

TABLE 1. Analysis of water samples

Sl No	CO ₃	HCO ₃	Cl	SO ₄	Total	Ca	Mg	K	Na	Total	E. C. milli-mhos	pH	R.S.C	S.A.R	S.S.P
					milli equivalents/litre										
1.	1.9	5.9	5.0	0.9	13.7	2.6	4.0	3.3	5.9	15.8	1.9	7.4	0.5	3.24	47.0
2.	1.9	7.9	5.0	0.8	15.6	4.2	3.1	2.6	8.3	18.2	1.8	7.5	2.5	4.35	45.6
3.	3.9	5.9	7.0	0.9	17.7	4.0	5.4	0.6	10.9	20.9	2.0	7.6	0.4	5.03	52.2
4.	—	4.9	1.0	0.1	6.0	3.8	0.4	—	0.7	4.9	0.6	7.5	0.7	0.48	18.0
5.	3.9	3.9	1.0	0.2	9.0	2.8	3.3	—	2.4	8.5	0.8	7.7	1.7	1.37	28.2
6.	1.9	8.9	2.0	0.1	12.9	2.6	3.3	—	4.6	10.5	0.9	7.0	4.9	2.68	43.8
7.	3.9	4.9	1.0	0.4	10.2	4.0	2.2	—	2.1	8.3	0.2	7.1	2.2	1.19	25.3
8.	1.9	3.9	2.0	0.5	8.3	3.0	2.2	0.9	1.6	7.7	0.2	7.4	0.6	0.99	26.2
9.	3.9	4.9	2.0	0.7	11.5	3.0	1.6	—	4.1	8.7	0.2	7.6	2.2	2.40	47.1
10.	3.9	5.9	1.0	0.1	10.9	1.8	3.4	—	4.4	9.6	0.4	7.5	4.6	2.73	45.8
11.	1.9	11.0	1.0	0.1	14.0	2.8	2.8	—	5.7	11.3	1.0	7.0	7.7	3.53	50.4
12.	3.9	3.0	1.0	0.1	8.0	3.4	2.4	—	1.2	7.0	0.45	7.5	0.9	0.70	17.1
13.	3.9	4.0	1.0	0.2	9.1	2.2	2.8	—	2.6	7.6	0.6	7.8	2.9	1.64	34.2
14.	5.8	6.9	1.0	0.1	13.8	3.3	1.9	—	10.9	16.1	1.20	8.2	7.5	6.76	73.6
15.	1.0	4.0	27.0	12.2	44.2	1.6	12.4	0.1	26.0	40.1	4.8	7.7	—	9.83	64.7
16.	2.0	9.0	7.0	4.3	22.3	1.2	4.0	—	19.0	24.2	1.92	8.6	5.8	11.78	78.5
17.	2.0	7.0	3.0	3.2	15.2	1.5	5.2	—	4.2	10.9	1.2	8.9	2.3	2.30	38.5
18.	2.0	5.0	3.0	4.0	14.0	0.8	5.2	0.1	3.8	9.9	1.2	8.0	1.0	2.20	38.4
19.	2.0	6.0	3.0	3.5	14.5	0.8	5.2	0.1	3.9	10.0	0.96	8.7	2.0	2.25	39.0
20.	2.0	5.0	1.0	1.8	9.8	1.2	0.8	—	3.7	5.7	0.60	8.6	5.0	3.66	64.9
21.	2.0	6.0	6.0	5.3	19.3	0.4	2.8	—	20.0	23.2	1.92	9.0	4.8	19.91	86.2
22.	2.0	2.0	24.0	7.3	35.3	3.6	13.6	—	21.5	38.7	4.2	8.6	—	7.33	55.5
23.	2.0	8.0	18.0	5.3	33.3	0.4	7.6	—	20.9	28.9	8.24	8.8	2.0	10.45	72.3
24.	5.0	10.0	22.0	5.4	42.4	0.4	9.2	2.0	26.0	37.6	4.2	8.7	5.4	11.87	69.1

mined as per the standard laboratory methods (Sankaram, 1965) and expressed as m. e./lit. The pH and E. C. were also determined

The analytical values are tabulated in Table 1. Soluble sodium percentage (S.S.P.) residual sodium carbonate (R.S.C) and sodium adsorption ratio (S.A.R) were worked out and are presented in Table 1. Soil analysis, crops grown and the classification of water under different methods are given in Table 2 and 3.

