Journal of Pharmacognosy and Phytochemistry

Available online at www.phytojournal.com

E-ISSN: 2278-4136
P-ISSN: 2349-8234
JPP 2019; 8(1): 23-28
Received: 10-11-2018
Accepted: 12-12-2018

Sudhakara NR
Department of Soil Science and Agricultural Chemistry, College of agriculture. University of Agricultural Sciences, GKVK, Banglore, Karnataka, India

Srinivasa N
Department of Soil Science and Agricultural Chemistry, College of agriculture. University of Agricultural Sciences, GKVK, Banglore, Karnataka, India

Krishnamurthy R
Department of Soil Science and Agricultural Chemistry, College of agriculture. University of Agricultural Sciences, GKVK, Banglore, Karnataka, India

Correspondence
Sudhakara NR
Department of Soil Science and Agricultural Chemistry, College of agriculture. University of Agricultural Sciences, GKVK, Banglore, Karnataka, India

Available sulphur status of rice growing regions of Mandya district, Karnataka

Sudhakara NR, Srinivasa N and Krishnamurthy R

Abstract
A study was conducted with a view to assess the soil available sulphur status of rice growing regions of Mandya district. A total of 119 soil samples were collected manually randomly from 0-15cm depth Hobli wise, (4-5 samples/hobli) from seven taluks of Mandya district. The soil samples were analyzed and it is observed that out of 119 soil samples about 92 samples were found to be sufficient and 27 samples were deficient in available sulphur content. As per the statistical analysis 77.32 % and 22.68 % of the samples of the study area are sufficient and deficient in available sulphur content. The overall results portray that in different taluks of Mandya district, four taluks *i.e* Mandya, Maddur, S.R. Patna, and Pandavapura have recorded sufficient range of sulphur status, where as in other taluks namely Malvalli, K.R. Pet, and Nagamangala taluks with deficient sulphur status were observed. Nagamangala taluk has least sulphur status among taluks of Mandya district with all five hoblis showing deficiency range of sulphur status: barring Nagamangala taluka, the remaining taluks are sufficient in available sulphur hence an intelligent application of sulphur fertilizers and organic manures are right away recommended.

Keywords: Rice growing regions

Introduction
Rice is a staple and major food crop of India. Rice is one of the diverse crops grown in different agro-climatic conditions corresponding to climate, soil availability of water and adoptability of crop season and it is the second largest produced cereal in the world. The crop is being grown in all the three seasons in Karnataka *viz., Kharif*, *Rabi* and *summer* under rainfed and irrigated conditions (Basanth. 2012) [1]. Sulphur is now recognized as fourth essential nutrient element after nitrogen, phosphorous, and potassium. Crop requires sulphur generally as much as phosphorous and one tenth of nitrogen. Its role in synthesis of certain amino acids such as cystine, cysteine, and methionine is well known. It is essential for the synthesis of chlorophyll, vitamins, glycosides, ferrdoxins and certain disulphide linkages besides activation of proteolytic enzymes and ATP-sulphurylase enzyme (Rahman *et al.,* q) [3]. It also improves the quality of cereals for milling and baking. It increases the oil content in oil seeds and improves the quality, colour, and uniformity of vegetable crops. For the next upcoming generations S deficiency is projected to widen and sulphur deficiency could develop into a serious constraint in crop production. About 42 per cent of Indian soils are deficit in Sulphur (Singh, 2001) [4].

Sulphur status of soils is influenced by several factors. Soil is the principle supplier of plant nutrients; plant derives 14 essential nutrients out of 17 from the soil. But soils vary considerably in their inherent capacities to supply nutrients which are gradually declining over a time due to intensive cropping with high yielding verities, very little or no use of organic materials and improper soil and crop management practices. Low native sulphur content, coarse texture, inherent low organic matter contents and soil conditions that favour sulphur leaching losses are the prime soil factors responsible for sulphur deficiency. However introduction of high yielding varieties, growing of high sulphur responsive crops, intensive cropping, use of sulphur free fertilizers (urea, MOP, DAP), lack of organic manures addition, less crop residues recycling and use of irrigation water less in S are those man-made causes for low available sulphur in Indian soils. Paddy is one of the predominate crop in southern dry zone (zone 6) of Karnataka and continuous paddy growing has resulted in S deficiency in command area of the zone. Hence a Survey was conducted to know sulphur status of paddy growing areas of Mandya district.

