained under present agro-climate conditions. One of the major factors responsible for profitable cultivation of grape is the judicious manuring with proper management practices. Recently, leaf analysis has been found to be an useful diagnostic tool to determine fertilizer needs and to determine the nutrient deficiencies. The present survey was therefore conducted to assess the mineral nutrient status of both soil and vines. Knowing fertility status of vineyards is very important in the management of nutrient programme for maximizing vine growth production and fruit quality. Hence, a survey was taken up to understand the fertility status of soils and petiole composition of few vineyards of Bijapur taluk.

The survey included 30 vineyards which represent entire grape growing areas of Bijapur taluk. The surface soil samples upto a depth of 30 cm were collected and after drying were passed through 2 mm sieve. The soil samples were analyzed for various attributes. The soil pH and electrical conductivity were determined in 1 :2.5 soil water suspension using Elico pH meter and direct reading conductivity meter, respectively.

The CEC of the soils was determined by the method described by Black (1965). Whereas, the available N was determined by the method described by Subbaiah and Asija , (1956). The organic carbon, available phosphorus, potassium and sulphur in the soil were determined by the method described by Jackson (1967).

Leaf petioles opposite to clusters were collected as per standard technique suggested by Chapman (1964). The petioles were separated from leaf blades immediately after collection. placed in polythene bags and brought to laboratory, These were washed with 0.1 N HCl and a series of distilled water and were dried and ground to fine powder. Tissue samples were wet digested with diacid mixture of nitric acid and perchloric acid in 9:4 ratio. The digested material was diluted by using 6 N HCl and filtered through Whatman No. 42 filter paper. The procedure was repeated 3 to 4 times with additional quantity of 6N HCl unitl all the residue is filtered and final volume was made up the volume to 100 ml with distilled water. The samples after digestion were analyzed for various nutrients. The nitrogen was estimated by Nessler's reagent method and phosphorus was determined by vanadomolybdate phosphate yellow colour method. Potassium was estimated by flamephotometer and calcium and magnesium were estimated by vesenate method. The micronutrients were estimated by using atomic absorption spectrophotometer.

The data on analysis of soil samples presented in table 1 revealed that soil was clay in texture which is considered quite fit for grape growing. The CEC of all the soils of vineyards was in higher range. It might be due to clay texture of soil. The soil pH of various vineyards ranged from 8.26 to 8.41, slightly above the optimum range (5.50 - 8.00) considered to be satisfactory for grape cultivation. The electrical conductivity values varied from 0.18 to 0.27 dSm^{-1} well below the critical concentration. Panday and Divate (1976) reported that soil containing salt concentration of 0.30 per cent are not fit for grape cultivation. The soil organic carbon contents were medium to high in all the vineyards. It might be due to continuous application of plant and animal residues to the soil. The available nitrogen was in lower range 201.24 to 236.45 kg ha^{-1}. This might be due to higher range of mineralization due to high temperature (dry zone) and loss of nitrogen in the form of ammonia as the soils are calcareous. The soil available phosphorus content of vineyards ranged from 28.23 to 35.89 kg ha^{-1}, which was medium in range.

Table 1. Chemical properties and nutrient status of soils of vineyards

SI. No	pH (1:2.5)	EC (dS m^{-1})	CEC cm^{-1} (p+)	Organic Carbon (g kg^{-1})	Available (kg ha^{-1})				Exchangeable (cm-1 (P+)kg^{-1})			DTPA estractable (mg kg^{-1})		
					Nitrogen	Phosphorus	Potassium	Sulphur	Calcium	Magnesium	Zinc	Iron	Manganese	Copper
1.	8.41	0.21	52.25	7.2	219.36	3306	533.63	33.83	45.42	8.79	1.37	5.02	8.41	0.51
2.	8.34	0.27	53.04	6.8	213.61	30.89	521.87	31.92	42.89	9.60	1.59	5.59	8.73	0.43
3.	8.40	0.26	52.89	6.8	209.43	27.16	518.93	30.69	43.1 0	8.53	1 42	5.07	7.28	0.37
4.	8.41	0.25	52.96	7.4	231. 71	34.73	558.86	35.32	48.83	9.t3	1.38	4.93	7.25	0.43
5.	8.25	0.26	57.75	6.8	206.86	28.67	492.21	24.87	42.38	8.60	1.43	4.54	7.56	0.40
6.	8.38	0.19	50.96	6.9	208.63	29.73	495.41	25.79	40.81	8.20	1.43	4.01	8.57	0.47
7.	8.40	0.20	54.08	7.3	225.17	34.27	551.80	34.89	47.71	9.26	1.48	5.87	7.80	0.38
8.	8.29	0.19	55.90	6.7	197.36	24.23	438.73	24.76	42.45	8.91	1.45	4.88	7.91	0.42
9.	8.28	0.18	50.55	7.1	213.87	32.65	523.63	31. 96	39.64	8.80	1.73	5.68	8.23	0.48
10.	8.39	0.26	56.01	7.5	236.45	35.89	592.47	37.90	49.72	9.76	1.74	6.12	8.26	0.44
11.	8.29	0.26	50.03	6.8	201.24	25.83	453.86	25.67	38.89	8.67	1 53	5.32	7.87	0.46
12.	8.26	0.19	50.57	6.8	207.64	29.76	494.42	28.89	40.45	8.73	1.49	5.09	7.16	0.38
13.	8.27	0.20	50.94	6.7	204.86	28.23	503.61	27.81	43.28	8.61	1.37	4.96	7.08	0.40
14.	8.26	0.21	51.60	7.0	212.26	30.73	515.83	29.90	42.93	8.00	1.30	4.81	8.64	0.48
15.	8.34	0.21	53.44	6.9	21 7.48	32.58	531.47	33.86	44.63	9.13	1.57	5.81	8.41	0.46
Mean	8.33	0.22	52.86	7.0	213.73	30.56	515.12	30.47	43.54	8.93	1.47	5.18	7.94	0.43

