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Simulating Yields for Selected Vegetables in Qatar Using Crop, Climate, Soil and Management Information to Improve the Country's Food Security

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Abstract

Qatar produces only about 8 to 10 percent of food consumed in the country. Domestic production of perishable commodities, primarily vegetables, will be increased by using a combination of hi-tech water-efficient field and greenhouse production systems. Improving the decision making in the various stages of production faces a number of challenges mainly related to adverse climatic conditions, quality of soils, scarcity of irrigation water, and market constraints. This paper highlights preliminary results in assessing climate, soil and crop management constraints in Qatar. Components of the research framework include assessing the yield potential of selected crops through simulation modelling using historical climate and soils data. AquaCrop, a model developed by FAO, has been used in this study to simulate yields of squash for different planting cycles of 110 days in Doha over the 30 year period from 1985 to 2014. The mean simulated yield for January to March planting dates (22nd of each month) was 23 t/ha with a narrow range of only 21 to 24 t/ha, while the simulated yields were highly variable for April, May and June planting dates. The mean yield for April was 17 t/ha (lowest 4 t/ha, highest 24 t/ha). The mean yield for May and June plantings was 7 t/ha with a range of 1 to 20 t/ha. These results compare well with the recent data collected from Al

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Sulaiteen Agricultural and Industrial Complex site (SAIC) in Doha. The relatively lower yield with greater variability during April to June months is associated with higher evaporative demand and higher temperatures during the crop growth period. The model is used to estimate yields for other crops including cucumber and tomatoes. Comparison of the simulated crop yields with actual field data is underway. Further and more detailed analysis of the AquaCrop model is required.

This analysis will help improve the overall food security in the state of Qatar by assisting the decision making process in the various stages of production of selected perishable food crops. Yield potential for selected crops were simulated for conditions where water and nutrients are not limiting. However the simulated results can be used to estimate the optimum amount (and timing of application) of water and nutrients required to achieve the desired production.

The findings of this paper will contribute towards achieving the goals of our research project “Improving Food Security in Qatar: Assessing Alternative Cropping Systems Feasibility and Productivity in Variable Climates, Soil and Marketing Environments” (NPRP6-064-4-001) funded by Qatar National Research Fund (QNRF- a member of Qatar Foundation) through its National Research Priority Program.