

Research Article

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Assessment of ground water quality for supplemental irrigation of semi dry rice cultivating tracts of Ramanathapuram district

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Summary

A study was carried out in the semi dry rice cultivating tracts of Ramanathapuram district to characterize the physico-chemical properties of ground water samples which include pH, EC, SAR, RSC and SSP. To assess the suitability of underground water, 70 ground water samples were collected from major semi dry rice cultivating tract of Paramakudi and Ramanathapuram block and their quality was assessed using CSSRI, criteria. Of the 70 ground water samples, 5 were good (3.2%), 36 samples were marginally saline (53.3%), 25 were high SAR saline (37.5%) and 4 were alkali (5.5%) category. The good water samples recorded the mean value of 1.8 dSm⁻¹, 1.1 meq/l and 5.1 of EC, RSC and SAR, respectively. In high SAR saline category of the 25 samples, the mean values were 3 dSm⁻¹, 0.4 meq/l and 13.5 of EC, RSC and SAR, respectively. The alkali category mean values were 2.9 dSm⁻¹, 4.6 meq/l and 8.3 of EC, RSC and SAR, respectively. In Paramakudi block, 7.5 per cent were good, 80 per cent were marginally saline, 5 per cent were high SAR saline and 7.5 were alkali in nature. Hence, both this good and marginally saline quality of ground water can be safely used for supplemental irrigation. In Ramanathapuram block, 26.6 per cent were marginally saline, 70 per cent were high SAR saline and 3.4 per cent were alkali in nature, respectively. Hence, in Ramanathapuram block, 73.4 per cent of ground water samples comprising high SAR saline and alkali which cannot be used as supplemental irrigation.

Key words : Ground water quality, Supplemental irrigation, Semi dry rice cultivating tracts

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Introduction

In coastal Tamil Nadu, rice is grown under upland condition wherein, rice is grown as pre-monsoon direct sown with dry seeding during September-October. The Ramanathapuram district is a dry district where non-system tank is the major source of irrigation; hence, rainfall is the most decisive factor (Selvaraj and

Ramasamy, 2006). Apart from drought, other abiotic stress like salinity, low soil fertility, less water holding capacity and imbalanced use of fertilizers, etc, are the major reason for low yields in semi-dry rice soils, which is the livelihood for farmers living in an area of 73,550 ha in Ramanathapuram district of Tamil Nadu. In coastal areas, rice is grown as direct sown dry seeded rice during pre-monsoon season viz., September second week

