EVALUATION OF SURFACE DRAINAGE METHODS FOR
IMPERFECTLY DRAINED REDDISH BROWN EARTH SOILS
IN MAHAWELI SYSTEM C

By

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ABSTRACT

During maha rains the imperfectly drained Reddish Brown Earth soils (RBEs) become waterlogged due to uneven topography and a shallow impermeable bed rock at a depth of 1.2-1.75 m. A field experiment was conducted, using maize to evaluate the effectiveness of surface drainage methods for alleviating waterlogging. The ridge and furrow and raised beds were compared with flat beds, which is the normal practice of farmers when growing maize during maha.

Measurements made throughout were: soil moisture at 10 cm increments down to 1.4 m depth, water table depth in all drainage methods, plant height at harvest and the grain yield. Differences in the latter two parameters were non significant with all surface drainage methods used. This may be because the treatments were not effective in lowering the water table. Excess water collected in the surface drains and remained for long periods. For drainage to be effective excess water in the drains has to be removed from the site. Ridge and furrow or raised beds will not be sufficient to relieve waterlogging for maize without capital intensive methods of removing water from the field.

The soil physical and hydraulic properties of the sites were evaluated to examine the soil constraints related to poor drainage. The measured parameters were soil texture, bulk density, water retention, saturated hydraulic conductivity and infiltration.

The steady infiltration rate for the site varied from 0.05 to 0.11 m d^{-1}, which is low when compared with well-drained RBE soils. The saturated hydraulic conductivities (Ks) measured for the soil horizons decrease with depth from 0.8 to 0.008 m d^{-1}. The sharp decrease was associated with increasing clay content in the subsoil. Profile drainage is restricted by the low Ks values of the sub soil and by the perched water table created by water trapped above the bed rock.

When soil water retention was characterized, field capacity varied from 0.20 to 0.31 m^3 m^{-3} as depth increased, indicating more water retained in the deeper horizons. When the aeration porosity was computed it varied from 0.15 (A1) to 0.12 m^3 m^{-3} (B1) and less than 0.10 m^3 m^{-3} in the B2 horizon, indicating soil aeration problems as the depth increased. All these changes in soil physical properties with

depth were due to increasing clay content, with a clay bulge at 70 to 90 cm depth. These factors contributed to the poor drainage of the soil profile. Furthermore, the low aeration capacity limits the effective rooting depth to 0.7 m. Deep tillage and sub surface drainage may therefore be more effective in improving drainage in these soils, but as suggested earlier if surface drainage is used, water in the drains has to be released to lower lying area.