

Investigation of Land Grading and Consolidation Effects on Physical and Chemical Characteristics of Soil and Drainage Water Quality in Paddy Fields of Astaneh Ashrafieh County

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Abstract

Rice is the second most important staple food after wheat in the world, and Iran has an annual production of 2 M tons. Due to water scarcity problems and high water consumption in paddy fields and the need to increase irrigation water productivity, a lot of paddy fields are consolidated in the Northern provinces of Iran every year. In consolidation projects, soil is displaced by leveling practice, and then the content of soil chemical elements will be changed. This study was aimed to investigate the role of consolidation projects in paddy fields on soil and drainage water quality. The research was conducted in Astaneh Ashrafiyeh in Guilan Province on traditional and consolidated paddy fields in 3 situations (upland, middle land, and lowland) with 5 replication, in 2016. The soil and outlet/drainage water chemical properties were analyzed based on split plot design with Tucke's mean analysis method. The soil physical and chemical characteristics results showed that the amount of SAR, Cl, NO₃ and SO₄ in consolidated fields were significantly different than that in traditional fields. The amount of SP and OC of soil in consolidated fields were, respectively, 22% and 11%, more than that in traditional fields, and available potassium was 2% less than traditional farms. Also, the amount of SAR and Cl and NO₃ of outlet water in consolidated fields were, respectively, 14%, 23%, and 49%, more than that in traditional fields. All soil mineral components, other than clay, land had less uniformity in levelled lands than traditional lands. Uniform distribution of mineral components in levelled lands can be effective in improving irrigation and nutrition management of plants. In addition to infrastructural changes, the leveling of rice paddies also causes changes in physical and chemical conditions of the soil, as well as changes in the quality of drainage water, which should be considered in agricultural management and reuse of outlet drainage water in downstream farms.

Keywords: Land leveling, Rice field, Water productivity, Traditional paddy fields

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