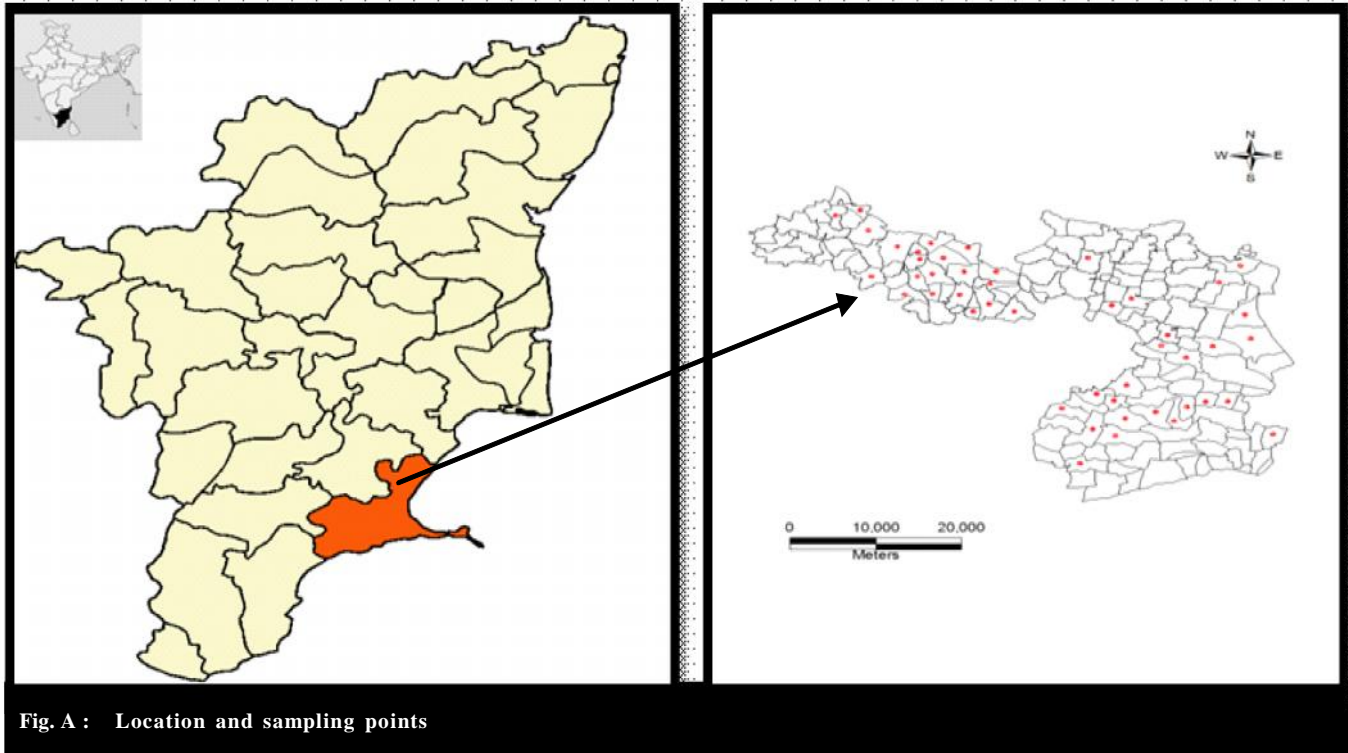


Fig. A : Location and sampling points

onwards at Paramakudi block and October first week onwards at Ramanathapuram block. In Paramakudi block, semidry rice is grown with supplemental irrigation either through tanks or underground marginally saline water. But in Ramanathapuram block, the underground water is poor quality *viz.*, high SAR saline or alkali in nature which could not be used for supplemental irrigation (AICRP, 2000-2002). Hence, when the monsoon recedes early during flowering stage (December second week onwards) rice yields are drastically affected. Therefore, managing abiotic stress of drought and imbalanced fertilization with selection of good cultivars and creating awareness among farmers of above technologies will increase rice yields of semi dry rice. There is a scope to increase yield by 0.5 to 1.0 t ha⁻¹ with supplemental irrigation combined with balanced fertilization which will increase net profit of farmers by Rs.5000 to Rs.10000 per ha (FAO,1999).

Resource and Research Methods

The present study was taken upto study the ground water related constraints and to increase the rice yields under semi-dry condition.

Seventy ground water samples were collected in

plastic container from different bore wells of semi-dry rice cultivating areas of Ramanathapuram district. The plastic container safely handled, transferred and stored in appropriate place of analytical lab for further chemical analysis.

Research Findings and Discussion

Of the 70 ground water samples, five were good (3.2%), 36 samples were marginally saline (53.3%), 25 were high SAR saline (37.5%) and 4 were alkali (5.5%) category. In Paramakudi block, of the 40 water samples, 7.5 per cent were good, 80 per cent were marginally saline, 5 per cent were high SAR saline and 7.5 were alkali in nature (Table 1 and Fig. 1). In Ramanathapuram block, of the 30 ground water samples, 26.6 per cent were marginally saline, 70 per cent were high SAR saline and 3.4 per cent were alkali in nature, respectively (Table 2 and Fig. 2). Poor quality aquifers, sea water inundation, were the reasons for poor quality waters. In Paramakudi block, 87.5 per cent ground waters were suitable for supplemental irrigation which could be exploited to increase rice productivity. But in Ramanathapuram block, 73.4 per cent of ground water were either high SAR saline or alkali, thus, unsuitable for supplemental

Table 1 : Assessment of ground water quality of semi-dry rice soils of Paramakudi block

