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## Major and micronutrient status of vertisols at flowering and harvest of bt. cotton in northern transitional zone of Karnataka

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### Abstract

Field survey was conducted to evaluate the major and micronutrient status of Vertisols at flowering and harvest of Bt. cotton in northern transitional zone of Karnataka. Fifty surface soil samples were collected from Bt. cotton growing Vertisols of Bandiwad, Byahatti, Dattur, Hebsur, Ingalalli, Kiresur, Kusugal, Rottigwad, Siraguppi and Sulla villages of Dharwad district during flowering and harvest of Bt. cotton by using GPS and analysed for major and micronutrients status. The results of the study indicated that available nitrogen, phosphorus, potassium and sulphur varied from 112 to 359, 43.8 to 107.1, 245 to 583 kg ha<sup>-1</sup> and 7.5 to 28.4 mg kg<sup>-1</sup>, respectively. Whereas the micronutrients like copper, iron, manganese and zinc content varied from 0.25 to 0.53, 2.30 to 3.52, 2.83 to 7.35 and 0.40 to 0.69 mg kg<sup>-1</sup>, respectively during flowering. About 42 to 271 kg ha<sup>-1</sup> of nitrogen, 27.59 to 93.47 kg ha<sup>-1</sup> of phosphorus, 275 to 540 kg ha<sup>-1</sup> of potassium, 4.92 to 25.50 mg kg<sup>-1</sup> of sulphur, 0.21 to 0.49 mg kg<sup>-1</sup> of copper, 2.23 to 3.47 mg kg<sup>-1</sup> iron, 2.86 to 7.27 mg kg<sup>-1</sup> of manganese and 0.33 to 0.63 mg kg<sup>-1</sup> of zinc after harvest of the crop.

**Keywords:** Vertisols, Bt. cotton, major nutrients, micronutrients, flowering and harvest

### Introduction

Cotton is queen of fibres, important raw material for the Indian textile industry contributing about 65 per cent of its requirement. India is an important grower of cotton on a global scale. It ranks second in global cotton production after China. Area under cotton in India is projected to be 118 lakh hectares with a production of 330 lakh bales (Anon. 2013) [1]. To minimise the infestation of insect pests particularly boll worms, Bt cotton was developed by Monsanto Company in 2002 which contains cry 1AC gene of *Bacillus thuringiensis*. The area under Bt Cotton in India was targeted to be around 95.04 lakh ha during year 2011-12. The cotton productivity was 309 kg per hectare in 2001 before the introduction of Bt genotypes which increased to 495 kg per ha in 2010 (Anon. 2011) [2]. In order to know the major and micronutrient status of soil during flowering and after harvest of Bt. cotton present work was carried out.

### Material and Methods

Fifty Bt. cotton growing farmers were selected from Bandiwad, Byahatti, Dattur, Hebsur, Ingalalli, Kiresur, Kusugal, Rottigwad, Siraguppi and Sulla villages of Dharwad district. Soil samples were collected at 0-30 cm depth from the selected villages using GPS during flowering and after harvest of the crop and analysed for available nitrogen, phosphorus, potassium, sulphur and DTPA extractable micronutrients like zinc, copper, iron and manganese by using standard procedures.

### Results and Discussion

The data in Table 1. Indicates that major and micronutrient status in soil at flowering of Bt. cotton. Available nitrogen, phosphorus and potash status in the soils studied ranged from 112 to 359, 43.8 to 107.1 and 245 to 583 kg ha<sup>-1</sup>, respectively. Sulphur content varied from 7.5 to 28.4 mg kg<sup>-1</sup>. The micronutrient status in the soils varied from 0.25 to 0.53, 2.30 to 3.52, 2.83 to 7.35 and 0.40 to 0.69 mg kg<sup>-1</sup> of copper, iron, manganese and zinc, respectively. In general, there was an increase in nutrients status of soils at flowering compared to initial status which might be due to the application of manures and fertilizers by the farmer's.

The values in Table 2. Represents the available major and micronutrient status in the soil after harvest of Bt. cotton. Available nitrogen status in soils ranged from 42 to 271 kg ha<sup>-1</sup>, whereas phosphorus and potash contents in soils ranged from 27.59 to 93.47 kg ha<sup>-1</sup> and 275 to 540 kg ha<sup>-1</sup>, respectively. The residual sulphur in the soil varied from 4.92 to 25.5 mg kg<sup>-1</sup>.

