Economics of Agricultural Aviation Industry in the United States: Optimum Applicator Pricing, Effects of Regulation and Efficacy of Technologies

Stephen Cain – Department of Agricultural Economics, Texas A&M University (scain@tamu.edu)
Senarath Dharmasena – Department of Agricultural Economics, Texas A&M University (sdharmasena@tamu.edu)
Dan Martin – Aerial Application Technology Research, USDA-ARS, College Station, TX (dan.martin@ars.usda.gov)

Selected Paper prepared for presentation at the 2017 Agricultural & Applied Economics Association Annual Meeting, Chicago, Illinois, July 30-August 1

Economics of Agricultural Aviation Industry in the United States: Optimum Applicator Pricing, Effects of Regulation and Efficacy of Technologies

Stephen Cain - Department of Agricultural Economics, Texas A&M University
Senarath Dharmasena - Department of Agricultural Economics, Texas A&M University
Dan Martin - Aerial Application Technology Research, USDA-ARS, College Station, TX

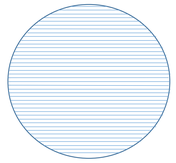
Overview

- The agricultural aviation industry treats 25% of all commercially treated cropland in the U.S. (71 million acres).
- Associated costs include highly specialized aircraft/equipment, fuel, repairs and maintenance, insurance, costs associated with regulations imposed by government regulatory bodies, pilot and ground crew pay, housing, meals, etc.
- Risk is a factor many applicators have difficulty incorporating into their pricing structure.
- Increasing competition along with the high cost of operation allows small changes in price per acre/hour to make or break a business.
- Precision pricing that accurately reflect the cost of doing business is incredibly important for these applicators.

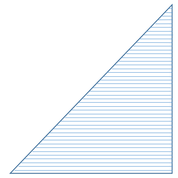
Objectives

- Develop a simulation model with risk that simulates optimum price, revenue and profits for the aerial application industry.
- Assess the effects of government regulatory policies on the price, revenue and profit of aerial applicators
- Investigate the economic efficacy of different application technologies as they affect the applicator's income, all relevant to the aerial application industry of the United States.

100 Acres
Application Time: 21.295 minutes
Distance to field: 5 miles



100 Acres
Application time: 28.225 minutes
Distance to field: 5 miles



100 Acres
Application time: 23.085 minutes
Distance to field: 5 miles

CHARGE SAME PRICE	Rectangle Field	Circle Field	Triangle Field
Aircraft Operating Cost	$709.83	$940.83	$769.50
Labor Cost			
Pilot	$200	$200	$200
Mixer/loader	$4.26	$5.65	$4.62
Total Cost	$914.09	$1,146.48	$974.12
Price/acre	**$10**	**$10**	**$10**
Gross Revenue	$1,000	$1,000	$1,000
Net Revenue	$85.91	-$146.48	$25.88
Profit Margin	**8.59%**	**-14.65%**	**2.59%**

CHARGE DIFFERENT PRICES	Rectangle Field	Circle Field	Triangle Field
Aircraft Operating Cost	$709.83	$940.83	$769.50
Labor Cost			
Pilot	$238	$315.60	$258
Mixer/loader	$4.26	$5.65	$4.62
Total Cost	$952.09	$1,262.08	$1,032.12
Price/acre	**$11.90**	**$15.78**	**$12.90**
Gross Revenue	$1,190	$1,578	$1,290
Net Revenue	$237.91	$315.92	$257.88
Profit Margin	**20%**	**20%**	**20%**

Data and Methods

- Collected revenue and cost information from multiple applicators will be used to simulate optimum revenue and prices.
- Cost and revenue functions will be developed and analyzed using econometric techniques yielding price, revenue and profit models.
- Stochastic simulation of prices, revenue and profit will be conducted using Monte Carlo simulation.
- Costs from compliance with government regulations and economic viability of technological innovations will be factored into the cost function. Multiple scenarios of the optimum price model will be simulated to reflect these different scenarios, again with Monte Carlo simulation.

References

Dharmasena, S., G.C. Davis and O. Capps, Jr., 2014, "Partial versus General Equilibrium Calorie and Revenue Effects Associated with a Sugar-Sweetened Beverage Tax." Journal of Agricultural and Resource Economics, 39(2):157-174

Greene, W., 2003, Econometric Analysis, 5th edition, Pearson Education, Inc., Upper Saddle River, New Jersey, USA

NAAA, 2016, National Agricultural Aviation Association, Voice of the Aerial Application Industry, Internet access: June 1, 2016

Richardson, J.W., K.D. Schumann, and P.A. Feldman, "SIMETAR, Simulation for Applied Risk Management."