



CAMI Conference

**Breaking New Ground in the Caribbean:
Weather and Climate serving Agriculture**

*Knustford Hotel, Kingston, Jamaica
November 6th, 2012*

Crop Simulation Models in Climate and Climate Change Analysis

Presented by:
Shontelle Stoute
Technical Assistant [CAMI] Project
Caribbean Institute for Meteorology and Hydrology
Husbands, St. James
Barbados

Models

- DSSAT v4.5
 - Decision Support System for AgroTechnology Transfer

Focus:

- Yield trends
 - Are yields increasing or decreasing across the Caribbean
- Impacts of varying planting dates
 - How much do yields vary with respect to planting dates?
- Yields of the future climate
 - To what extent will yields change in light of climate projections?

Set up a simple seasonal analysis using:

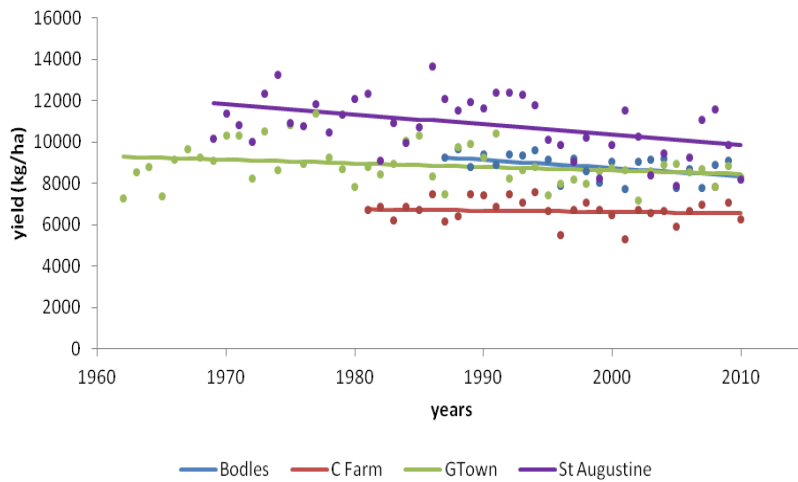
- Meteorological parameters
 - Rainfall, T_{\max} , T_{\min} , Solar Radiation
- Field parameters
 - Soil type
- Planting dates
- Crop/Cultivar (maize and tomato)
 - Cultivar coefficients estimated using the “GLUE” parameter
- Fertilizer applications

Results - Yield Trends

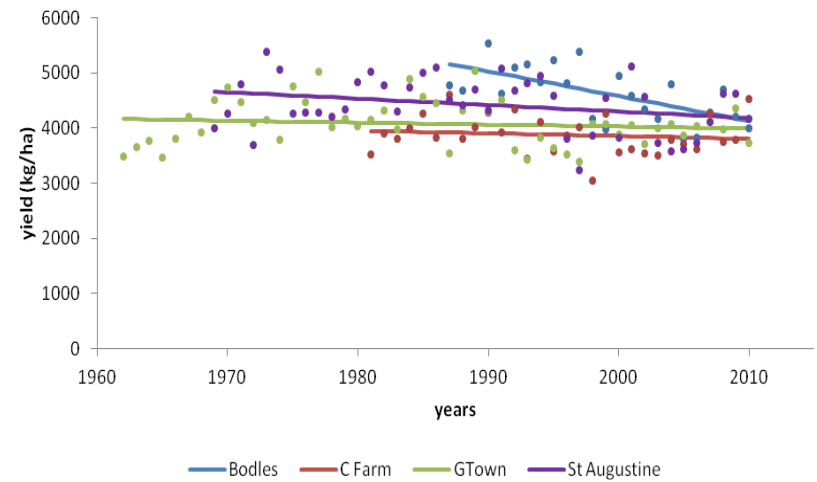
- 4 stations in this experiment
 - Central Farm, Belize
 - Bodles, Jamaica
 - St. Augustine, Trinidad
 - Georgetown, Guyana

Yield Trends - Maize and Tomato

Historical Maize yields - Planting July 4 [rainfed]



Historical Tomato yields - Planting July 4 [rainfed]

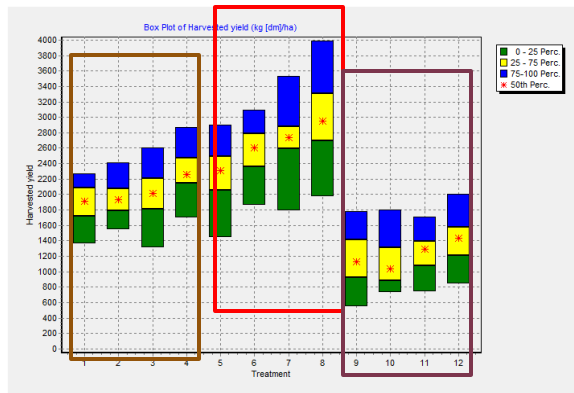


- Decreasing maize yields (significant at Bodles and St. Augustine)
- All downward trends but only statistically significant at Bodles