Materials and Methods
Soil samples were collected from 0-15cm depth in the paddy growing regions of Mandya district. The samples were collected randomly hobli wise, (4-5 samples/hobli) and brought to

laboratory, shade dried, processed. These processed soil samples were analysed for available sulphur content by using 0.15 per cent $CaCl_2$ extraction by turbidimetry method.

Results and Discussion

The data on available sulphur status of paddy growing regions in Mandya district is presented in Table 1. Out of 119 soil samples collected throughout Mandya district, 92 samples were found to be sufficient and 27 samples were deficient in available sulphur content. It is revealed from the data that available S content in seven taluks of Mandya district (Mandya, Maddur, Malavalli, Sriranga Patna, Pandavapura, Krishnaraja Pet and Nagamangala) ranged from 27.77 ppm to 5.55 ppm with 77.32 per cent areas under high and 22.68 per cent under low. The lowest was recorded in Kikkeri hobli of K.R. Pet taluk and highest was recorded in Arkere hobli of Srirangapatna taluk of Mandya district.

Table 1: Available sulphur status (ppm) of paddy growing areas in Mandya district.

Sampling place		Concentration (ppm)	Inference
Mandya Taluk			
Mandya Hobli			
1	Mandya	26.34	Sufficient
2	Sathanur	19.31	Sufficient
3	Bhudhanur	13.69	Sufficient
4	Thubinakere	16.15	Sufficient
Duddha Hobli			
1	Duddha	21.07	Sufficient
2	Javanahalli	13.34	Sufficient
3	Mudhaghandur	11.41	Sufficient
4	Chandagalu	22.82	Sufficient
Basaralu Hobli			
1	Basaralu	12.29	Sufficient
2	Bundara Koppalu	10.76	Sufficient
3	Chikkakothagare	21.07	Sufficient
4	Hallegere	14.04	Sufficient
Keregodu Hobli			
1	Keregodu	15.8	Sufficient
2	Upparakoppalu	17.2	Sufficient
3	Halgarae	13.34	Sufficient
4	Hulivana	11.41	Sufficient
Kothatti Hobli			
1	Kothatti	14.92	Sufficient
2	Hunaganahalli	14.04	Sufficient
3	Haluvadi	12.29	Sufficient
4	Kalaenahalli	13.71	Sufficient
Maddur Taluk			
Maddur Hobli			
1	Gejjelgere	13.02	Sufficient
2	Maddur	11.97	Sufficient
3	K. Honnalagerae	14.4	Sufficient
4	Huluganahalli	14.92	Sufficient
Koppa Hobli			
1	Tharikeri	17.18	Sufficient
2	Koppa	15.27	Sufficient
3	Naganadoddi	15.8	Sufficient
4	Eregowdanahalli	13.69	Sufficient
Athagur Hobli			
1	Athagur	12.29	Sufficient
2	Kadalur	16.15	Sufficient
3	Kestur	11.94	Sufficient
4	Navilae	13.34	Sufficient
Chikkarasinakere Hobli			
1	Chikkarasinakere	22.82	Sufficient
2	K.Shettihalli	11.8	Sufficient
3	Boppasamudra	14.92	Sufficient
4	Bannahalli	14.04	Sufficient
Malavalli Taluk			
Malvallihobli			
1	Kodipura	11.45	Sufficient
2	Haladahalli	12.49	Sufficient
3	Malvalli	14.4	Sufficient
4	Thalagavadi	11.28	Sufficient
Halagur Hobli			
1	Ganahalli	14.39	Sufficient
2	Halagur	16.15	Sufficient

