



How can organic rice be a boon to smallholders? Evidence from contract farming in India



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ABSTRACT

Demand for organic basmati rice (OBR), both at home and abroad, coupled with policy reforms have given rise to contract farming (CF) production in India. OBR production, however, is highly susceptible to weather and pest risks. This study investigates the impact of smallholders' perceived production risks on their adoption of CF in OBR farming. We also assess the impact of CF in OBR production on yields, prices received, and the livelihood of OBR producers. We use farm-level data from smallholder organic basmati rice farms in India and the endogenous switching regression method to account for heterogeneity. Although CF in OBR led to lower yields, it increased the prices producers received and improved the livelihood of OBR producers. The impact of CF varied with farmers' revealed risk attitudes. Risk-loving OBR growers with CF experienced the highest loss in yields, and risk-averse OBR growers with CF received the highest prices. We find that the OBR growers who did not adopt CF would benefit from adopting it, regardless of their risk attitudes, especially when it comes to prices received and livelihood.

1. Introduction

India has the world's largest harvested area of rice, with 44 million hectares (more than one-quarter of the global rice acreage), and contributes nearly one-quarter of the world's rice production. As a staple, rice represents a primary source of calories for majority of smallholder families in India and plays a vital role in food security, and its cultivation is a primary source of income for these families (Naresh et al., 2013). India also remains one of the world's largest exporters of rice, contributing significantly to global food security. The biggest successes in rice production have come from the improvement of total farm factor productivity; the development and adoption of climate-smart varieties; the vertical integration of stakeholders in the value chain; and the transformation of the basmati rice industry.¹ Improved technologies, improved management practices, upgrading of post-harvest technology (drying, storage, milling, and processing), improved packaging, and improved branding as well as marketing strategies have increased the visibility of India's basmati industry. In recent years, as Wani et al.,

(2015) pointed out, India has become a leading exporter of basmati rice to the world market.

As India became a leading exporter, though, the indiscriminate use of chemical fertilizer, pesticides, and water during the Green Revolution resulted in serious health and environmental issues. These uses have led to a loss of soil fertility and biological activities, increased soil salinity, and lower water tables. Concern for deteriorating environmental health, the growing demand from consumers and importers for safe and high-quality products, and opportunities for premium returns have motivated farmers to look to sustainable agriculture, also known as organic farming. In 2004–05, India launched the National Project on Organic Farming (NPOF) to further boost organic farming in the nation.² As a result, acreage in organic farming has increased from 0.2 million hectares (ha) in 2005–06 to 1.49 million ha in 2015–16.³ Nevertheless, farmers are reluctant to adopt organic agriculture, due to lower yields and higher production costs, in India and throughout the world (Offermann and Nieberg, 2000; Uematsu and Mishra, 2012; Crowder and Reganold, 2015). Crowder and Reganold

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¹ Until the economic reforms of India (early 1990s), Pakistan dominated the world basmati rice market.

² Organic farming in India also is being promoted by National Horticulture Missions (NHM) and Rashtriya Krishi Vikas Yojana (RKVY).

³ Total area under organic certification is 5.71 million ha, which includes 4.22 (74%) million ha of forest and wild area for collection of minor forest produces.

(2015) also noted that the growth of organic agriculture is frequently limited by inadequate marketing and technical skills, by inadequate infrastructure, and by government policies.

Contract farming (CF) may be able to relax the above constraints and provide farmers with higher prices for high-quality outputs and timely delivery. Government policies, such as India's 2003 Agricultural Produce Marketing Committee⁴ (APMC) Act, also created opportunities for CF, which had been hindered by the Land Ceilings Act, which prohibits agribusiness firms from farming.⁵ The 2003 act has drawn several corporate groups, multinational corporations, agricultural-input agencies, and other organizations to enter into contract farming (CF). Additionally, CF can play a significant role in reducing post-harvest losses and easing liquidity constraints (Mishra et al., 2016; Kumar et al., 2010). Contracts can be used to manage production and marketing risks (Allen and Leuck, 1995; Kohl and Uhl, 1985). Theory predicts that risk-averse farmers would adopt CF; however, the literature on this issue is scant, and results are mixed (Guo et al., 2005). Although India's rice sector achieved astounding success in the past, the challenges and opportunities for future OBR production are enormous, arising from both demand and supply sides (Surekha et al., 2010).

The objective of this study is twofold. First, to assess the impact of the perception of production risks, specifically, weather risk and pest and disease risk (biotic risk), on the probability of smallholders' adopting CF in OBR. Second, to analyze the impact of adoption of CF on productivity (yield), prices received, and the livelihood of OBR producers. We account for observed and unobserved heterogeneity by using the endogenous switching regression (ESR) method (see Wollni and Brümmer, 2012). However, the treatment-effect model may not capture potential heterogeneous impacts due to factors generating differential impacts, like endowments (human capital, land quality), of the adoption of CF. Finally, we examine the impact of adoption of CF on productivity, prices received, and smallholders' livelihood by revealed risk preferences⁶ of OBR smallholders. We use data from a farm-level survey of smallholders in three states of India, namely Punjab, Haryana, and Uttarakhand.