Yields of the future Climate

Scenario: Projected data for T_{max} and T_{min} obtained for Belize, Trinidad and Tobago

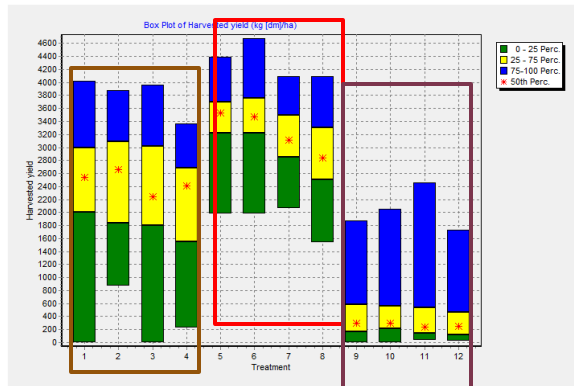
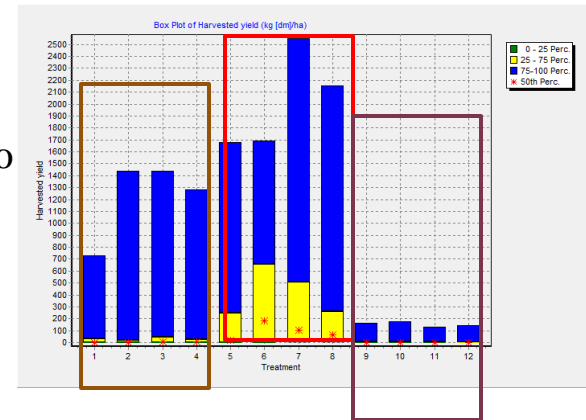
** Comparisons of yields of planting dates



Central Farm, Belize

Maize

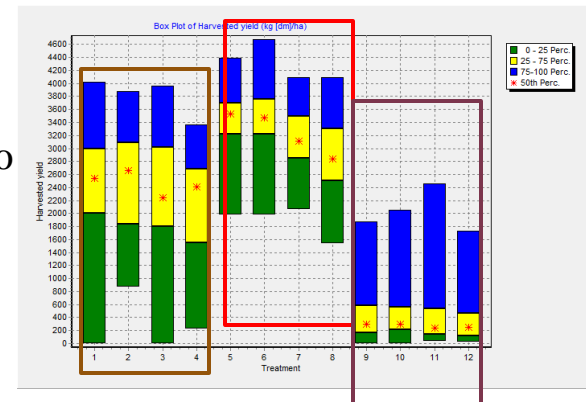
Tomato



Piarco, Trinidad

Maize

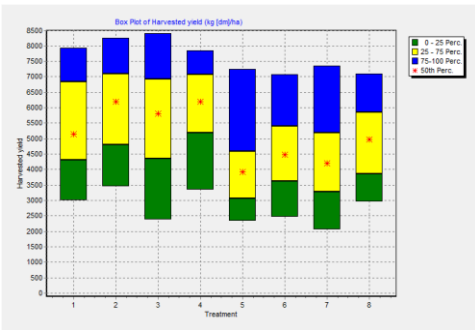
Tomato



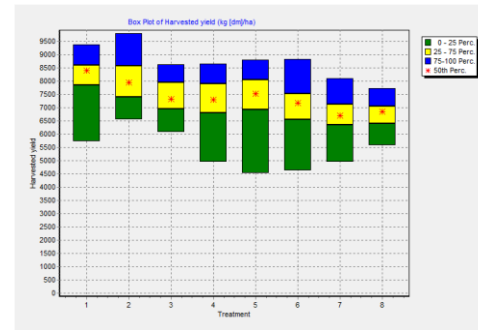
Yields of the future Climate - Maize

↑ Temperatures
↓ Rainfall

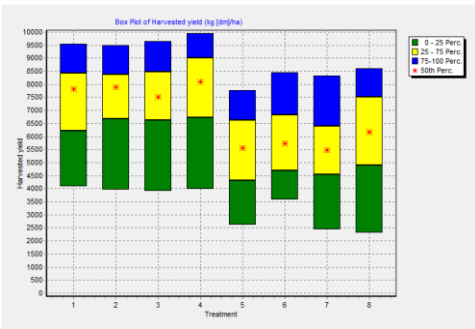
Scenario: Increase T_{max} and T_{min} by 2°C; decrease rainfall by 25%



