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Analysis

Heterogeneity in Intention to Adopt Organic Strawberry Production Practices Among Producers in the Federal District, Brazil

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ABSTRACT

Despite its benefits, adoption of organic farming is low in Brazil. We used the theory of planned behavior to determine factors that influenced a farmer's decision to adopt organic production methods and identify key social psychological barriers. We focused on strawberry production as a model, and surveyed 83 conventional strawberry farmers (response rate 90.2%), and found that attitudes and perceived behavioral control (PBC) predicted intent to adopt organic production ($r^2 = 37.2\%$). For farmers interested in conversion, beliefs about the improved social/financial status from conversion were positively related to their attitude toward conversion, and the lack of control over informational and physical resources was negatively related to PBC. For farmers disinterested in conversion, the influence of their social norms was stronger than for interested farmers, and PBC most strongly influenced their intention to convert. These results suggest that different strategies should be pursued for encouraging conversion to organic strawberry production. For interested farmers, their interest may be enhanced by addressing their attitudinal beliefs, and allaying concerns over access to technical assistance. For disinterested producers, it may be important to raise the salience of their positive attitudinal beliefs, involve people whose opinions they value, and enhance their perceived control over information and risks.

1. Introduction

Organic production and other sustainable agricultural practices, such as agroecology, are viewed as a means to sustain agricultural production while reducing environmental and human health problems associated with conventional production practices. Although organic agriculture and agroecology have important differences (Bellon et al., 2009; Nicholls et al., 2016), in Brazil, the adoption of both agroecological and organic production has been increasing steadily (Ministério da Agricultura, Pecuária e Abastecimento, 2015). Efforts in Brazil have intensified to encourage growers to convert to agroecological and organic production practices (Planapo, 2013), and there has been increased investment in research, extension and formal education (Bianchini and Medaets, 2013). Yet organic agriculture still had only 0.3% of the production in 2014 (Research Institute of Organic Agriculture-FiBL, 2016).

Several approaches have been used to investigate the factors that may be involved in facilitating or restricting conversion to organic practices. In general, it is believed that economic, social and psychological factors govern the conversion process (e.g., Egri, 1999; Gliessman, 2007; Lamine and Bellon, 2009; Cranfield et al., 2010; Sulemana and James, 2014; Home et al., 2015; Lakner and Breustedt, 2015). Investigations using standard economic theory have shown that producers respond in predicted ways to economic incentives when converting (Pietola and Oude Lansink, 2001), and the compensation required to induce conversion has been estimated using a real options approach (Kuminoff and Wossink, 2010). Studies using a broader socio-economic approach have found that output prices, policy incentives, farm and structural factors, individual farmer characteristics, and the system of information dissemination all shape the adoption process (Burton et al., 2003; Flaten et al., 2006; Läpple, 2010; Schmidtner et al., 2012). More generally, the level of social capital in a community is suggested to affect the potential for individuals in a community to adopt changes (Flora, 2004; Flora and Flora, 2008).

More recently, potential psychological barriers to conversion to pro-environmental and organic methods have been investigated. The theoretical framework informing these studies is the theory of planned behavior (TPB; Ajzen, 1991). The TPB posits that attitudes toward behavior, subjective norms (perceived social support), and perceived behavioral control, together shape an individual's behavioral intentions

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and behaviors. It has been successfully used to predict behavioral intention in various health-related fields (Armitage and Conner, 2001; Hardeman et al., 2002), and has been frequently used to study farmer decision making. Läpple and Kelley (2013) found that the influence of economic incentives on intention to adopt organic method by producers in Ireland varied in relation to the perceived technical barriers and the social acceptance of conversion. Borges et al. (2016) found that attitudes, subjective norms, and perceived behavioral control accounted for 48% of the variation in intention to adopt native grasslands by cattle farmers in Brazil. The main criticism of the TPB is that there may be other factors that influence behavioral intentions and behavior. Empirical studies have shown that typically 40% of the variance of behavioral intent could be explained by the model (Armitage and Conner, 2001; Werner, 2004).

Conventional strawberry production in Brazil requires frequent applications of pesticides and intensive production practices to control arthropod pests and disease (de Carvalho, 2005) leaving detectable pesticide residues in final product (Anvisa, 2013). Two factors would seem to encourage conversion to organic strawberry production. First, all strawberry producers in our study area would be considered to be small-scale producers who rely on considerable labor inputs. About 74% of producers have <1 ha of strawberries and the largest producer has only 6 ha of strawberries. In addition, it is widely known in the area that organic strawberries command a premium price, generally about 44 and 28% higher than conventionally produced strawberries, respectively in 2014 and 2015 (Seagri, 2015, 2016). Thus, it would seem that producers would be interested in exploring the possibility of converting to organic production. Despite the support and apparent incentives, conversion to organic strawberry production has been slow, as can be observed in the production area in the Brazlândia region, Federal District where among 148 strawberry producers in this region, only 11 are producing organically (EMATER-DF, 2016).