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The residual micronutrients status in the soils ranged from 0.21 to 0.49, 2.23 to 3.47, 2.86 to 7.27 and 0.33 to 0.63 mg kg<sup>-1</sup> Cu, Fe, Mn and Zn, respectively. The results of the study indicated that the available nutrient status was decreased with

the advancement in crop growth stage. However, the nutrients status in the soil was found low after harvest of crop due to the removal of nutrients by the crop and also due to losses of nutrients from the soil.

**Table 1:** Available major and micronutrients status of soil at flowering of Bt. Cotton

Sl. No.	Village	Name of the farmer	Major nutrients (kg/ha)			mg/ kg	Micronutrients (mg/kg)			
			N	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	S	Cu	Fe	Zn	Mn
1	Bandiwad	Ayyappa. V. Mulimani	247	60.4	510	15.5	0.32	2.55	0.55	3.20
2		Bharmappa Veerappa Dalagar	305	71.0	583	20.5	0.41	2.77	0.57	3.95
3		Chandrasekhar. Madiwalar	230	55.6	317	9.2	0.29	2.54	0.54	3.15
4		Goudappa Patil	214	77.5	498	18.5	0.38	2.70	0.52	3.59
5		Siddaramayya Gurlingayya Hiremath	279	57.0	459	9.5	0.30	2.51	0.55	3.10
6	Byahatti	Basavanagouda Dyamangouda Kallangouda	226	59.4	444	17.5	0.39	2.88	0.59	3.55
7		Hanumanthagouda Sangangouda	261	60.4	433	18.5	0.40	2.87	0.50	3.52
8		Ismail sab	112	81.4	490	20.3	0.42	3.00	0.60	3.99
9		Neelappa Holemannur	231	43.8	467	7.5	0.25	2.55	0.49	2.87
10		Siddanagouda Mottchennappagouda	234	68.1	488	15.5	0.33	2.74	0.51	3.20
11	Dattur	Kallappagoudar	229	76.3	366	24.1	0.47	3.41	0.60	5.10
12		Anand Pujar	322	71.4	570	22.4	0.46	3.39	0.62	4.45
13		Yallappagoudar	242	85.4	424	20.7	0.43	3.29	0.58	4.25
14		Shekappa Mulimani	283	70.1	468	17.5	0.39	2.85	0.51	3.35
15		Basavangoudar	336	81.6	339	23.2	0.42	3.31	0.57	4.35
16	Hebsur	Channagouda Shivangouda Patil	307	84.6	397	21.3	0.45	3.23	0.55	3.99
17		Narayanappa Venkappa Mudaraddi	242	80.1	483	18.5	0.40	2.88	0.57	3.95
18		Ramappa Bheema Amadlu	172	61.9	505	19.5	0.40	3.19	0.60	4.00
19		Subhash R. Chavaraddi	225	77.4	475	20.6	0.45	3.31	0.59	4.35
20		Thimmaraddi G. Kunnor	233	75.6	486	14.9	0.31	2.79	0.51	3.25
21	Ingalalli	Basavaraj Dundur	198	74.4	362	20.7	0.41	3.39	0.62	4.50
22		K.G. Vasthra	210	74.7	508	21.5	0.47	3.41	0.60	5.74
23		Murgappa Hanumanthappa Nategali	238	107.1	454	20.5	0.49	3.60	0.68	6.49
24		Muthappa Talawar	286	106.8	539	24.1	0.48	3.49	0.65	6.88
25		S.P. Dundur	281	66.4	346	10.1	0.27	2.61	0.47	3.20
26	Kiresur	Basappa Y Kamdoli	257	96.4	432	25.5	0.52	3.51	0.68	7.35
27		Govindaraddi T. Bandiwad	245	59.8	448	11.5	0.31	2.76	0.51	3.10
28		M.S. Thirlapur	196	56.5	425	8.5	0.30	2.72	0.50	2.99
29		Somanna Hurali	289	76.3	446	20.5	0.39	2.91	0.57	3.55
30		Veeranna Kamdoli	287	82.0	470	21.2	0.49	3.39	0.65	6.10
31	Kusugal	Basavraj Parappa Annigeri	359	68.1	245	19.5	0.42	3.19	0.51	3.89
32		Basavraj Eshwarappa Annigeri	264	56.7	424	10.7	0.33	2.83	0.49	3.30
33		Huchappa Mattigatti	193	65.2	427	21.7	0.40	3.12	0.59	4.65
34		Neelappa Mattigatti	227	60.1	466	9.5	0.37	2.85	0.55	3.30
35		M. V. Kodli	307	81.6	479	19.9	0.45	3.29	0.58	3.98
36	Rottigwada	Ashwini Manjunath Kadli	202	58.3	322	12.6	0.32	2.81	0.55	3.15
37		Basappa. D. Bengeri	240	86.9	414	23.1	0.47	3.47	0.64	6.85
38		Basavannappa Fakirappa Kabnur	279	78.2	444	22.6	0.31	2.75	0.51	3.15
39		Ningappa F. Kabnur	217	67.4	332	25.7	0.37	2.77	0.55	3.54
40		Subhash Bengeri	290	93.9	478	22.5	0.47	3.38	0.62	6.69
41	Siraguppi	Ajrasab Gulsab Mishrakoti	241	90.9	488	23.1	0.51	3.49	0.69	8.35
42		Eranna Shekappa Betageri	341	71.3	462	8.5	0.53	3.5	0.69	2.83
43		Gadiyappa Basavannagoudar	239	73.5	400	12.4	0.28	2.83	0.47	3.25
44		Rachappa Mudakappa Angadi	172	65.5	491	20.6	0.46	3.39	0.50	4.98
45		Rudragoudar Kantappagoudar	312	95.1	453	28.4	0.50	3.52	0.64	5.88
46	Sulla	Eranna Rudrappa Angadi	267	76.5	481	24.2	0.47	3.40	0.52	5.30
47		B.S. Asundi	224	70.6	457	10.2	0.25	2.30	0.41	3.10
48		G.C Ingalagi	165	74.6	386	20.5	0.45	3.25	0.54	4.75
49		Mahadevappa Chebbi	237	70.4	559	9.5	0.26	2.55	0.40	3.10
50		Veerabhadrappe Asundi	138	83.4	470	25.8	0.45	3.30	0.57	6.03
		Average	246.62	73.06	446.20	18.21	0.40	3.05	0.56	0.56