RESULTS AND DISCUSSION

All the twenty four water samples are free from any suspended materials and are quite clear. From the pH values it is observed that most of the samples have neutral to mildly alkaline reaction. The sample 14 falls under moderately alkaline and few samples (*i. e.*) 16, 17 and 19 to 24 are strongly alkaline. Therefore in case these water samples are to be used for irrigation proper application of ameioratives is necessary. The other samples are suitable for irrigation for all the soil types and crops.

Water samples containing carbonates and bicarbonates in excess of calcium and magnesium are harmful. Eaton (1950) classified waters on the basis of residual sodium carbonate as: $(\text{CO}_3 + \text{HCO}_3) - (\text{Ca} + \text{Mg})$ all in terms of m.e./lit. If the values are negative and less than 1.25 the water is suitable and values above 2.5 are considered as unsuitable. Accordingly the samples 1, 3, 4, 8, 12, 15, 18 and 22 are suitable for irrigation. Samples 2, 5,

7, 9, 17, 19 and 23 are marginal. The samples 6, 10, 11, 13, 14, 16, 20, 21 and 24 are unsuitable for irrigation and most of them fall in the range of doubtful to unsuitable in the E. C. class also.

According to the U. S. D. A., classification the E. C. values for all samples were analysed and classified as follows. Samples 7, 8 and 9 are low salinity; samples 4, 10, 12, 13 and 20 are medium; 1, 2, 3, 6, 11, 14, 16, 17, 18, 19 and 21 are high and samples 5, 15, 22, 23 and 24 are unsuitable for irrigation. It was observed that C_3 classes contain maximum number of the samples *i. e.*, 46 per cent (11) and all the other classes C_1 , C_2 and C_4 contain 54 per cent (13). Verma (1973) also observed a similar relationship and noted 35.4 per cent of samples to be under C_3 class. As per this S.A.R value 20 samples fall under S_1 and can be used on almost all soils. Water samples collected from Muthiampatti, Konganapuram and Rakkiyampatti villages with sample numbers 16, 23, 24 respectively fall under S_2 and are considered to have appreciable sodium hazard with fine textured soils and can be used on coarse textured soils. The water is used for irrigating sandy clay loam textured, Mallasamuthiram soils and therefore it must be irrigated with caution using proper ameioratives under garden land condition. The sample from Avaniur village with the sample No. 21 alone is having a very high S.A.R value and fall under S_3 . This water is used for irrigating Thulukkanur soils of pH 7.0 with light texture and rapid permeability.

TABLE 2. Crop response to soil types and irrigation water

Sl. No.	Place of collection	Owner's opinion of water	Depth of water table in m.	Soil series used for irrigation	Soil pH	Soil E.C. milli mhos	Soil texture	Soil per-meability	Crops grown	Crop growth
1.	Pakkaliur	Slightly saltish	12.0	Chittalandur	7.5	0.12	gsi	Rapid	Ragi, Cotton cholam	Medium
2.	Morur	Good	12.0	Chittalandur	7.5	0.12	gsi	Rapid	Paddy cotton sugarcane	Good
3.	Uppupalayam	Good	21.0	Chittalandur	7.5	0.12	gsi	Rapid	Cotton, paddy fodder cholam	Medium
4.	Irchi	Good	19.7	Tiruchengode	8.0	0.36	sl	Rapid	Paddy, ragi, cotton, gingelly	Good
5.	Mettikkadu	Good	18.0	Tulukkanur	7.0	0.12	gsi	Rapid	Sugarcane, paddy cotton	Good
6.	Varuthampatti	Good	21.0	Tiruchengode	8.0	0.36	sl	Rapid	Paddy	Good
7.	Rayalur	Good	16.4	Tiruchengode	8.0	0.36	sl	Rapid	Paddy, sugarcane	Good
8.	Kadukarpalayam	—	15.0	Tiruchengode	8.0	0.36	sl	Rapid	— To be assessed	Good
9.	Srirangagoun-danpalayam	Good	12.0	Kuppanda-palayam	8.5	0.7	scl	Moderately rapid	Brinjal, sugar-cane, fodder cholam	Good
10.	Ukkilipatti	Good	15.0	Thondipatti	6.4	0.2	sl	Rapid	Sugarcane, paddy, ragi, cotton groundnut	Good
11.	Pudur	Good	12.0	Kuppanda-palayam	8.5	0.7	scl	Moderately rapid	Paddy, sugarcane, ragi, cotton	Good
12.	Vettalpalayam	Good	13.6	-do-	8.5	0.7	scl	-do-	Ragi, paddy, banana	Good
13.	Konakaluthanur	Good	15.0	Tiruchengode	8.0	0.36	sl	Rapid	Sugarcane	Good
14.	Mc. Donald's—choultry.	—	3.0	Mallasamudram	9.0	0.24	scl	Rapid	—	—
15.	Koolanur	Saltish	12.0	Thondipatti	6.4	0.2	sl	Rapid	Ragi, cotton, cholam, tobacco	Medium
16.	Muthiampatti	Good	9.0	Vannapatti	7.3	0.24	sl	Very rapid	Chillies, paddy, cholam, cumbu.	Medium