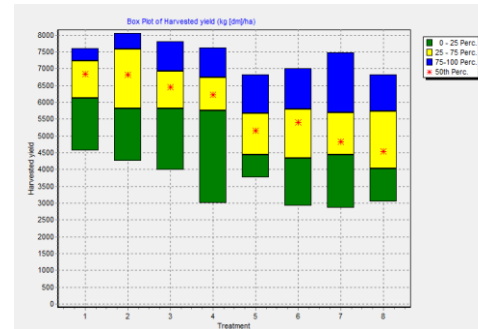
VC Bird, Antigua



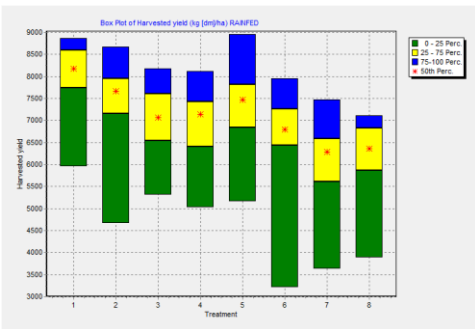
Melville Hall, Dominica



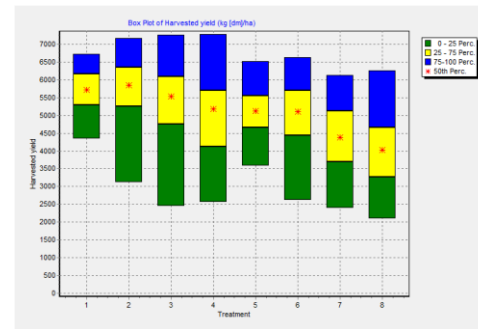
CIMH, Barbados



MBIA, Grenada



Canefield, Dominica



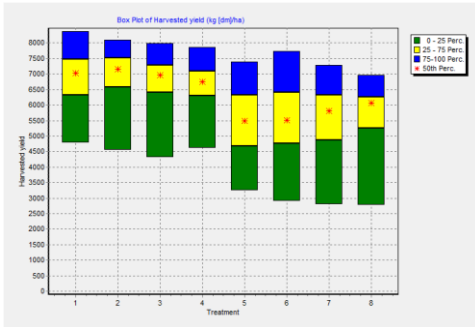
Georgetown, Guyana

Yields of the future Climate - Maize

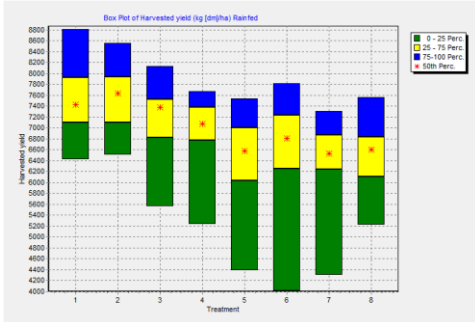
Scenario: Increase T_{max} and T_{min} by 2°C; decrease rainfall by 25%

