https://doi.org/10.29321/MAJ.10.A03052

Madras agric. J. 65 (2) : 100—106, Feb., 1978

Economics of Irrigation in Coimbatore Taluk

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Cost of irrigation water increased with the step up in horse-power of electric motor pumpsets responding to the depth of wells. The difference in cost between different horse-power groups was attributed to the increased consumption of electricity, annual repairs and replacement charges. The variation in fixed cost was due to higher investments on well, electric motors and their accessories depending on the depth of wells. The average cost per irrigation under gardenland was Rs. 67.31 for wells up to a depth of 30.67 metres and Rs. 147.00 for wells above that depth. The average cost per hectare of cholam was Rs. 414.19 while that of sugarcane was Rs. 2290.30 in first depth group of Wells. In the second depth group, the same was Rs. 1016.21 and 3894.21 respectively. The high cost of irrigation in deep wells of Coimbatore taluk suggests rationalizing water use by optimum crop mix to maximise farm income. This could be achieved by extension efforts towards individual farm planning

Coimbatore district in Tamil Nadu is located in the rain shadow region with an average annual rainfall of 524.4 mm and most of it is received between August and December. The depth of wells in the farms of study region ranges from 15 to 64 metres, and they hardly command the full extent of land in any farm. There is an imperative need to rationalise investment on wells as well as the use of water irrigation.

An attempt was made to find the cost of one irrigation and to estimate the cost of irrigation per hectare of major crops under different horse-power groups of electric motor and the results are presented herein.

MATERIALS AND METHODS

Sampling : The study was conducted in gardenland farms in Coimbatore taluk in 1976 covering the year 1974-75. Eight villages viz., West Chitharai Chavadi, Madhavarayapuram, Thelungupalayam, Karunjamikkavundampalayam, Thirumalaiyampalayam, Vellakinnar, Vallamadai and Vilankuruchi were selected by simple random sampling. From each village twelve garden land farmers were selected at random. Altogether the sample constituted ninety six farmers. The farms were post-stratified into two groups based on dep-th of wells. The first group comprised of wells whose depth was up to 30.67 metres (100.6 feet) - the mean depth of all wells, and the second group constituted the wells with depth, above this mean.

Water-lifted for irrigation : The total quantity of water lifted in an agricultural year was estimated by collecting information on the area under individual crop grown in the farms and

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number of irrigations given to each of them. Assuming that for each irrigation 5 ha cm will be allowed, the total quantity of water lifted to irrigate a particular crop was computed. Summation of such quantities for all the crops grown in the farm gave the total quantity of water lifted in terms of ha cm during the agricultural year.

Algebraically, this could be expressed for a given year as :

$$W = K \sum_{j=1}^{n} A_j N_j$$

where,

W = total quantity of water pumped in terms of hectare centimetre for crop production in a farm during the year,

A_j = Area in hectare irrigated under j th crop,

N_j = Number of irrigations per hectare given to j^{th} crop.

K = 5 ha cm water required per irrigation.

Cost of irrigation: The annual total cost of irrigation in farms included fixed cost and variable cost. The components of the variable cost were the charges paid towards electricity consumed, charges for guiding water and rectifying channel and miscellaneous expenses incurred towards repairs for electric motor, minor purchase for replacement, purchase of asbestos wick, waste cotton, grease etc. The fixed cost of irrigation water was accounted for by depreciation and interest for the investments on wells, electric motor and their accessories, pump house and irrigation structures.

The annual total cost of irrigation in the farms was divided by the total quantity of water lifted to compute the cost of one ha cm of irrigation water. The cost per irrigation was obtained by multiplying the cost of one ha cm of water by five which was the assumed quantity allowed for one irrigation. From the total annual cost of irrigation in farms, the cost of irrigation for major crops was worked out.

RESULTS AND DISCUSSION

Cost per irrigation: The average cost of one irrigation for two depth of wells under various horse-power groups of electric motor pumsets are presented in Table I. The average total cost of one irrigation for the first group was Rs. 67.31. The increase in cost was significantly higher when the shift was from 7.5 HP to 10.0 HP. The average total cost for the second group was Rs. 147.00 accounting for more than two times that of first group. A sharp rise in cost was observed for 17.5 HP motor compared with 15.0 HP motors.