3	Kodihalli	9.72	Deficient
4	Yathambadi	8.5	Deficient
Kirugavalu Hobli			
1	Chikkamalagudu	11.28	Sufficient
2	Kirugavalu	12.15	Sufficient
3	C.P. Koppalu	6.77	Deficient
4	Havyarahalli	7.29	Deficient
B.G. Pura Hobli			
1	Purigali	14.39	Sufficient
2	B.G.Pura	22.82	Sufficient
3	Vasuhalli	7.63	Deficient
4	Nattakal	10.06	Sufficient
Srirangapatna Taluk			
Srirangapatna Hobli			
1	Srirangapatna	19.31	Sufficient
2	Hosur	24.58	Sufficient
3	Mahadevapura	15.8	Sufficient
4	Hampapura	17.2	Sufficient
K. Shettahalli Hobli			
1	K.Shettahalli	14.92	Sufficient
2	Sabbanakuppae	15.8	Sufficient
3	Somavarapetae	15.27	Sufficient
4	T.M. Hosur	14.92	Sufficient
Arkere Hobli			
1	Mundagadoorae	22.56	Sufficient
2	Arkere	17.01	Sufficient
3	Kalkere	27.77	Sufficient
4	Hunjuganahalli	13.54	Sufficient
Belagola Hobli			
1	Palahalli	11.28	Sufficient
2	Kaaraekura	13.19	Sufficient
3	Belola	14.06	Sufficient
4	Hulikere	15.97	Sufficient
Pandavapura Taluk			
Pandavapura Hobli			
1	Pandavapura	11.41	Sufficient
2	Kennalu	13.34	Sufficient
3	Chikkodi	15.08	Sufficient
4	Koddaluhosur	14.04	Sufficient
5	Kerethannuru	14.92	Sufficient
Chinnakurali Hobli			
1	Chinkurali	21.07	Sufficient
2	Narayanapura	14.39	Sufficient
3	M.Singapura	11.94	Sufficient
4	Katteri	12.67	Sufficient
Melkote Hobli			
1	Mahadevapura	16.14	Sufficient
2	Jakkanahalli	9.72	Deficient
3	Melkote	15.1	Sufficient
4	Sunkathanur	16.66	Sufficient
K.R. Pet Taluk			
Bukinakere Hobli			
1	Bukanakerae	8.68	Deficient
2	Ballaekere	12.15	Sufficient
3	Murukanahalli	9.02	Deficient
Akki Hebbal Hobli			
1	Halambaadi	19.36	Sufficient
2	Jainahaali	24.58	Sufficient
3	Dhudakanalli	26.34	Sufficient
4	Akkihebbal	19.36	Sufficient
K. R. Pet Hobli			
1	Pura	8.33	Deficient
2	K.R.Pet	14.92	Sufficient
3	Holageraemenasa	17.2	Sufficient
4	Hosaholalu	11.41	Sufficient
Seelanare Hobli			
1	Rayasamudra	13.69	Sufficient
2	Singapura	14.04	Sufficient
3	Seelanere	14.92	Sufficient

Kikkeri Hobli			
1	Kikkeri	7.89	Deficient
2	Ooginahalli	5.55	Deficient
3	Ganganahalli	8.85	Deficient
4	Chowdenahalli	8.5	Deficient
Nagamangala Taluk			
Nagamangala Hobli			
1	Nagamangala	10.76	Sufficient
2	P.Neeralaekere	7.98	Deficient
3	Hanchibhuvanahalli	8.5	Deficient
4	Tholali	12.29	Sufficient
Binduganavilae Hobli			
1	Binduganavilae	12.29	Sufficient
2	Sathaenahalli	7.11	Deficient
3	Giuvinahinnapura	6.77	Deficient
4	D. Kodihalli	9.2	Deficient
Bellur Hobli			
1	Halaekuppa	14.92	Sufficient
2	Javaranahalli	14.04	Sufficient
3	Jogipura	9.72	Deficient
4	Dhanchinakerae	8.33	Deficient
Devalapura Hobli			
1	Dhandiganhalli	8.5	Deficient
2	Bhimanahalli	9.02	Deficient
3	Nagaenahalli	12.15	Sufficient
4	Yadavanahalli	9.37	Deficient
Honakere Hobli			
1	Honakere	9.02	Deficient
2	Manchapatna	8.68	Deficient
3	Brahmadevarahalli	6.59	Deficient
4	Buruduguntae	7.98	Deficient

