# Selection of Appropriate Depth and Spacing of Subsurface Drainage and Comparison of Some Drainage Equations in Rice Cultivation

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## Abstract

In rice cultivation, mid-season and end-season drainage at harvest time are two important operations of water management which, respectively, increase yield and provide better conditions for harvesting rice. Due to the unique conditions of paddy fields of Guilan province, making decisions about the spacing and depth of drains and proper equation to determine the drainage spacing in paddy field requires research on the mid-season and end-season drainage. Therefore, in this research, the efficiency of drains spacing (L) and depth (D) of subsurface drainage in controlling water table and also accuracy of the steady and non-steady equations were evaluated at mid-season and end-season drainage stages in Guilan's rice fields. Drainage treatments included six conventional subsurface drainage systems with rice husk envelope including drainage system with drain depth of 0.8 m and drain spacing of 7.5 m ($L_{7.5}$ $D_{0.8}$), ($L_{10}$ $D_{0.8}$), ($L_{15}$ $D_{0.8}$), ($L_{7.5}$ $D_1$), ($L_{10}$ $D_1$), and ($L_{15}$ $D_1$). All drain lines were 40 m long and made of PVC corrugated pipes with a diameter of 125 mm. Results showed that subsurface drainage with spacing of 15 m and depth of 80 cm (due to the proper water table depth and higher yield) and subsurface drainage with distance of 10 m and depth of 80 cm (due to the highest resistance to pentrometer penetration and the lowest soil moisture content) are recommended as the best drainage treatment for mid-season and end-season drainage, respectively. Dagan, Hooghoudt and Bouwer & Van Schilfgaarde equations combined with Hooghoudt equation were suitable equations for determining drainage spacing at mid-season drainage stage. Hooghoudt, Kirkham, Dagan, Bouwer & Van Schilfgaarde equations combined with Hooghoudt equation and Glover-Dumm equation were selected as suitable formulas for determining the spacing of subsurface drains for end-season drainage.

**Keywords: Paddy Field, Mid-season and end-season drainage, Drainage Equation**

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