水田田埂高度對田間水位變化與灌溉用水量之

影響-以新竹長源圳灌區為例

Effects of Ridge Height in Paddy on Water Level and Irrigation Water Requirement - a Case Study of Changyuan Irrigation District in Hsinchu

臺灣新竹農田水利會 會長 組長 股長 股長 徐元楝 陳美嫦 褚淑慧 簡大為 Yung-Tung Hsu Mei-Chang Chen Shu-Hue Chu Ta-Wei Chien 財團法人農業工程研究中心 副研究員

姜世偉

Shih-Wei Chiang

摘要

以築田埂方式的水田湛水耕作,具有可將降雨量蓄存在田間的特性,本研究旨在探 討水田耕作期間,不同田埂高度對田間水位變化與灌溉用水量之影響。研究中,首先利 用水平衡理論建立水田水文模式。模式中,考量降雨量、溫度、濕度、日照、風速、土 壤入滲率等條件,並依照農田水利會灌溉計畫,進行作物需水量、水田滲漏量、灌溉用 水量之估算,再據以計算田間水位之變化。接續以新竹長源圳灌區為例,透過現場調查 瞭解灌區內田埂高度分布狀況,依照現況設定不同的田埂高度,再配合土壤特性,以2015 至2019 近5年實際降雨條件進行模擬計算。結果顯示,當田埂高度為22公分時,一期 作與二期作最大分別可利用雨量達59.82%與33.81%。

關鍵詞:降雨量、田埂高度、地下水、農業水資源。

Abstract

Paddy field cultivation would keep rainfall water in the field with ridge construction. This study is to investigate the influence of different heights of ridge on the changes of field water level and irrigation water requirement during paddy field cultivation. First, the water balance theory was used to establish a paddy field hydrological model. In the model, conditions such as rainfall, temperature, humidity, sunshine, wind speed, and soil infiltration rate were considered. The crop water demand, infiltration rate and irrigation water requirement were determined with the irrigation plan of the Irrigation Association. The

estimation of field water level changes can be determined then. The Changyuan irrigation district in Hsinchu was as selected as an example. The distribution of ridge height in the irrigation district was obtained through on-site investigation. The water level and irrigation water requirement were simulated with the different ridge heights, the soil characteristics and the rainfall conditions from 2015 to 2019. The results showed that the maximum rainfall usages for the first and second crop were 59.82% and 33.81% respectively with 22 cm of the ridge height.

Keywords: rainfall, ridge height, groundwater, agricultural water resources