Villages	pH	EC (dSm ⁻¹)	Indices			
			SAR	RSC (meq/l)	SSP	Class
Parthibanur	7.8	2.0	5.7	-	46.5	Good
Perungarai	7.4	2.6	6.1	-	44.6	Marginally saline
Kamuthakudi	8.0	3.2	9.9	1.9	57.4	Marginally saline
Pothuvakudi	8.5	3.6	7.3	4.7	45.3	Alkali
Kulavi Patti	7.7	2.0	6.3	2.2	50.8	Good
Vilathur	7.2	2.2	7.0	-	52.4	Marginally saline
Perumal Koil	7.7	2.3	6.2	0.8	48.1	Marginally saline
Madanthai	7.4	3.3	5.7	-	39.4	Marginally saline
M.Puram	7.0	2.4	5.8	-	45.2	Marginally saline
Melayakudi	7.7	2.4	5.3	0.7	42.5	Marginally saline
Kavanoor	7.9	2.2	8.5	5.0	58.7	Alkali
Paamboor	8.2	2.6	9.2	4.2	58.7	Alkali
Venthoni	7.8	2.3	7.5	0.1	54.0	Marginally saline
V.Kurichi	8.5	2.7	10.1	4.4	61.5	Highly alkali
Ariyanendal-1	7.7	2.4	9.0	0.3	59.9	Marginally saline
Ariyanendal-2	7.1	2.5	5.7	-	43.9	Marginally saline
Kalaiyur	8.9	2.9	13.6	2.1	70.7	High SAR saline
Oorapuli	7.7	2.9	7.6	-	50.7	Marginally saline
Ariya-2	7.1	3.1	6.8	-	45.6	Marginally saline
Nagatchi-1	8.1	2.8	11.2	-	64.3	High SAR saline
Nagatchi-2	7.4	3.1	5.9	-	41.6	Marginally saline
Kiliyur-1	7.3	2.6	6.8	-	49.4	Marginally saline
Kiliyur-2	7.1	2.9	6.4	1.4	45.4	Marginally saline
O.Puthur	7.6	2.8	8.6	0.9	55.6	Marginally saline
Valaiur	7.1	3.2	5.8	-	40.5	Marginally saline
P.Puram	7.4	2.7	6.7	-	48.0	Marginally saline
S.Kavanoor	7.1	2.3	6.1	-	47.2	Marginally saline
Valasai	6.9	2.0	2.1	-	21.5	Marginally saline
P.Vilundan	7.6	2.5	7.3	-	51.6	Marginally saline
N.Patti	7.1	2.1	4.3	-	38.8	Marginally saline
Karaiur	7.5	2.6	6.3	-	46.6	Marginally saline
K.Paati	7.6	2.7	4.3	-	35.0	Marginally saline
Mr.Puram	7.6	2.7	7.4	0.4	50.8	Marginally saline
Kidaripati	7.0	1.9	3.7	-	35.0	Good
Neduklam	7.4	3.0	6.9	-	47.3	Marginally saline
Terkupatti	7.6	2.8	6.9	-	47.8	Marginally saline
Deriveli	6.8	1.9	3.2	-	31.3	Good
Pedandal	7.2	2.1	4.4	-	38.2	Marginally saline
Kariakudi	8.0	3.0	10.1	1.3	60.2	High SAR saline
Kattupati	7.1	1.6	4.1	-	41.2	Good