Extent of high sulphur soils in Mandya district

Taluk wise hoblis higher in available sulphur concentration are presented in Table 2.

As per the statistical analysis in Mandya taluk sulphur concentration was significantly highest in Mandya Hobli with average mean concentration of 18.87 ppm followed by Duddha (17.16 ppm). Lowest of 13.74 ppm of sulphur status was observed in Kothatti hobli.

In Maddur taluk, high sulphur concentration of 15.89 ppm was in Chikkarasikere hobli followed by Koppa (15.48 ppm). Lowest of 13.43 ppm of sulphur status was observed in Athagur hobli.

In Malvalli taluk sulphur concentration was significantly highest in B.G. Pura hobli with average mean concentration of 15.76 ppm followed by Halagur (15.27 ppm). Lowest of 11.72 ppm of sulphur status was observed in Kirugavalu hobli.

In S.R. Patna taluk sulphur concentration of 20.22 ppm was in Arkere hobli followed by S.R. Patna (19.22 ppm). Lowest of 13.63 ppm of sulphur status was observed in Belgola hobli.

In Pandavapura taluk sulphur status was significantly highest in Melkote hobli with a concentration of 15.97 ppm followed by Chinnakurli (15.02 ppm). Lowest of 13.76 ppm of sulphur status was observed in Pandavapura hobli.

In K.R.Pet taluk sulphur status was significantly highest in Akki Hebbal hobli with a concentration of 22.41 ppm followed by the K.R. Pet (14.51 ppm). Lowest of 12.15 ppm of sulphur status was observed Bukinakere hobli.

In Nagamangala taluk sulphur status was significantly highest in Bellur hobli with a concentration of 14.48 ppm followed by Bindiganavilae (12.29 ppm). Lowest of 11.53 ppm of sulphur status was observed in Nagamangala hobli.

Table 2: Paddy growing areas in Mandya with high-S status (Taluk wise)

Taluks	Hoblis	Mean Sulphur (Ppm)	± Sd
Mandya	Mandya	18.87	5.484
	Duddha	17.16	5.627
	Basaralu	14.54	4.555
	Keregodu	14.44	2.573
	Kothatti	13.74	1.093
		15.75	4.272
Maddur	Maddur	13.5775	1.338
	Koppa	15.485	1.442
	Athagur	13.43	1.908
	Chikkarasikere	15.895	4.800
		14.60	2.722
Malvalli	Malvalli	12.41	1.434
	Halagur	15.27	1.245
	Kirugavalu	11.72	0.615
	B.G.Pura	15.76	6.489
		13.71	3.529
S.R.Patna	S.R.Patna	19.22	3.852
	K.Shettihalli	15.23	0.416
	Arkere	20.22	6.256
	Belgola	13.63	1.947
		17.07	4.420
Pandavapura	Pandavapura	13.76	1.489
	Chinnakurali	15.02	4.164
	Melkotae	15.97	0.794
		14.73	2.554
K.R.Pet	Bukinakere	12.15	-
	Akkihebbal	22.41	3.594
	K.R.Pet	14.51	2.917
	Seelanare	14.22	0.634
		15.82	4.888
Nagamangala	Nagamangala	11.53	1.082
	Bindiganavile	12.29	0.000
	Bellur	14.48	0.622
	Devalapura	12.15	-
		12.74	1.491

Extent of low S soils in Mandya district

Taluk wise hoblis deficient in available sulphur concentration are presented in Table 3.

