FIELD STUDIES ON IRRIGATION PRACTICES IN SYSTEM C OF THE MAHAWELI DEVELOPMENT PROGRAMME

By

WIPULA KEERTHI BANDARA ELKADUWA

Thesis

Submitted in partial fulfilment of the requirements

for the degree of

MASTER OF PHILOSOPHY

in the

POSTGRADUATE INSTITUTE OF AGRICULTURE

of the

UNIVERSITY OF PERADENIYA

SRI LANKA

Approved :

Supervisor ..... (Dr. S.M. Miranda)

Examiner ..... (Dr. K.G.A. Gunasekera)

Examiner ..... (Dr. E.R.N. Gunawardena)

August 1987.

ABSTRACT

A water use study of lowland rice was conducted in Block 301 and 302 of zone 3, Mahaweli system C from yala 1985 to yala 1986. Block 301 was representative of the conventional system of canal design and farm layout followed in the rest of the project area. Block 302 was a pilot demonstration farm developed by Japanese consultants with a more extensive network of lined canals serving relatively smaller turnout areas with continuous irrigation for relatively larger lyaddes (farm plots). Flow was measured in distributory canals, field and drainage channels of isolated micro-catchments. Conveyance and field losses were estimated and ground water levels monitored. To evaluate irrigation efficiencies water requirements were estimated and compared with actual irrigation practices.

Total ex-sluice water duty in maha to Block 301 was 3,565 mm with rainfall of 1,762 mm, and to Block 302 was 3,911 mm with a rainfall of 1,909 mm. In yala duty was 3,362 mm with 323 mm of rain in Block 301. During both seasons, the top 30 cm which had an antecedent soil moisture content of 15% demanded 52 mm of water for land soaking but actual usage at farm turnout was 132 mm in yala and 250 mm in maha. Some farmers started first ploughing without soaking. Total irrigation water used for land preparation at the field turnout was 548 mm in yala and 895 mm in maha over approximately 20 days; rainfall was 67 mm and 140 mm respectively. The duration of land preparation in the entire area was staggered over 42 days in Block 302 and 55 days in Block 301. Distributory canal duty for irrigating the crop varied from about 21 to 27 mm/d during yala and 27 to 33 mm/d in maha.

Evapotranspiration estimates averaged 5.4 mm/d in maha and 7.4

mm/d in yala. Seepage and percolation varied from 9 mm/d (downslope) to 20 mm/d (upslope) along the 3 to 5% slope. The ground water table fluctuated below the first 60 cm in well drained soils and within the first 30 cm in most parts of the imperfectly-drained soils during the second half of maha and very early yala. The estimated water requirement for both Blocks during maha was 25 mm/d for well drained soils on one-sixth of the paddy land; on the remaining imperfectly drained land it was estimated as 17 mm/d in the upper half and 14 mm/d in lower. The weighted average was 17 mm/d for maha and over 19 mm/d for yala.

Supply schedules prepared by the project staff to irrigate each farm twice a week by rotating irrigation within the field turnout were compared with actual practice in Block 301. Seventy-three percent of the farms were irrigated either continuously (with occasional breaks) or at two to four day intervals. Some rotation was evident only on field channels serving a command area of more than 10 ha. Despite a designed capacity of 28.32 l/s for field channels, actual issues varied from 7 to 40 l/s in Block 301. Though the designed discharge was 34 l/s, some field channels in Block 302 carried up to 70 l/s. During heavy showers issues in some distributory canals were suspended for a few days while no regulation was effected in others. The duration of irrigation was 145 days in maha and 123 days in yala. Towards the season end flow rates were not reduced though the cultivation was staggered by stage of crop development and varietal age. Present practices caused low irrigation efficiencies and loss of much rainfall to surface run-off. Efficient water use and the implementation of rotational schedules was constrained by unsatisfactory cooperation and lack of proper leadership in turnout groups, and by the distance from homestead to paddy field.

The objectives embodied in developing Block 302 were partly achieved. Established irrigation and drainage facilities were suitable for local conditions. This block had no irrigation difficulties but problems were reported in 16% of land developed in Block 301. Though facilities for control and measurement were superior water duties were greater than that in Block 301. Measured seepage and percolation rate was the same as in Block 301, despite the subsoil treatment etc. The idea of future mechanization was negated by subdivision of larger farm plots.