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Organic Carbon and Macronutrient Status in the Cotton Growing Soils in Different Mandals of Guntur Division

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ABSTRACT

A survey was conducted during August to December of 2010 in cotton growing areas of fifteen mandals in Guntur division in Guntur district, Andhra Pradesh to study the organic carbon and macronutrient status and their effect on cotton kapas yield. The results revealed that the soils were low in organic carbon and available nitrogen but high in available phosphorus and potassium. All the secondary nutrients (Ca, Mg and S) were found to be high. The available potassium and calcium were positively and significantly correlated with the cotton kapas yield whereas the available magnesium and sulphur were significantly and negatively correlated with the kapas yield.

Key words : Cotton kapas, Macro nutrients.

Cotton which is known as the king of fibers is cultivated in three distinct agro-ecological zones (north, central and south) of the country. Approximately 65% of India's cotton is produced in rainfed condition. Cotton crop is grown in approximately 17.76 lakh ha. during 2010-11(Cotton advisory board,2010) in A.P and mostly as a rainfed crop. Profitability of cotton cultivation in the area is dependent to a very large extent upon judicious use of nutrients which is very difficult in rainfed region. This total reliance on chemical fertilizers and their indiscriminate use has in recent times resulted in total crop losses and threatening cotton cultivation in the established belt (Revolution in Indian cotton, 2009). Keeping this in view the present investigation was conducted in the cotton growing areas of Guntur division to find out the areas of nutrient deficiencies and sufficiencies and their effect on kapas yield.

MATERIAL AND METHODS

The field survey was conducted during August to December of 2010 in cotton growing areas of Guntur division in Guntur district of Andhra Pradesh covering fifteen mandals. The representative surface soil samples were collected. The samples were analysed for organic carbon and available macronutrients. The kapas yield data was collected for different mandals. The correlation study was carried out between soil available nutrients and yield of cotton kapas.

RESULTS AND DISCUSSION

The mean organic carbon and available macronutrients(N, P and K) along with mandal wise yield data are presented in Table 1.The organic carbon in cotton growing soils of different mandals in Guntur division was found to be low (0.24 - 0.46 %). The available nitrogen of the surveyed areas was also found to be low (164 - 222 kg ha^{-1}). Lower use of organic and crop residues attributed towards the low organic carbon and low available nitrogen of the soils (Sharma *et al*. 2008). The soils were medium to high in their available phosphorus (44 – 143 kg P_2O_5 ha^{-1}) and high in available potassium (476 – 1038 kg K_2O ha^{-1}). These findings were similar to the findings of Madhuvani (1999). The soils were rich in available P and K. This might be due to more frequent use of complex fertilizer lading to the build up of phosphorus and potassium in these soils. All the secondary nutrients (calcium- 0.67-0.95%, magnesium- 0.05-0.15% and sulphur-24-58 ppm) were present in sufficient amounts in the soil. The average cotton kapas yield in Guntur division for the season 2010-11 was 2912 kg ha^{-1}. The lower yield was due to high precipitation during the crop growth period leading to water logging condition and lower uptake of nutrients (Stephen *et al*.2009).

The correlations carried out between available macronutrients and yield of cotton kapas were presented in Table 2. The available potassium showed significant positive correlation with the yield (r = 0.277). Significant positive correlation was found

Table 1.The mean organic carbon and available macronutrient along with the yield in different mandals of Guntur division

S.No.	Name of the Mandals	O.C (%)	N (kg ha^{-1})	P_2O_5 (kg ha^{-1})	K_2O (kg ha^{-1})	Ca (%)	Mg (%)	S (ppm)	Yield (kg ha-^{1})
1	Guntur	0.38	183	140	963	0.97	0.099	13	2932
2	Pedakakani	0.29	151	49	444	0.25	0.033	20	2920
3	Prattipadu	0.42	193	95	954	1.01	0.124	18	3633
4	Vatticherukuru	0.27	202	144	739	0.91	0.154	26	3002
5	Pedanandipadu	0.32	188	93	1067	0.99	0.130	11	3360
6	Mangalagiri	0.36	196	72	679	0.57	0.084	15	3240
7	Tulluru	0.36	196	106	728	0.93	0.066	19	2991
8	Tadikonda	0.35	185	112	799	0.91	0.113	41	3027
9	Amaravathi	0.33	201	64	549	0.89	0.072	32	2737
10	Sattenapalli	0.34	202	62	855	0.82	0.138	67	2554
11	Pedakurapadu	0.33	197	48	648	0.88	0.098	39	2484
12	Medikonduru	0.27	201	64	739	0.86	0.135	64	3392
13	Phirangipuram	0.26	203	52	687	0.79	0.114	72	2159
14	Muppala	0.34	207	81	672	0.73	0.078	74	2741
15	kakumanu	0.44	182	92	606	0.93	0.064	17	2502
	Mean	**0.33**	**192**	**85**	**742**	**0.82**	**0.1**	**35**	**2912**

Table 2.Correlation coefficient (r) values between soil nutrients and cotton kapas yield

Soil nutrient parameters	Correlated values(r)
Organic carbon	0.016 NS
Nitrogen	-0.081 NS
Phosphorus	0.181 NS
Potassium	0.277**
Calcium	0.199*
Magnesium	-0.213*
Sulphur	-0.207*

* Correlation is significant at 0.01 level NS Non- significant
*Correlation is significant at 0.05 level

between available calcium and yield (r = 0.199). Further, the available magnesium (r = -0.213) and sulphur (r = -0.207) were significantly and negatively correlated with the yield. The organic carbon and available phosphorus were positively correlated with the yield while nitrogen was negatively correlated with the same but was non significant.

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