As per the statistical analysis in Malvalli taluk the sulphur concentration was significantly more deficit in Halgur hobli with a concentration of 9.11 ppm was, followed B.G. Pura (7.63 ppm). Lowest of 7.03 ppm of deficit sulphur concentration was observed in Kirugavalu hobli. In K.R. Pet taluk the sulphur concentration significantly more deficit in Bukinakere hobli with a concentration of 8.85 ppm was, followed by K.R. Pet (8.33 ppm). Lowest of 6.72 ppm of deficit sulphur status was observed in Kikkeri hobli.

In Nagamangala taluk sulphur concentration significantly more deficit in Bellur hobli with a concentration of 9.03 ppm followed by Honakere (8.85 ppm). Lowest of 6.94 ppm of deficit sulphur concentration was observed in Bindiganavilae hobli.

Table 3: Paddy growing areas in Mandya with low-S status

Taluka	Hobli's	Mean Sulphur (Ppm)	± SD
Malvalli	Halgur	9.11	0.863
	Kirugavalu	7.03	0.368
	B.G. Pura	7.63	0.000
		7.92	1.158
K.R. Pet	Bukinakere	8.85	0.240
	K.R. Pet	8.33	0.000
	Kikkeri	6.72	1.655
		7.97	1.190
Nagamangala	Nagamangala	8.24	0.368
	Bindiganavile	6.94	0.240
	Bellur	9.03	0.983
	Deevalapura	8.76	0.368
	Honakere	8.85	0.240
		8.36	0.965

Taluks having high sulphur status in Mandya district

Taluks wise sufficient in available sulphur concentration are presented in Table 2. As per the statistical analysis in Mandya district sulphur concentration was significantly highest in S.R. Patna taluka with average mean concentration of 17.07 ppm followed by K.R. Pet (15.82 ppm). Lowest of 12.74 ppm of sulphur status was observed in Nagamangala taluka. As per the statistical analysis the overall per cent of highest sulphur concentration was observed in S.R. Patna taluka.

Taluks having low sulphur status in Mandya district

Taluks, deficiet in available sulphur concentration are presented in Table 3. As per statistical analysis in Mandya district the sulphur concentration was significantly more deficit in Malvalli taluka with a concentration of 7.92 ppm followed by K.R. Pet (7.97 ppm). 8.36 ppm of sulphur status was observed in Nagamangala taluka. As per the statistical analysis the overall percent of lowest sulphur status was observed in Malvalli taluka.

Sulphur status of Mandya district

As per the statistical analysis out of 119 soil samples 77.32 per cent (92 samples) sulphur status is sufficient and remaining 22.68 per cent (27 samples) sulphur status is deficit in Mandya district. The data on available sulphur status in soils under paddy growing regions in Mandya district is presented in Table 1 and Fig. 1.

