Climate Action Initiative
BC AGRICULTURE & FOOD

Farm Adaptation Innovator Program

Predicting Soil Water Content and Number of Workable Days Under Changing Climate Using DRAINMOD Model in Delta, BC

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Geographic Applicability	This study was conducted in Delta; findings should be applied only to locations with humid maritime climate and poorly drained, silty soils
Commodity Relevance	This study was conducted on blueberry and vegetable crop fields but findings may also be applied to other crops
Time Frame	Fall 2015 – Spring 2017

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Background

Rainfall irregularity and extremes pose a critical challenge for farmers. Installing sub-surface drainage can be an effective means of reducing excess water from the soil caused by rainfall during critical periods of field operations. In places like Delta, BC, drainage is particularly important in the production shoulder seasons: in the spring during field preparation and in the fall during harvest. While tile drains are known to be effective for improving the number of days, days when the soil is dry enough to be workable without heavy equipment causing compaction, it is unclear if current spacing recommendations are likely to be effective if rainfall increases according to climate change projections for the region. DRAINMOD is a computer model designed to simulate the hydrology of farm fields, and can predict the effects of drainage management. In this study DRAINMOD was used to forecast soil water content to explore various drainage spacing options under current and future climate scenarios.

Study Objectives

- Simulate DRAINMOD model for various drainage spacings with rainfall for 2016 and 2030
- Predict daily volumetric soil water content (%) for each drainage spacing option and quantify number of workable days in 2016 and 2030

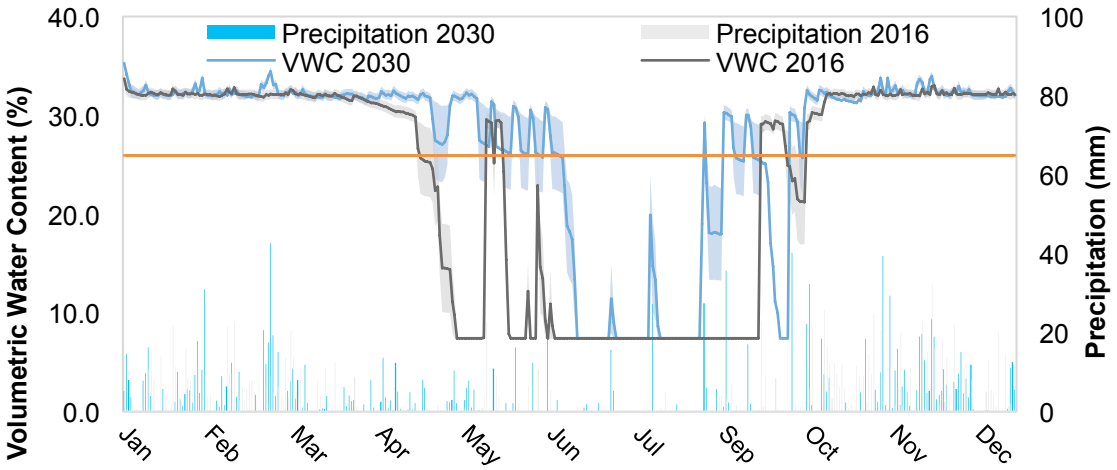

Figure 2. DRAINMOD-Modeled Volumetric Water Content (VWC %) in 2016 and 2030 for 15ft drainage treatment

Results

- DRAINMOND simulations predict that the volumetric water content (%) of the soil increases with the change in precipitation in 2030 for all drainage treatments as compared to the water content in 2016 (Figure 1).
- The number of workable days substantially increases with drains spaced more closely together. The modeling results also highlight how changing rainfall patterns in 2030 may substantially reduce the number of workable days compared to 2016 (Figure 2).
- Fields with drains at 15 ft spacing are predicted to gain 49% more workable days compared to fields without drainage in 2016.
- For the expected rainfall patterns of 2030, the gain from 15 ft drains would be a 64% increase in the number of workable days compared to fields without drainage.
- Reducing drain spacing from 30 to 15 ft is predicted to result in a 6% increase in workable days in 2016 and a 13% increase in 2030.

Definitions

volumetric water content: a measure of soil moisture determined by the ratio of water volume to soil volume

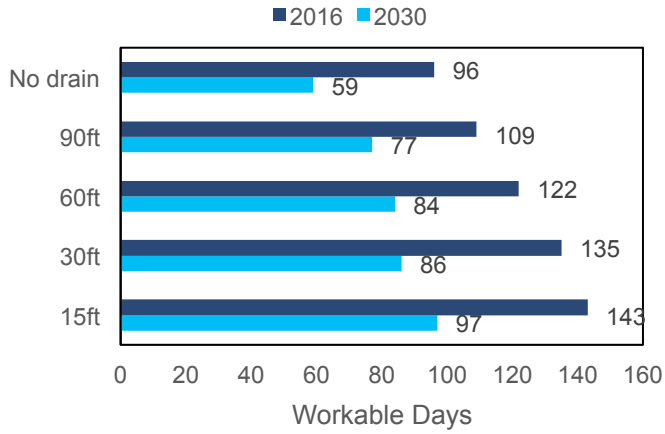

Figure 1. Workable days predicted for 2016 and 2030 for various drainage spacing options

For more information:

For more details on the results of this project visit the Climate Action Initiative website: http://www.bcagclimateaction.ca/faip-project/fi13/

and the Sustainable Agricultural Landscapes Lab: http://sal-lab.landfood.ubc.ca/projects/delta-drainage-project/

For more information on drainage management visit the BC Ministry of Agricultures website: http://www2.gov.bc.ca/gov/content/industry/agriculture-seafood/agricultural-land-and-

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