**Table 2:** Available major and micronutrients status of soil at harvest of Bt. Cotton

Sl. No.	Village	Name of the farmer	Major nutrients (kg/ha)			mg/kg	Micronutrients (mg/kg)			
			N	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	S	Cu	Fe	Zn	Mn
1	Bandiwad	Ayyappa.V.Mulimani	157	34	463	12.1	0.30	2.51	0.50	3.11
2		Bharmappa Veerappa Dalagar	212	40	540	17.8	0.39	2.73	0.53	3.89
3		Chandrasekhar. Madiwalar	152	35	275	7.5	0.27	2.52	0.48	3.09
4		Goudappa Patil	120	44	450	13.3	0.36	2.63	0.49	3.50
5		Siddaramayya Gurlingayya Hiremath	201	34	417	6.9	0.27	2.45	0.52	2.99
6	Byahatti	Basavanagouda Dyamangouda Kallangouda	151	35	402	15.4	0.37	2.82	0.54	3.48
7		Hanumanthagouda Sangangouda	174	33	385	12.8	0.38	2.82	0.44	3.46
8		Ismail sab	42	63	449	15.4	0.39	2.96	0.56	3.90
9		Neelappa Holemannur	155	27	426	4.94	0.24	2.51	0.41	2.81
10		Siddanagouda Mottchennappagouda	156	48	440	12.0	0.30	2.70	0.48	3.11
11	Dattur	N.S. Patil	145	55	325	20.6	0.42	3.38	0.55	4.99
12		H.S. Patil	236	50	520	18.4	0.41	3.35	0.57	4.37
13		M.N. Patil	156	63	375	17.5	0.39	3.26	0.53	4.16
14		N.S. Patil	200	41	420	13.9	0.37	2.82	0.45	3.30
15		S.R. Patil	255	61	299	19.5	0.38	3.29	0.52	4.27
16	Hebsur	Channagouda Shivangouda Patil	221	62	357	18.9	0.43	3.20	0.50	3.81
17		Narayanappa Venkappa Mudaraddi	147	47	435	13.8	0.38	2.85	0.51	3.88
18		Ramappa Bheema Amadlu	92	36	461	13.3	0.38	3.17	0.53	3.91
19		Subhash R. Chavaraddi	147	60	428	17.6	0.41	3.28	0.55	4.29
20		Thimmaraddi G. Kunnor	150	51	444	10.5	0.28	2.76	0.47	3.17
21	Ingalalli	Basavraj Dundur	123	58	314	17.3	0.39	3.34	0.56	4.41
22		K.G. Vasthra	133	57	460	15.4	0.42	3.37	0.54	5.68
23		Murgappa Hanumanthappa Nategali	164	92	411	15.2	0.43	3.56	0.63	6.41
24		Muthappa Talawar	214	93	491	22.1	0.43	3.44	0.60	6.80
25		S.P. Dundur	195	42	300	8.5	0.25	2.58	0.40	2.98
26	Kiresur	Basappa Y Kamdolli	181	80	392	21.3	0.49	3.47	0.61	7.27
27		Govinda raddi T. Bandiwad	159	35	400	8.53	0.27	2.72	0.46	2.26
28		M.S. Thirlapur	114	36	377	7.50	0.29	2.70	0.43	2.91
29		Somanna Hurali	201	43	398	18.3	0.37	2.89	0.51	3.48
30		Veeranna Kamdolli	215	71	422	18.4	0.47	3.34	0.59	5.97
31	Kusugal	Basavaraj Parappa Annigeri	271	44	200	17.7	0.38	3.10	0.47	3.80
32		Basavaraj Eshwarappa Annigeri	180	36	379	8.42	0.31	2.81	0.42	3.20