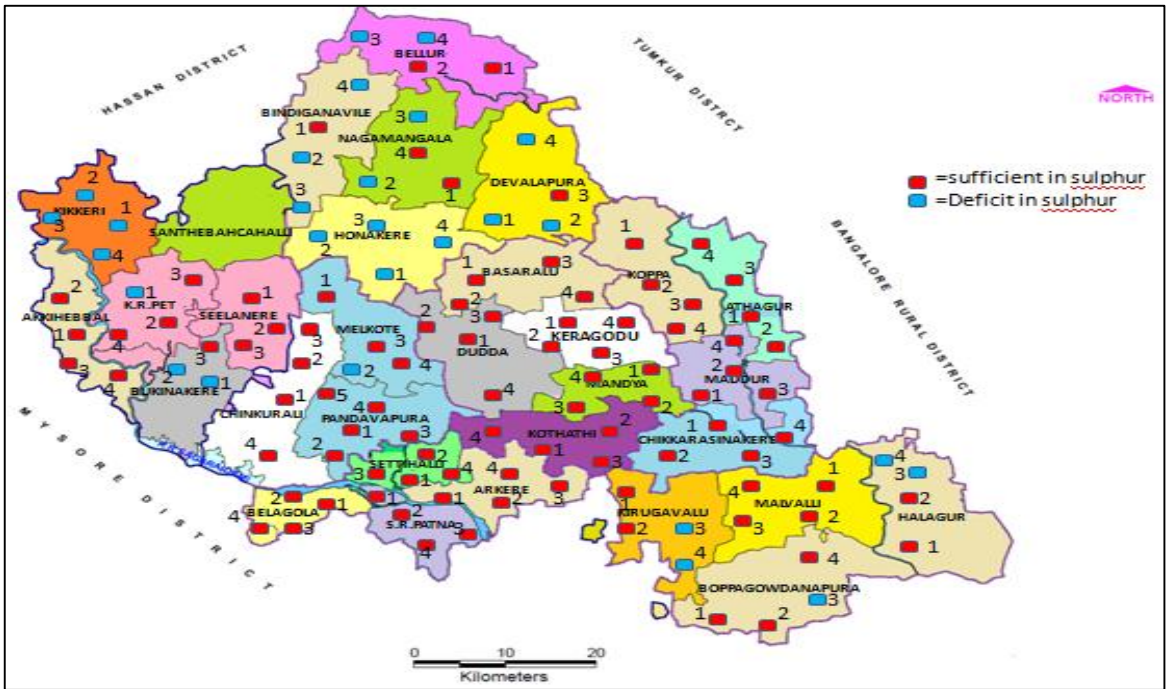

Fig 1: Sulphur status of paddy growing areas of the Mandya district (hobli wise)

In different taluks of Mandya district, four taluks *i.e* Mandya, Maddur, S.R. Patna, and Pandavapura have recorded sufficient range of sulphur status, where as in other taluks namely Malvalli, K.R. Pet, and Nagamangala taluks with deficient sulphur status were observed. Nagamangala taluk has least sulphur status among taluks of Mandya district with all five hoblis showing deficiency range of sulphur status.

The high status of sulphur in these areas may be to application of sulphur containing fertilizers to fields and because of application of $ZnSO_4$ to soil and low sulphur use efficiency because of continuous paddy cultivation in most of the taluks of Mandya district. This has resulted in buildup of sulphur in these soils. Mashi *et al*. (1989) [2] reported that total sulphur varied from as low as 100.8 ppm to as high as 2050 ppm with overall average of 801.3 ppm in Rajasthan soils. Such variations are bound to occur due to difference in soil make up, mineralogy and organic matter. Vageesh *et al*. (1989) [5] also reported that the available sulphur in soils of Shimoga district ranged from 2.8 to 163.5 ppm, the overall picture of Shimoga district indicated S deficiency in 23.1 per cent of the 220 soil samples studied.

References

1. Basanth YS. Insecticide resistance in BPH, M.Sc. (agri.) Thesis, univ of agri. sci. GKVK, Bengaluru, 2012.
2. Mashi MR, Sharma S, singh N. Status and supplying capacity of sulphur in soils of Rajasthan. Proceedings of national seminar on sulphur in agriculture. 1989, 172-177.
3. Rahman MN, Isla MB, Sayem SM, Rahman MA, Masud MM. Effect of different rates of sulphur on the yield and yield attributes of rice in old Brahmaputra floodplain soil. J Soil. Nature. 2007; 1(1):22-26.
4. Singh MV. Importance of Sulphur in balanced fertilizer in India. fert news. 2001; 40(10):13-35.
5. Vageesh TS, Gajanan GN, Shetty VY, Naidu BS. Sulphur status of soils of Shimoga district. Proceedings of national seminar on sulphur in agriculture. 1989; 169-171.