17.	Nadupatti-Kattuvalasu Chittur	Slightly saltish	18.0	Thulukkanur	6.4	0.12	sl	Rapid	Cotton, paddy, tapioca.	Medium
18.		Slightly saltish	12.0	Thondipatti	6.4	0.2	sl	Rapid	Ragi, cotton, tapioca	Medium
19.	Pudurakkarai-patti	Good	13.6	Vannapatti	7.3	0.24	sl	Very rapid	Paddy, cotton, fodder cholam.	Good
20.	Anaipalam-kattuvalavu	Good	10.6	Chavediparai	6.0	0.24	sl	Very rapid	Paddy, tapioca, ragi.	Good
21.	Avanur	Slightly saltish	7.5	Thulukkanur	7.0	0.12	gsi	Rapid	Ragi, chillies, cholam	Medium
22.	Odapatti	Saltish	10.6	Thondipatti	6.4	0.2	sl	Rapid	Ragi, chillies, cholam	Medium
23.	Kongana-purem	Saltish	6.0	Mallasamudram	9.0	0.24	scl	Rapid	Sugarcane, cotton, paddy, cholam, ragi.	Medium
24.	Rakkampatti	Saltish	6.0	Mallasamudram	9.0	0.24	scl	Rapid	Sugarcane, cotton, cholam	Medium

Lal and Singh (1974) observed that pH of soils was closely related to the SAR of irrigation water. They have also stated that pH value decreased with an increase in the salt concentration of irrigation water, while it tended to increase with a rise in clay percentage of the soil. In the present investigation also it was observed that water samples 16, 21, 23 and 24 recorded higher SAR values and soil samples of 23 and 25 only recorded higher soil pH values and samples 16 and 21 recorded normal pH values. This variation was, as explained by Lal and Singh (1974), could be attributed to an increase in clay content in samples 23 and 24.

Based on the soluble sodium percentage, sample numbers 1 to 13, 17 to 19 and 22 are classed as excellent to good; sample numbers 14, 15, 20, 23 and 24 are classed as good to injurious and sample numbers 16 and 21 are classed as injurious to unsatisfactory. Crop growth was adversely affected when water in samples 1, 3, 15 to 18 and 21 to 24 was used due to higher salt content.

TABLE 3. Classification on suitability of irrigation water

Sample No.	U.S.D.A.	Soluble sodium percentage (S.S.P)	E.C	R.S.C
1.	C3-S1	Excellent to good	Doubtful	Suitable
2.	C3-S1	Excellent to good	Doubtful	Marginal
3.	C3-S1	Excellent to good	Doubtful	Suitable
4.	C2-S1	Excellent to good	Good	Suitable
5.	C4-S1	Excellent to good	Doubtful	Marginal
6.	C3-S1	Excellent to good	Doubtful	Unsuitable
7.	C1-S1	Excellent to good	Excellent	Marginal
8.	C1-S1	Excellent to good	Excellent	Suitable
9.	C1-S1	Excellent to good	Excellent	Marginal
10.	C2-S1	Excellent to good	Good	Unsuitable
11.	C3-S1	Excellent to good	Doubtful	Unsuitable
12.	C2-S1	Excellent to good	Good	Suitable
13.	C2-S1	Excellent to good	Good	Unsuitable
14.	C3-S1	Good to injurious	Doubtful	Unsuitable
15.	C4-S1	Good to injurious	Unsuitable	Suitable
16.	C3-S2	Injurious to unsatisfactory	Doubtful	Unsuitable
17.	C3-S1	Excellent to good	Doubtful	Marginal
18.	C3-S1	Excellent to good	Doubtful	Suitable
19.	C3-S1	Excellent to good	Doubtful	Marginal
20.	C2-S1	Good to injurious	Good	Unsuitable
21.	C4-S3	Injurious to unsatisfactory	Doubtful	Unsuitable
22.	C4-S1	Excellent to good	Unsuitable	Suitable
23.	C4-S2	Good to injurious	Unsuitable	Marginal
24.	C4-S2	Good to injurious	Unsuitable	Unsuitable

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