Mathematical Programming for Optimal Sustainable Growth in Agriculture: Results of Agricultural Sector Model in Syria

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Introduction

- Syrian agriculture faces multiple challenges that threatens the state of food security in the country.
- Since 2011, food production has been severely affected by the conflict outcomes like damaged agriculture infrastructure, disrupted food value chains, and fluctuation in food prices and exchange rates.
- Moreover, severe drought episodes have regularly hit the country which further weakened the agricultural sector.

Before 2011	After 2011
- 0.5 million Syrians are food insecure - Unemployment 8.6% - 12% population live in "extreme poverty"	- 13 million Syrians are food insecure - Unemployment 60% - 80% of population are poor

Research Question

- What are the policy interventions that would not only help households smooth their income and help agriculture to recover from the conflict, but also promote sustainable growth in the post-war time in Syria?

Methodology

- The study adopts the agricultural sector model (ASM) to simulate policy scenarios in the post-conflict era.
- The research was conducted in 2019 in Syria. Data was collected from 1,430 households. Data is being analyzed using GAMS software.
- AgroSyr project: a research project jointly executed by ICARDA-CGIAR and the National Agricultural Policy Centre (NAPC) in Syria.

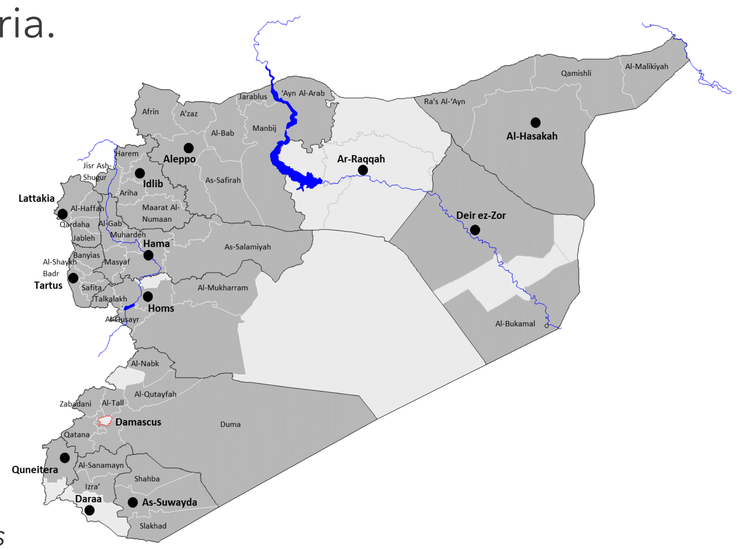
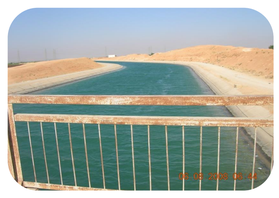


Fig 1. Map of the study areas

Discussion

- The mathematical programming model assumes that Syrian farmers have the objective of profits maximization subject to multiple constraints:

Fixed farm resources



Collective constraints

Risks

Exogenous features

- The model further depicts the technology used at the farm level and agricultural practices (rotations pursued, the existence of intercropping, and the presence of policy-imposed constraints or incentives).

Highlights

- The model simulates different scenarios that address the impact of different cropping patterns and the adoption of modern irrigation techniques on effective water use in agriculture in Syria.
- The results of this study have important implications not only for successful cultivation of food crops, but also for encouraging the use of sustainable technologies which ultimately results in better food security outcomes in the long run.

What's Next?

- The model is currently being built and calibrated.
- Preliminary findings show the possibility to use the outcomes of this model to inform policy makers about the pathways towards more resilient and growth oriented agricultural sector while prioritizing sustainability.

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