* Part of M. Sc. (Agri.) thesis submitted by the senior author to the University of Agricultural sciences, Dharwad - 580 005, India

The available potassium ranged from 438.73 to 592.47 kg ha^{-1} , which was in high range in all the vineyards.

The available sulphur varied from 24.87 to 37.90 kg ha^{-1}, which was in sufficient range. The exchangeable Ca and Mg contents of all the soils were high. The mean value of available Zn, Fe, Mn and Cu in the vineyard soils was 1.47, 5.18, 7.94 and 0.43 mg kg^{-1} respectively which were higher in range. It might be due to soil application of manures and fertilizers by the fanners.

The data regarding petiole analysis of different vineyards presented in Table 2 revealed that petiole nitrogen, phosphorus and potassium were in optimum to higher range. It might be due to addition of fertilization and manuring by the farmer. The petiole Ca and Mg content were also in satisfactory range. The micronutrients content in the petiole were also in optimum to higher in range. The optimum values could be attributed to repeated application of manures and fertilizers to vineyards by farmers. The yields of different vineyards surveyed were ranged from 10.48 to 19.42 t acre^{-1} with the mean value of 13.87 t acre^{-1}.

From the results, it might be concluded that as regards to nutrient status of soil seems to be fairly well in almost all available nutrients in the vineyards surveyed hence their application should be made on the basis of actual soil test only.

Table 2. Nutrient composition of petiole and yield of vineyards

SI. No	Nitrogen	Phosphorus	Potassium	Calcium	Magnesium	Sulphur	Zinc	Iron	Manganese	Copper	Yield
			(%)					(mg kg^{-1})			(tlacre)
1.	2.12	0.39	2.66	1.32	0.58	0.18	96	62	85	18	13.36
2.	2.06	0.36	2.76	1.56	0.57	0.16	98	55	72	16	13.69
3.	1.83	0.31	2.97	0.94	0.27	0.15	91	53	74	17	13.34
4.	2.96	0.48	3.07	1.12	0.34	0.16	84	57	86	20	15.22
5.	1.20	0.28	2.71	0.98	0.27	0.14	81	59	84	19	11.28
6.	1.17	0.36	2.77	0.91	0.24	0.15	83	47	79	17	10.48
7.	1.86	0.49	2.82	1.01	0.38	0.17	89	49	87	21	17.78
8.	1.21	0.27	2.72	0.86	0.24	0.12	87	51	81	17	12.61
9.	1.87	0.31	2.96	0.94	0.27	0.14	87	48	73	16	12.50
10.	1.93	0.53	3.04	0.90	0.26	0.18	96	57	86	20	19.42
11.	1.15	0.29	2.89	0.92	0.27	0.15	88	52	83	16	14.05
12.	1.17	0.30	2.87	0.89	0.26	0.14	94	48	77	18	12.76
13.	1.08	0.32	2.90	1.01	0.31	0.13	95	56	76	17	13.02
14.	2.04	0.33	2.63	0.98	0.28	0.14	87	51	75	15	11.85
15.	2.08	0.32	3.05	1.02	0.27	0.15	89	58	76	19	16.64
Mean	1.72	0.35	2.85	1.02	0.32	0.15	90	54	80	18	13.87

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(Received: September, 2007)

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