

利用水資源危害指標探討氣候變遷下淺根系作物灌溉蓄水量之影響-以臺灣新竹地區為例

Using water resource hazard index to explore the impact of climate change on irrigation water storage of shallow root crops - a case study in Hsinchu, Taiwan

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摘要

淺根系作物是指根系主要分布在土壤表層深度通常在 30 公分以內，由於根系無法深入土壤深層獲取水分，通常比較容易受到乾旱影響。常見的淺根系蔬菜包括葉菜類如菠菜、小白菜、萵苣，以及部分根莖類如馬鈴薯。這些作物灌溉一般以配置蓄水池做為灌溉水源調蓄功能，以因應淺根系作物常常需要 1 日多次灌溉之需求。本研究以臺灣新竹地區為例，利用水資源危害指標針對年平均連續不降雨日數變化率之推估，探討未來受氣候變遷影響下，對於蓄水量之影響。首先統計 2016 至 2024 近 10 年之連續不降雨日數，依據統計結果顯示，每年均會發生 5~10 日連續不降雨 5 次以上，11~15 日連續不降雨在過去 10 年發生於 6 個年份；16~20 日連續不降雨發生於 3 個年份；21 日以上連續不降雨發生於最近 2 年。配合年平均連續不降雨日數變化率之推估，以中位數而言，RCP4.5、RCP8.5 以及 GWL2.0 等 3 個情境，分別增加 4.78%、7.43%、11.71%，若以較嚴重的 GWL2.0 情境而言，有 5% 機會達 45.95%。

關鍵詞：農業水資源，灌溉用水量，連續不降雨

Abstract

Shallow root crops refer to crops whose roots are mainly distributed in the soil surface, usually within 30 cm. Since the roots cannot penetrate deep into the soil to obtain water, they are usually more susceptible to drought. Common shallow root vegetables include leafy vegetables such as spinach, Chinese cabbage, lettuce, and some root vegetables such as potatoes. These crops are generally irrigated with reservoirs as irrigation water source regulation functions to meet the needs of shallow root crops that often require multiple irrigations per day. This study takes the Hsinchu area in Taiwan as an example, and uses

water resource hazard indicators to estimate the change rate of the annual average number of consecutive days without rainfall, and explores the impact of climate change on water storage in the future. First, the number of consecutive days without rainfall in the past 10 years from 2016 to 2024 was counted. According to the statistical results, there will be more than 5 consecutive days without rainfall for 5 to 10 days every year, and 11 to 15 consecutive days without rainfall occurred in 6 years in the past 10 years; 16 to 20 consecutive days without rainfall occurred in 3 years; and more than 21 consecutive days without rainfall occurred in the past 2 years. Combined with the estimated rate of change of the annual average number of consecutive days without rainfall, in terms of the median, the three scenarios of RCP4.5, RCP8.5 and GWL2.0 increased by 4.78%, 7.43% and 11.71% respectively. If the more severe GWL2.0 scenario is taken, there is a 5% chance of reaching 45.95%.

Keywords: agricultural water resources, crop water requirement, consecutive days without rainfall