In the first depth group of wells, on an average, the variable cost accounted for 47.48 per cent of which the major components were labour charges accounting for 21.69 per cent and electricity charages for 18.65 per cent. Miscellaneous charges constituted 7.14 per cent. In the second group, the proportion of variable cost accounted for 36.48 per cent, a decrease by 11 per cent than of the first group. This was primarily due to a sharp decline in

TABLE I. Cost and break-up cost per irrigation (Approximately 5 ha cm.) (in rupees)

Horse-power	Variable cost/irrigation				Fixed cost/irrigation			
	Electricity charges	Labour charges	Miscellaneous charges	Variable cost/irrigation	Depreciation	Interest	Fixed cost per irrigation	Total cost per irrigation
FIRST GROUP								
1. 5.0 HP	9.90 (16.28)	14.60 (24.01)	4.30 (7.07)	28.80 (47.36)	10.10 (16.61)	21.90 (36.03)	32.00 (52.64)	60.80 (100.00)
2. 7.5 HP	15.85 (21.80)	14.50 (19.94)	5.24 (7.21)	35.59 (48.95)	12.13 (16.64)	25.00 (34.41)	37.13 (51.05)	72.72 (100.00)
3. 10.0 HP	19.35 (15.98)	13.10 (10.82)	9.05 (7.47)	41.50 (34.27)	24.90 (20.56)	54.70 (45.17)	79.60 (65.73)	121.10 (100.00)
4. Average	12.55 (18.65)	14.60 (21.69)	4.81 (7.14)	31.96 (47.48)	11.30 (16.79)	24.05 (35.73)	35.35 (52.52)	67.31 (100.00)
SECOND GROUP								
1. 10.0 HP	19.13 (15.27)	14.83 (11.80)	9.04 (7.21)	43.00 (34.28)	25.44 (20.29)	57.01 (45.43)	82.45 (65.72)	125.45 (100.00)
2. 12.5 HP	22.72 (18.14)	14.06 (11.23)	9.17 (7.36)	45.95 (36.73)	24.25 (19.38)	54.90 (43.89)	79.15 (63.27)	125.10 (100.00)
3. 15.0 HP	30.74 (20.07)	15.48 (10.12)	12.23 (8.01)	58.45 (38.20)	29.60 (19.35)	64.95 (42.45)	94.55 (61.80)	153.00 (100.00)
4. 17.5 HP	29.62 (12.26)	13.82 (5.72)	23.16 (9.60)	66.60 (27.58)	56.92 (23.57)	117.93 (48.85)	174.85 (72.42)	214.45 (100.00)
Average	26.81 (18.23)	15.04 (10.22)	11.78 (8.03)	53.63 (36.48)	29.21 (19.86)	64.16 (43.66)	93.37 (63.52)	147.00 (100.00)

the proportion of labour charges (10.22 per cent) when compared with the first group (21.69 per cent). Labour was mainly used for guiding water to the field and when the size of total cost increased, the proportional share of labour to total cost got decreased while in absolute terms the labour charges per unit remained almost the same. All the other components of cost showed increasing trend as the horse-power of motor increased due to higher consumption of electricity.

Considering the fixed cost, interest on fixed investments accounted for 35.73 per cent in the first group and thus, got increased to 43.66 per cent for the second group. This was mainly due to high investments on wells and use of high powered motor pumsets. Consequently, the depreciation charge was also comparatively high for the second group.

The variations in total costs and its components were due to the varia-

TABLE II Number of Irrigation and water requirements of major crops in the sample farms

Name of the crop/ Particulars	Paddy		Cholam CSH. 5	Ragi Co. 7	Maize Deccan Hybrid	Chillies	Tomato	Onion (Bellary)	Sugar-cane Co. 419	Turmeric	Cotton	
	IR.20	Bhavani									MCU.5	Vara-lakshmi
Season	Jan.-Apri.	Aug.-Nov.	Mar.-May	Nov.-Jan.	Dec.-Jun.	Jul.-Oct.	Mar.-Jun.	Jan.-Jun.	Jan.-Jan.	Apr.-Jan.	Sept.-Feb.	Sept.-Feb.
Number of irrigations	55	55	6	9	8	20	10	13	35	30	10	10
Water requirement in ha cm.	103	103	30	45	40	100	50	65	175	150	50	50

