Are Pesticide Buffers Expensive? Using Positive Mathematical Programming to Estimate the Cost of Proposed Pesticide Buffers in California

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Introduction

- Agricultural production in California currently relies on the use of pesticides to control for weeds, insects, and pathogens.
- Pesticide drift and runoff affect water quality.
- On February 1, 2010, the California Department of Pesticide Regulation (DPR) proposed draft regulations to reduce surface water contamination from pesticides.
- A key provision is the requirement of pesticide buffers of 25, 100, and 150 feet around sensitive aquatic sites dependent on the pesticide application method and active ingredient (AI).

Methods

- A positive mathematical programming model is utilized to study the effects of pesticide buffers (Howitt 1995). The model structure is similar to the fixed-proportion model used in Merel, Simon, and Yi (2011), and the calibration methods used are developed in Merel, Simon, and Yi (2011) and Garnache and Merel (2012).
- The model has 31 water districts and 24 crop groups.
- The amount of land in water buffers is calculated using GIS for each crop-district pair using DWR land and NHD water data.
- Two different simulations: growers respond by (1) using alternative AIs (yield and cost shocks) in buffers or, (2) not planting in buffers

Questions

For these proposed pesticide buffer regulations:
- What is the overall cost to California agriculture?
- What are the regional costs?
- How will California agriculture adapt?
- How will the change in crop patterns differ by region?

Results and Discussion

- The cost to California is between $27.2 to $457.1 million in lost revenue. The exact amount depends on the proportions of growers that respond to the regulations as modeled in Scenarios 1 and 2.
- The relative cost of the policy differs by region. Percentage wise, the Central Coast is the least affected region and the Sacramento Valley is the most affected region.

Citations