This study is timely and relevant because it addresses two of the main issues related to India's organic farming industry. The government of India under its National Trade Mission has outlined several policy initiatives, including (1) the enhancement of organic basmati production, improved nutritional security, and income support to smallholder households; and (2) an end-to-end holistic approach covering production, post-harvest management, processing, and marketing to ensure appropriate returns to producers. This study provides the tools to address the above government policy concerns. Finally, findings from this study will have a wider impact because poverty and low incomes are major problems for rural households that are trying to achieve higher productivity, better livelihoods, and food and nutritional security in India and other South and Southeast Asian countries.

2. Organic agriculture and India's organic rice sector

Organic farming in India has taken shape for three reasons. First, organic farming has emerged in areas of low-input where organic farming is a way of life and where one could say smallholders have practiced organic farming as a tradition. Second, farmers started practicing organic farming in response to the ill effects of the Green Revolution. Third, smallholders have recognized the benefits (market

⁴ APMC ensures that farmers are not exploited by intermediaries or middlemen and that all produce should first be brought to a place and then sold through auction.

⁵ This APMC Act allows processors and contractors to procure raw materials directly from the farmers' field and the government to make agricultural production more profitable and competitive (Singh, 2005). Moreover, food safety and quality requirements in domestic and international markets raise formidable challenges to the growers to participate in the value chain. Contractors are better able to handle these responsibilities.

⁶ See data section for measurement of risk preference in our study.

demand and premium prices of growing organic foods. As a result, the total area under certified organic farming (organic and in the process of converting to organic) has increased from 42,000 hectares (ha) in 2003–04 to about 4.43 million ha in 2011–12 (Yadav, 2012). According to the Agricultural and Processed Foods Products Export Development Authority (APEDA), 50% of the world's certified organic producers, or about 597,873 smallholder farms, reside in India. Additionally, India exported about 69,837 million metric tons of organic agricultural products in 2012 to various destinations in the Gulf countries, Germany, Switzerland, the United Kingdom, Netherlands, Japan, and the United States.

The above trend toward organic farming is rooted in the economics of production. For instance, a study by Ramesh et al. (2010) compared the productivity, costs of production, and net returns of organic and conventional crops, and found some striking differences.⁷ The productivity of crops in organic farming was lower (about 9.2%) than that of crops in conventional farming. However, the average cost of cultivation in organic farming was lower (about 12%) than in conventional farming. Finally, the authors noted that organic growers received price premiums of about 20–40% and that their average net profit was about 22% higher compared to conventional growers. Several studies (Petersen et al., 1999; Reganold et al., 2001; Paul, 2006) have shown a combination of lower input costs and favorable price premiums make organic farms equally as profitable as conventional farms, and often more profitable. Basmati rice and organic rice (basmati and non-basmati) have garnered significant attention from producers, markets, and policymakers when it comes to price premiums, productivity, and trade.

2.1. Basmati rice

Basmati rice, a high-value crop, has been grown by Indian farmers for centuries and has been mentioned in ancient literature. Basmati rice has several characteristics that distinguish it from common rice, including aromatic, super-fine grains and extra-long, slender grains with a length-to-breadth ratio of more than 3.5 mm. It is cultivated primarily in India, Pakistan and the Himalayan foothills. The states of Haryana and Punjab accounted for about 72% of its production in India, followed by Uttar Pradesh and Uttarakhand. Interestingly, India accounts for about 70% of the total output of basmati rice and exports about 45% of the world's total output market (APEDA, 2017). The values and quantities of basmati rice account for almost all rice exports from India. Recognizing the importance of basmati rice in the Indian economy, the government of India has declared 24 districts in the states of Punjab, Haryana, Uttar Pradesh, and Uttarakhand declared as Basmati Export Zones (see Table 1).

Organic rice (both basmati and non-basmati) is the fourth-largest organically produced commodity in India, behind cotton, cereals, and millets. Organic agriculture certification is issued by testing centers accredited by the Agricultural and Processed Food Products Export Development Authority (APEDA) under the National Program for Organic Production of the Government of India. APEDA estimates that in 2011–12 about 22,674 million metric tons of organic rice was produced in India. According to APEDA, in 2012, about 5243 million metric tons of OBR was exported from India. Because of its high production and export volumes, OBR has received much attention from both growers and policymakers. Ramesh et al. (2010) found that growers of organic rice (both basmati and non-basmati) had slightly lower yields (3.77 vs. 3.82 tons/ha), significantly lower costs of production (Rs. 18,000/ha vs. Rs. 20,7000/ha), and much higher returns (Rs. 28,000/ha vs. Rs. 17,750/ha) than growers of conventionally produced rice. Though states like Punjab, Haryana, and Uttarakhand have been at the forefront of basmati rice farming, Uttarakhand has

⁷ The survey was conducted in Maharashtra, Karnataka, Tamil Nadu, Kerala, and Uttarakhand.

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