33		Huchappa Mattigatti	110	45	382	17.0	0.40	3.09	0.53	4.55
34		Neelappa Mattigatti	150	38	417	7.53	0.31	2.82	0.50	3.21
35		M.V. Kodli	209	44	438	15.2	0.40	3.24	0.52	3.87
36	Rottigwada	Ashwini Manjunath Kadli	116	33	280	8.02	0.29	2.79	0.51	3.05
37		Basappa .D. Bengeri	167	73	365	19.5	0.42	3.44	0.59	6.76
38		Basavannappa Fakirappa Kabnur	191	40	398	18.4	0.28	2.70	0.47	3.08
39		Ningappa F. Kabnur	132	33	285	21.4	0.33	2.72	0.5	3.45
40		Subhasha Bengeri	217	77	430	19.4	0.42	3.34	0.57	6.58
41	Siraguppi	Ajirasab Gulsab Mishra Koti	171	78	438	20.2	0.49	3.43	0.63	8.30
42		Eranna Shekappa Bengeri	256	51	415	7.5	0.50	3.44	0.61	2.77
43		Gadiyappa Basavanagoudar	165	60	352	10.5	0.25	2.78	0.42	3.18
44		Rachappa Mudakappa Angadi	100	57	442	15.9	0.44	3.32	0.43	4.89
45		Rudragoudar Kantapgoudar	239	84	412	25.5	0.44	3.47	0.58	5.80
46	Sulla	Eranna Rudrappa Angadi	196	64	437	20.1	0.42	3.35	0.50	5.20
47		B.S. Asundi	144	42	415	8.5	0.21	2.23	0.37	2.95
48		G.C Ingalagi	87	47	338	16.4	0.44	3.20	0.49	4.68
49		Mahadevappa Chebbi	152	48	512	7.13	0.23	2.51	0.33	3.03
50		Veerabadrappa Asundi	68	73	427	22.5	0.41	3.27	0.52	5.95
		Average	165.78	50.86	400.76	14.98	0.37	3.01	0.51	4.20

### Conclusion

In Bt. cotton growing Vertisols of Dharwad district the available nitrogen, phosphorus, potassium and sulphur status at flowering varied from 112 to 359, 43.8 to 107.1, 245 to 583 kg ha<sup>-1</sup> and 7.5 to 28.4 mg kg<sup>-1</sup>, respectively. Whereas the DTPA extractable micronutrients varied from 0.25 to 0.53, 2.30 to 3.52, 2.83 to 7.35 and 0.40 to 0.69 mg kg<sup>-1</sup> of copper, iron, manganese and zinc, respectively. But after harvest of crop the available nutrients like nitrogen, phosphorus, potassium and sulphur varied from 42 to 271, 27.59 to 93.47, 275 to 540 kg ha<sup>-1</sup> and 4.92 to 25.5 mg kg<sup>-1</sup>, respectively. The residual micronutrients status in the soils ranged from 0.21 to

0.49, 2.23 to 3.47, 2.86 to 7.27 and 0.33 to 0.63 mg ha<sup>-1</sup> Cu, Fe, Mn and Zn, respectively.

### References

1. Anonymous. Cotton Advisory Board. Meeting held on 17<sup>th</sup> April, 2013.
2. Anonymous. Press Information Bureau, Government of India, Ministry of Agriculture, 2011.