Land Use Modeling

Panel Discussion

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Why do we need land use models?

- describe the use of the Earth's land resource
- assess food and fiber production, water withdrawals, soil fertility status, nutrient leaching, GHG emissions
- calibrate/estimate behavioral equations that describe how land use changes with environmental variables: climate, water availability, but also economic variables (input and output prices) and policies (farm subsidies, agro-environmental policies, etc.)
- land use is driven by human decisions
- decisions are largely driven by economic opportunities

Challenges in land use modeling

- Old challenges:
  - understand underlying technology, e.g. yields, input requirements, fixed and variable costs, rotations
  - account for agents' observed behavior (crop choice, input choice, etc.)
- New(er) challenges:
  - local and global environmental impacts of land use, e.g.: nutrient leaching and GHG emissions
  - level of disaggregation, due to the new demands put on land use models and their integration with biophysical models
  - modeling land use decisions at the field level?
  - detailed yield information is useless w/o production costs
  - input use drives environmental outcomes $\rightarrow$ need to model the intensive margin

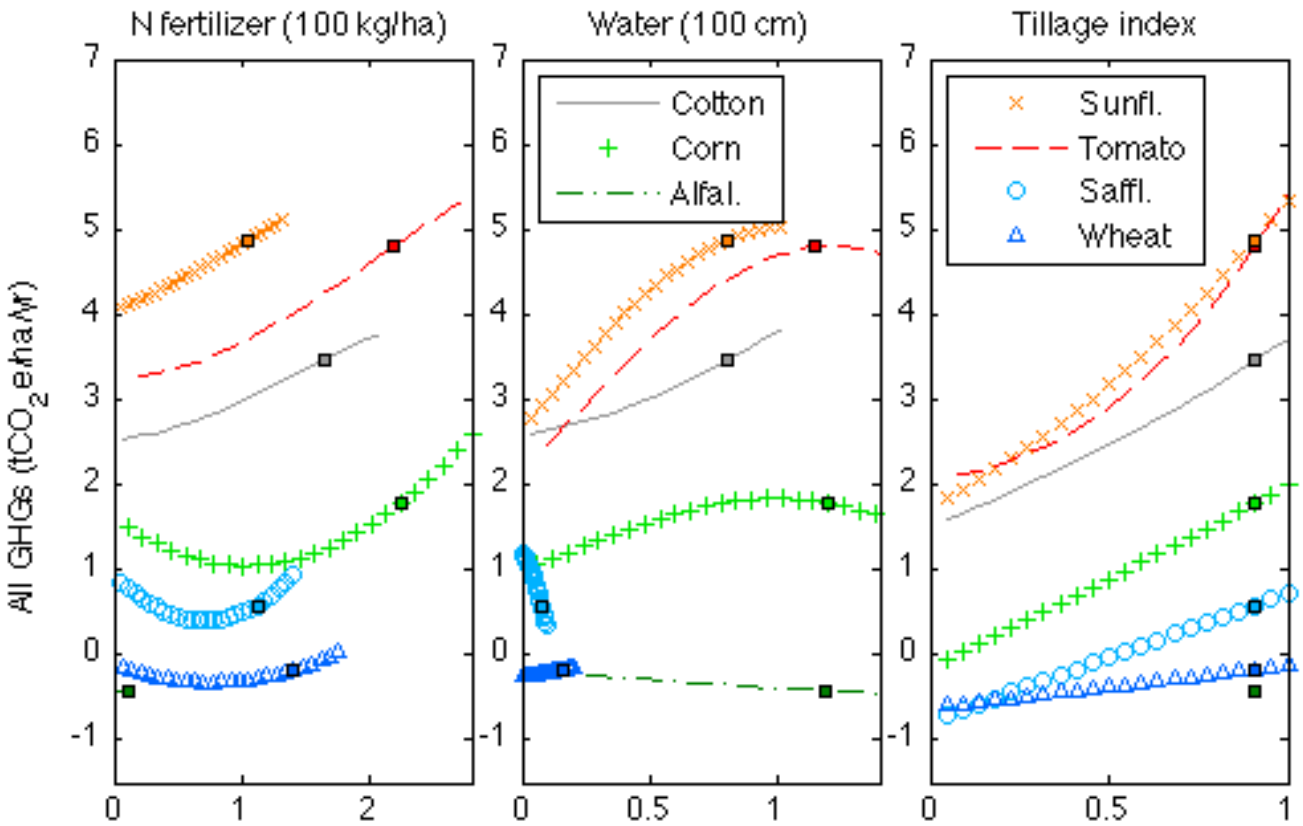

Figure: Emission factors for selected crop in the San Joaquin Valley