

EVALUATION OF DIFFERENT METHODS FOR REDUCING PERCOLATION LOSS OF WATER IN RICE FIELDS

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About 76 per cent of the total water required for rice culture was estimated to be percolation loss in sandy loam soils (Anon, 1975). Puddling of soil is a time old method for reducing percolation loss in paddy soils. Studies conducted in various parts of India such as Bikramang, Chiplima, Hyderabad, Jorhat and Navasari have shown the favourable influence of puddling on reducing percolation loss (Anon, 1980). The present investigation was conducted in a sandy loam soil to study the methods of reducing percolation loss in rice fields and their influence on grain yield.

Materials and Methods

The field experiment was undertaken in the sandy loam soil (coarse sand 73.21%, fine sand 6.98%, silt 6.05%, clay 11.78%) of the Agronomic Research Station, Chalakudy, Trichur district during all the three seasons of the year (kharif, rabi and summer) from rabi 1974 to summer 1980. The experiment was laid out in randomised block design with six replications and the following treatments.

- P1 Puddling with power tiller
- P2 Puddling with country plough
- P3 Puddling with wet land puddler
- P4 Subsoil compaction with a rammer at 30 cm depth
- P5 Soil dressing with lateritic loam at the rate of 200 cubic meter per hectare.

The treatment P4 which involved the removal of the top soil upto 30 cm depth and filling back after compaction was introduced from 1975-76 kharif onwards only. The treatment P3 was deleted since 1976-77 kharif and P5 was included instead. In the case of P4 and P5, the treatments were done only once and residual effects were studied in the later seasons.

In addition to yield, observations on water loss was recorded daily by measuring the subsidence of water level using hook gauges installed in each plot. The water level in each plot was brought to 5 cm every day.

Results and Discussion

Daily water loss: Though the value of daily water loss (Table 1) were not significantly influenced by the different treatments under investigation, subsoil compaction recorded the lowest water loss in most of the seasons studied. Patel and Singh (1979) also observed reduced water requirement under soil compaction as compared with soil puddling. It was also observed that The efficiency of subsoil compaction tended to reduce as seasons advanced as indicated by a

Table 1

Total water requirement of rice (cm) as affected by the treatments

Season	Treatments					C.D. (0.05)
	F ₁	F ₂	F ₃	F ₄	F ₅	
Kharif						
1975-'76	0.88	0.69	0.97	0.58	—	NS
1976-'77	1.22	1.28	—	0.87	1.09	NS
1977-'78	0.92	0.96	—	0.66	1.09	0.26
1978-'79	1.36	1.24	—	1.04	1.44	NS
1979-'80	1.49	1.54	—	1.39	1.61	NS
Rabi						
1974-'75	2.76	3.10	2.26	—	—	NS
1975-'76	0.93	0.80	0.92	0.74	—	NS
1976-'77	1.77	1.60	—	1.35	1.57	NS
1977-'78	1.57	1.49	—	1.32	1.53	NS
1978-'79	1.90	1.61	—	1.80	1.93	NS
1979-'80	1.53	1.58	—	1.50	1.65	NS
Summer						
1974-'75	2.22	2.19	2.32	—	—	NS
1975-'76	2.41	2.33	2.52	2.23	—	NS
1976-'77	2.89	2.56	—	2.56	2.67	NS
1977-'78	2.78	2.71	—	2.65	2.60	NS
1978-'79	2.90	2.57	—	2.76	2.59	NS
1979-'80	2.89	2.80	—	2.76	2.58	NS
Mean	1.91	1.83	1.80	1.61	1.86	

trend of increasing water loss and the narrowing down of difference with the other treatments, in the later seasons. Since evapotranspiration loss is uniform, the variation observed is due to variation in percolation loss.

It is also evident from Table 1 that the daily values of water loss were consistently the lowest during kharif season possibly due to the lower evaporative demand and shallow water table conditions during this season (Table 2). The soil at the study centre is sandy loam with high sand fraction (80.19%). The treatment effects were not significant probably because the creation of an impervious layer by puddling operation or by the other methods tried was not feasible in this coarse sandy loam soil with high proportion of sand fraction.