↑ Temperatures

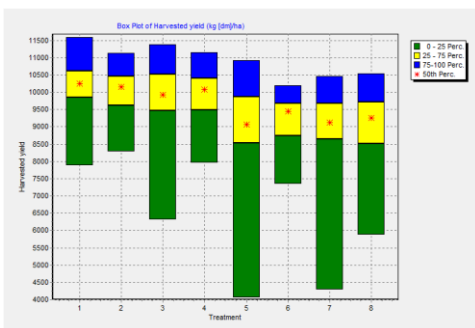
↓ Rainfall



Hewanorra,
St. Lucia



ET Joshua,
St. Vincent



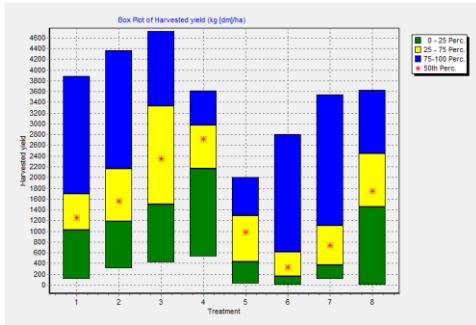
Worthy Park,
Jamaica

Yields of the future Climate - Tomato

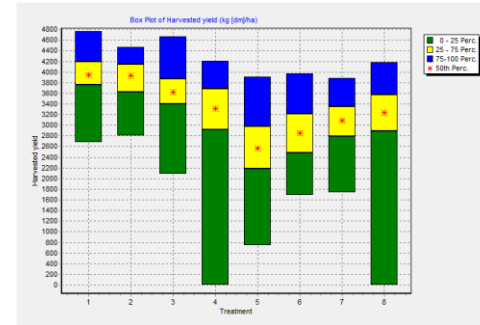
↑ Temperatures

↓ Rainfall

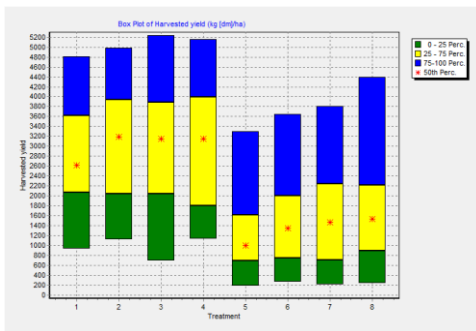
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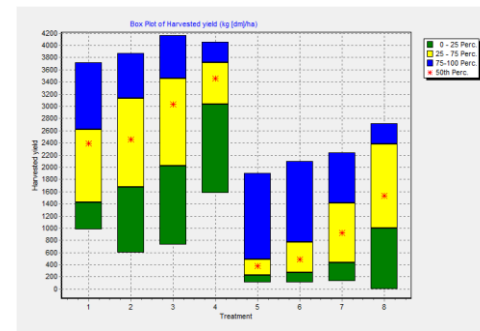
VC Bird, Antigua



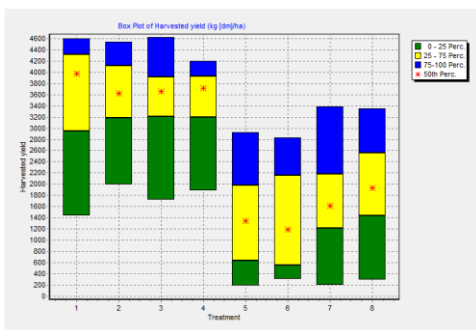
Melville Hall,
Dominica



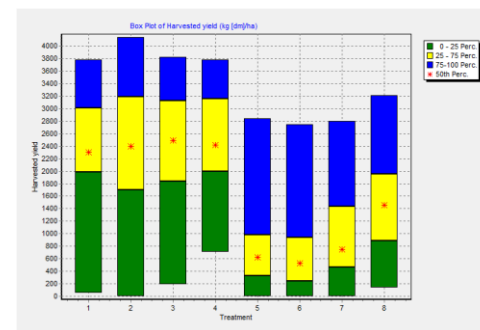
CIMH, Barbados



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Canefield,
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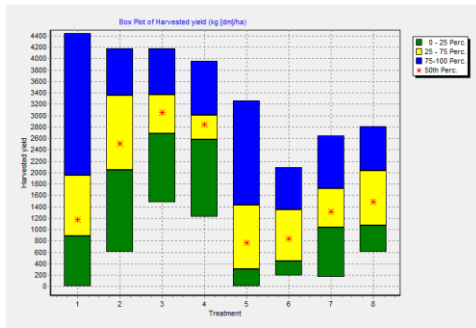
Georgetown,
Guyana

Yields of the future Climate - Tomato

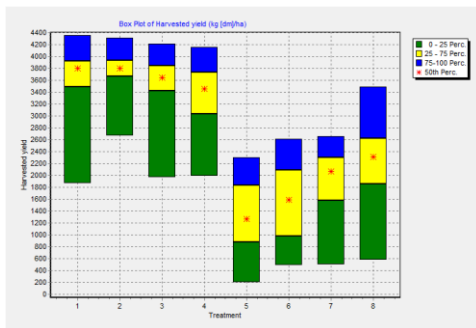
↑ Temperatures

↓ Rainfall

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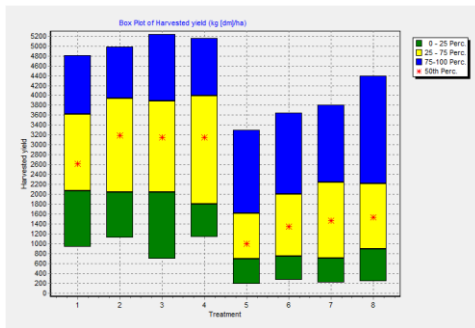
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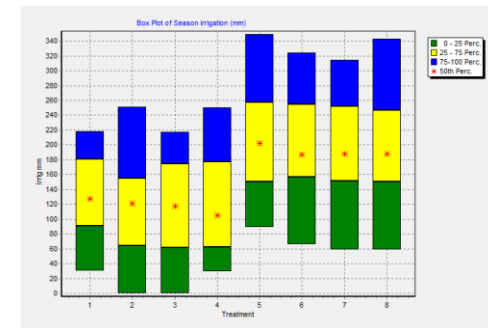
Irrigation Amounts

- As rainfall decreases irrigation requirements will increase. This is significant since farmers would then have to find ways to supplement this decline in rainfall to obtain desired yields. Irrigation can be very costly.



Yields

Irrigation
Requirements



For example, this crop requires twice as much water by end of century to produce ~1/2 of the current yields

Benefits of this model:

- Sensitivity analyses can be conducted on different cultivars, planting dates to determine the greatest yields
- Can aid research in determining suitable cultivars for the changing climate