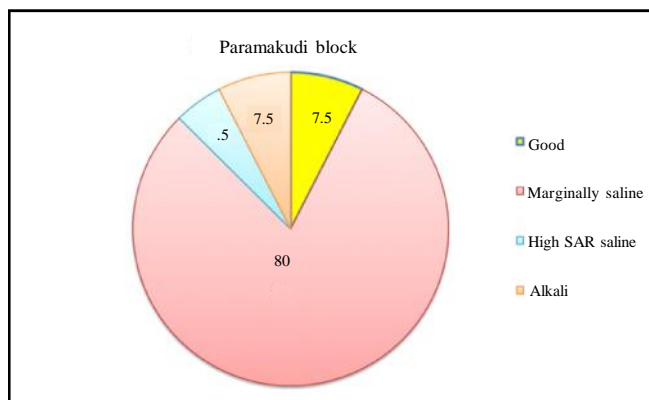


Fig. 1 : Ground water quality of Paramakudi block

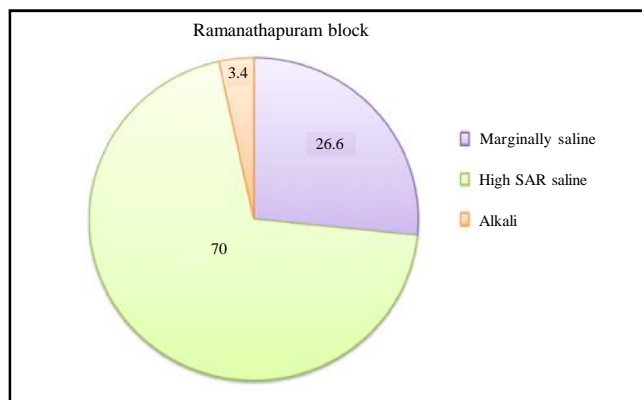


Fig. 2 : Ground water quality of Ramanathapuram block

Table 2 : Assessment of ground quality of semi-dry soils of Ramanathapuram block

Villages	pH	EC (dSm ⁻¹)	Indices			Class
			SAR	RSC (me /l)	SSP	
Sakkarkottai	7.1	2.5	4.5	-	36.7	Marginally saline
Bharathinagar	7.3	3.0	4.4	-	33.4	Marginally saline
R.S.Madai	8.0	2.7	10.9	0.28	64.1	High SAR saline
T.pattanam	7.6	2.1	9.1	-	62.1	Marginally saline
Mammathu kadai	7.8	2.6	9.1	0.79	58.1	Marginally saline
Kalari	8.0	3.0	11.4	-	64.4	High SAR saline
U.K.Mangai-1	8.5	3.1	14.7	-	72.4	High SAR saline
U.K.Mangai-2	8.0	3.1	12.2	-	66.4	High SAR saline
Maruthur	7.9	2.8	9.5	-	59.2	Marginally saline
Ekkudi	7.5	2.4	13.5	1.13	73.3	High SAR saline
Nallankudi	7.2	2.1	7.3	0.29	55.4	Marginally saline
Pullangudi	7.4	2.1	8.7	-	62.6	Marginally saline
Ammaari	8.1	2.8	14.0	-	71.4	High SAR saline
Peruvayal	7.7	2.4	8.9	-	60.8	Marginally saline
Naranamangalam	7.9	2.8	12.0	-	66.2	High SAR saline
Naiurani	8.1	3.0	14.0	-	70.1	High SAR saline
Veeravani	8.6	3.2	15.9	-	73.8	High SAR saline
RMD-B.Kanmai-1	8.1	3.1	14.2	-	71.4	High SAR saline
RMD-B.Kanmai-2	8.0	3.0	13.1	-	68.5	High SAR saline
Pasalai	7.6	2.9	11.5	-	65.0	High SAR saline
Karenthal	7.3	3.0	12.5	-	67.9	High SAR saline
Ragunathapuram	7.5	2.9	13.4	0.01	70.8	High SAR saline
Kalukurani	8.2	3.1	14.5	-	70.9	High SAR saline
Pullandai	7.8	2.8	11.4	-	65.2	High SAR saline
Pulivalasai	8.0	2.9	13.9	-	71.3	High SAR saline
Veeravanal	8.2	3.1	15.8	0.13	74.6	High SAR saline
Puliyur	8.7	3.4	18.8	0.16	78.1	High SAR saline
M.Karai	8.2	3.3	16.7	-	75.3	High SAR saline
Karaiur	8.1	3.1	12.8	-	67.5	High SAR saline
U.Pithur	7.7	2.8	14.7	4.36	74.0	High SAR saline

irrigation.

Conclusion :

In Paramakudi block, of the 40 ground water samples collected from Paramakudi block, 7.5, 80, 5 and 7.5 per cent were good, marginally saline, high SAR saline and alkali in nature. This good and marginally saline quality of ground water alone can be safely used for supplemental irrigation. Of the 30 ground water samples from Ramanadhapuram block, 26.6, 70 and 3.4 was marginally saline, high SAR saline and alkali in nature.

Hence, in Ramanathapuram block, 73.4 per cent of ground water samples surveyed cannot be used for supplemental irrigation.

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