Grain yield: In general the different treatments did not significantly influence the grain yield of medium or short duration rice varieties in all the three seasons. The non-significant effect on grain yield due to soil compaction as compared with soil puddling was also reported by Patei and Singh (1979). However, subsoil compacted plots tended to record higher grain yield during the rabi and summer seasons which reached the level of significance during 1975-76 rabi and 1976-77 summer season. This trend of increase in grain yield corresponds well to the reduction in water loss. The possible reduction in fertilizer loss through leaching in this treatments also cannot be overlooked

The findings of this study indicate that in loose sandy loam soils, puddling need be done to the minimum possible as no additional benefit by way

Table 2

Seasonal variation in evaporation values (cm/day) and ground water table in the experimental area (cm)

Year	Evaporation (cm/day)			Ground water table (cm)		
	Kharif	Rabi	Summer	Kharif	Rabi	Summer
1974-'75	—	0.67	0.69	—	43.0	88.0
1975-'76	0.40	0.45	0.47	5.3	9.5	55.1
1976-'77	0.31	0.35	0.47	3.7	11.6	45.6
1977-'78	0.33	0.35	0.47	6.6	14.7	82.7
1978-'79	0.30	0.37	0.49	8.1	18.3	89.4
1979-'80	0.29	0.34	0.50	8.5	14.8	86.6
Mean	0.33	0.42	0.52	6.4	18.7	74.6

of minimising the percolation loss or increasing the grain yield is derived through such an operation. It is also indicated that the creation of an impervious layer for reducing percolation loss by soil compaction with rammer or soil dressing with lateritic loam may also not be possible in such soils.

Summary

A field experiment was conducted in a sandy loam soil of the Agronomic Research Station, Chalakudy for five years (1974-'80 to study the efficiency of puddling with different implements (power tiller, country plough and wetland puddler), soil dressing with lateritic loam and sub-soil compaction at 30 cm depth in reducing percolation loss in rice fields. The study showed that these methods neither effectively reduced the water loss nor influenced the grain yield.

സംഗ്രഹം

മണൽരാശി കലർന്ന മണ്ണുള്ള നെൽവയലുകളിൽ വാർന്നു പോകുന്ന ജലത്തിന്റെ നഷ്ടം പരമാവധി ലഘൂകരിക്കുന്നതിനു വേണ്ടി ഫലപ്രദമായ ഒരു മാർഗ്ഗം കണ്ടു പിടിക്കുന്നതിനു ചാലക്കുടി അഗ്രോണമിക് റിസർച്ച് സ്റ്റേഷനിൽ 1974 മുതൽ 1980 വരെയുള്ള കാലയളവിൽ വിരിപ്പു, മുണ്ടകൻ, പുഞ്ച എന്നീ മൂന്നു വിളക്കാലത്തും പരീ ക്ഷണങ്ങൾ നടത്തുകയുണ്ടായി. വിവിധ കാർഷികോപകരണങ്ങൾ (പച്ചർടില്ലർ, നാടൻ കലപ്പ, വെറാലാൻഡ് പഡലർ) ഉപയോഗിച്ച് നിലം കലക്കുക, 30 സെ. മീ. താഴ്ചയിലുള്ള മണ്ണു ഇടിച്ചു ഉറപ്പിക്കുക, വയലിൽ വെട്ടുകൽമണ്ണു ചേർത്തു കൊടുക്കുക എന്നീ വിവിധ മാർഗ്ഗങ്ങൾ അവലംബിക്കുന്നതുമൂലം വയലുകളിൽ നിന്നും വാർന്നുപോകുന്ന ജലനഷ്ടം കുറയ്ക്കാനോ നെൽവിളവിനെ കാര്യമായി സ്വാധീനിക്കുവാനോ സാദ്ധ്യമല്ലെന്നു കണ്ടു.

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