It may be important to understand the relation among interest, attitudes, subjective norms and perceived behavioral control held by producers who contemplate the conversion to organic strawberry production to design effective policies, outreach and support systems that encourage conversion more effectively. If a producer has no interest in even considering conversion, most incentives will not work, and efforts might need to focus on encouraging the producer to consider the possibility.

This study aimed to use the TPB to investigate psychological factors that were influencing the intention of conventional strawberry farmers to convert to organic methods. This is part of a larger study examining factors that could influence conversion, including profitability (Resende Filho et al., 2017) and social capital (unpublished data). Through these studies we will assess factors that may encourage or constrain conversion to organic production, and propose new strategies and public policies to encourage the conversion of conventional farmers to organic strawberry production.

2. Theory of Planned Behavior

The conversion to organic strawberry production is a complex process. It requires a producer to deliberate and plan, considering the possible benefits and risks. It will affect family, close relatives and friends, and its success is uncertain, mainly because the producer does not control many of the factors that lead to success. The TPB seeks to identify the factors that form and change behavioral intent. It is particularly well suited for modeling the conversion to organic strawberry production, as individual attitudes toward conversion, the importance of the opinions of others close to the producer, and the perceived behavioral control over factors that can influence success are key elements of the model (Fig. 1).

The TPB model considers that direct measures of attitudes, social norms and perceived behavioral control are primary predictors of behavioral intent (Fig. 1). A second indirect set of measures that focus on salient beliefs, called belief-based measures, are a second tier of predictors because these are used to predict the direct measures. In the standard model, these belief-based measures are aggregated or considered individually to uncover why people hold the attitudes, social norms or perceived behavioral control measured directly.

Empirically, the model was parameterized by specifying a clear behavior, in our case, conversion of part of the farm to organic strawberry production sometime during the next two years. Typically, multiple measures of intention are used, and include direct questions about intention and more indirect questions about desire. Let BI_i be the ith measure of behavioral intention. Then $\overline{BI} = \sum_{i=1}^{n_{BI}} BI_i / n_{BI}$, is the overall measure of intention to convert, where n_{BI} = the number of measures of behavioral intention.

Similarly, the direct estimates of attitude toward the behavior (A), social norms associated with doing the behavior (SN), and perceived behavioral control of the behavior (PBC) are typically estimated by several measures, so for each respondent, the averages were calculated and used in the analysis:

$$\overline{A} = \sum_{i=1}^{n_A} A_i / n_A$$

$$\overline{SN} = \sum_{i=1}^{n_{SN}} SN_i / n_{SN}$$

$$\overline{PBC} = \sum_{i=1}^{n_{PBC}} A_i / n_{PBC}$$

Each of the belief-based measures was estimated from the strength of the belief and an evaluation of the outcome. For the attitudinal beliefs,

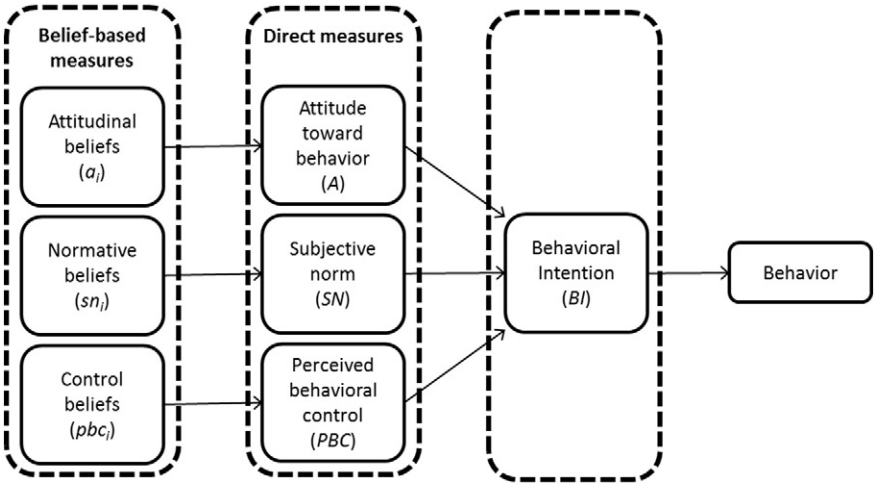

Fig. 1. Model of the theory of planned behavior.