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Title: Farming under Uncertain Rainfall: Optimal Policy and Benefits of Mechanization

Abstract:

Farming in emerging countries has stunted yields due to small farm size, inadequate fertilizers, inappropriate tools, lack of automation and overdependence on natural rainfall. In this paper, we study the optimal planting schedule problem under weather uncertainty and rain fall in a finite horizon setting. In our model, the farmer needs to decide the planting schedule given the climatic dynamics including soil moisture and rainfall. We develop a stochastic dynamic programming model and demonstrate that the optimal planting policy is a plant-down-to policy. Incorporating the weather data from countries in Africa along with farm level operational data, our computational study provides several insights on the advantage of optimal planting over current day heuristics. We also explore the optimal investment plan of seeds and mechanization capacity under budget constraints.

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