ECONOMICS OF METHYL BROMIDE: ASSET PRODUCTIVITY ENHANCEMENT IN STRAWBERRIES

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Abstract

This paper uses historical data from the California strawberry industry to discuss methyl bromide in the context of the economic literature of adoption and diffusion. In particular, Hellegers, Zeng, and Zilberman (2010) attempt to identify and model what causes productivity enhancing technological innovations to be adopted by high or low-quality asset holders. They specify two types of innovations based on how they affect patterns of production: asset-productivity-enhancing (APE) technologies, and variable-input-efficiency-enhancing (VIEE) technologies. APE technologies increase productivity per unit of asset, given a set amount of variable input, and tend to favor producers with high-quality assets. An example of an APE would be a quality control innovation to increase production via a reduction in defective goods. In contrast, VIEE technologies instead increase the utilization rate of the variable input, and may be more heavily adopted by low-quality asset holders. These technologies may take the form of improved electricity or fuel efficiency, for example. (Hellegers, Zeng, and Zilberman, 2010).

We intend to accomplish two things with this investigation:

The first goal is to provide empirical verification of the model itself. Unfortunately, although methyl bromide was introduced to California strawberry production in 1961, usage records do not appear to exist prior to 1970. However, previous publications have indicated almost 100% adoption of methyl bromide fumigation in strawberries throughout California by 1965. We make use of this information, along with crop reporting data and qualitative discussions of strawberry grower behavior. Our preliminary analysis indicates a land-use shift away from uncultivated, relatively low-quality land towards higher-quality valley land that was previously unusable due to Verticillium dahliae. These early findings suggest methyl bromide was an APE innovation in strawberry production.

The second goal is to create a historical narrative and subsequent analysis of methyl bromide adoption in strawberries, given its position as an APE innovation. Methyl bromide fumigation was a significant contributor to the substantial strawberry yield increases of the 1960s, but it also affected more structural changes in strawberry production, including land use, cultivar selection criteria, and changes to crop planting/rotation patterns. We will use this narrative and the APE/VIEE innovation model to construct a historical analysis of some of the challenges that have been

associated with attempting to replace methyl bromide, and emphasize the importance of continuous agricultural research in overcoming these obstacles. This analysis will also assist us in developing a counterfactual model to estimate acreage savings from the aforementioned structural changes caused by methyl bromide adoption.

References:

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