TABLE III Total cost of irrigation per hectare for major crops in Coimbatore Taluk (In rupees)

Name of the crop/ Particulars	Paddy	Cholam	Ragi	Maize	Chillies	Tomato	Onion	Sugarcane	Turmeric	Cotton
FIRST DEPTH GROUP (Up to 30.67 metre)										
5.0 HP Motor group	1438.05	329.53	563.90	646.64	1174.81	616.67	1065.64	1913.67	1519.23	746.80
7.5 HP Motor group	1452.50	476.47	523.74	651.95	1345.35	1341.72	—	2487.76	—	888.40
10.0 HP Motor group	—	739.92	968.74	—	2841.95	—	—	3123.65	—	1176.17
Average for all motor groups	769.39	414.19	605.25	648.62	1344.08	692.10	1065.64	2290.30	1591.23	901.11
SECOND DEPTH GROUP (Above 30.67 metre)										
10.0 HP Motor group	2457.23	835.21	1194.66	—	2476.71	—	1379.85	—	—	1269.95
12.5 HP Motor group	2200.88	802.38	1209.16	787.03	3026.48	—	—	3507.02	—	1266.80
15.0 HP Motor group	2586.60	1064.46	2002.30	1412.67	2345.39	—	2216.96	3940.37	—	1761.92
17.2 HP Mator group	—	1547.98	—	—	—	—	—	—	—	2021.23
Average for all Motor groups	2431.13	1016.22	1302.97	1158.11	2623.24	—	1937.92	3894.21	—	1571.24

tions in horse-power of the motor used by the farmers and this was attributed to the differences in depth of the wells owing to periodical deepening of wells. Increase in horse-power of the motors used resulted in an increase in electricity consumptions and miscellaneous charges. Because of relatively higher investment on wells, electric motors and its accessories in deeper wells, the depreciation and interest increased. So, the depth of well is the fulcrum on which all the components of cost revolved.

Cost of irrigation for major crops: The irrigation requirement of crops varied with nature of crops grown, their duration, seasonal conditions and soil characteristics. The common gardenland crops grown in this taluks, their season, number of irrigations and water requirement are presented in Table II. There were computed from the survey data and water requirement was worked out assuming 5 ha cm of water per irrigation for all the crops except paddy.

As among the food crops, paddy required 55 irrigations and 103 ha cm of water and was highly exacting in its water demand. In the initial stages, more quantity of water was fed into the fields and repeat irrigations were frequent but the quantity fed was less as the soils got fully saturated. During investigations, it was observed that the repeat irrigations for paddy were equivalent on an average to three-eight of an irrigation given to other gardenland crops. All other food crops required lesser number of irrigations and at longer intervals. The average quantity of water irrigated ranged from 30 to 45 ha cm. Sugarcane being an annual crop, required 35 irrigations and 175 ha cm of water followed by turmeric with 30 irrigations and 150 ha cm. The water requirement of cotton and tomato were same while onion, inspite of its lesser duration, exceeded these as it was grown during summer season.

Based on the number of irrigations and the area under each crop, the variable cost, fixed cost and total cost of irrigation were worked out for each crop. The horse-powerwise and depthgroupwise costs so calculated for a particular crop in individual farm were pooled for the entire study region, and averaged for one hectare of the crop concerned. The total cost of irrigation so computed is furnished in Table III.

Cholam was found to cost comparatively less when variable cost of irrigation alone was considered. Among commercial crops, less cost towards irrigation was spent on cotton and this probably contributed for an extensive coverage and intensive cultivation of cotton crop. The analysis of cost of irrigation for major crops showed that costs increased with the step up in horse-power of electric motor pumpsets responding to depth of wells.

The author expresses his gratitude to the Registrar, Tamil Nadu Agricultural University, Coimbatore for having permitted to publish his M.Sc.(Ag.) dissertation that formed the basis for paper. The authors are indebted to Dr. V. Rajagopalan. Professor and Head of the Department of Agricultural Economics, Tamil Nadu Agricultural University, Coimbatore for his valuable guidance and critical comments.

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