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A Ground Water quality of Thiruchirapalli district, Tamil Nadu

A.R. MOHAMED HAROON¹, A. BHASKARAN², S. MARAGATHAM³ and M. SHEIK DAWOOD²

¹ *Krishi Vigyan Kendra, Sirugamani-639 115,*

² *A.D. Agricultural College and Research Institute, Tiruchirapalli-620 009*

³ *Krishi Vigyan Kendra, Vamban, Pudukottai*

In Tamil Nadu, surface water flows are diminishing due to monsoon failures, decline in storage capacities of tanks due to encroachment, silting *etc.*, leading to over exploitation of ground water. This led to lowering of groundwater table, increasing the pumping costs and change of water quality. Of the total geographical area of 13 M. ha, 5.46 and 2.97 M ha are the net area sown and area under irrigation respectively. Among the different sources of irrigation, well irrigation contributes 54.7 per cent followed by canal irrigation (26.6%) and tank irrigation (18.3%). Among the 30 districts of Tamil Nadu, well irrigation is the dominant source in Thiruvannamalai (97.9%), Salem (93.5%), Vellore (92.5%) and Perambalur districts (92.3%).

Hence a survey was made to assess the suitability of underground water both from open and bore wells at every revenue village of Thiruchirapalli district. Thiruchirapalli district with an area of 4,40,412 ha has been subdivided in to eight taluks comprising 483 revenue villages. The water samples, collection from all the revenue villages were analysed for pH, EC and cationic and anionic composition and the quality parameters like Residual Sodium Carbonate (RSC) and Sodium Adsorption Ratio (SAR) were computed. The irrigation water suitability was assessed based upon the criteria developed by AICRP on saline water (1991) as follows.

Grouping of poor quality ground waters for irrigation

Water quality	EC _{iw} (dSm ⁻¹)	SAR _{iw} (m mol L ⁻¹)	RSC (me L ⁻¹)
A. Good water	<2	<10	<2.5
B. Saline water			
i. Marginally saline	2-4	<10	<2.5
ii. Saline	>4	<10	<2.5
iii. High-SAR saline	>4	>10	<2.5
C. Alkali water			
i. Marginally alkali	<4	<10	2.5-4.0
ii. Alkali	<4	<10	>4.0
iii. Highly alkali	Variable	>10	>4.0

Table 1. Per cent distribution of different quality of irrigation waters in Thiruchirappalli district, Tamil Nadu.

S. No.	Taluk	Total no.of samples	Per cent distribution						
			Good	MS	S	HSS	MA	A	HA
1.	Tiruchirappalli	94	49	25	6	4	4	11	1
2.	Manapparai	160	59	13	2	3	9	11	3
3.	Thottiyam	46	2	15	81	2	-	-	-
4.	Srirangam	155	83	6	-	3	3	5	-
5.	Manachanallur	8	75	25	-	-	-	-	-
6.	Thuraiyur	50	54	32	12	2	-	-	-
7.	Lalgudi	55	68	16	2	-	5	9	-
8.	Musiri	29	90	10	-	-	-	-	-
	Total	597	60	15	9	3	5	7	1

MS - Marginally saline; S - Saline; HSS - High SAR saline ; MA - Marginally alkali; A - Alkali; HA - Highly alkali

Table 2. Range of values for different quality of irrigation waters of Thiruchirappalli district, Tamil Nadu.

S. No.	Class	No.of sample	EC dSm ⁻¹	SAR	RSC	M ²⁺ /M cations
1.	Good	111	0.4-1.9	0.5-6.5	-	0.32-0.89
2.	Marginally saline	90	2.0-3.4	0.7-9	-	0.47-0.89
3.	Saline	53	4.6-14.4	2.7-9.4	-	0.37-0.75
4.	High SAR saline	15	4.6-15.9	9.9-22.2	-	0.13-0.34
5.	Marginally alkali	27	0.4-1.7	1.22-6.1	2.7-3.8	0.31-0.73
6.	Alkali	41	0.4-7.5	1-16.1	4.1-13.1	0.16-0.72
7.	Highly alkali	6	1.3-7.6	1.7-18.8	5.7-12.8	0.14-0.26

Ground water Quality of Thiruchirappalli district

The taluk wise distribution of different classes of irrigation water is given in table 1. Of the 597 water samples collected from Thiruchirappalli district, the distribution of different quality of irrigation water is as follows: 365 (60%) good, 90 (15%) marginally saline, 53 (9.0 %) saline, 15 (3.0 %) high SAR saline, 27 (5.0 %) marginally alkali, 41 (7.0 %) alkali and 6 (1%) highly alkali.

The range of values for EC, RSC and SAR of irrigation water samples of Thiruchirappalli district are given in table 2. The marginally saline and marginally alkali waters have a divalent to sum of cation ratio of 0.47-0.89 and 0.31-0.73 respectively. The saline and alkali waters have the divalent to sum of cation ratio as 0.37-0.75 and 0.16-

0.72 respectively, while in the high SAR saline and highly alkali category, the ratio is narrow with 0.13-0.34 and 0.14-0.26 respectively. The good quality water samples had divalent to sum of cation ratio of 0.32-0.89. Hence assessing the irrigation water quality as per the criteria developed by AICRP on use of saline water is highly suitable to monsoonal climate of India and this system of classification of irrigation water may be considered suitable for deciding the management strategies for the use of poor quality waters for irrigation.

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