

Sustainable horticulture: understanding barriers to the adoption of innovation

*Breda McCarthy**, James Cook University, breda.mccarthy@jcu.edu.au
Andrea Schurmann, James Cook University, Andrea.schurmann1@jcu.edu.au

Abstract

The purpose of this paper is to explore barriers to the adoption of sustainable horticultural practices. A total of 12 in-depth interviews were undertaken with growers and key informants. Key barriers are primarily associated with financial and marketing constraints. For some growers, lack of assurance in new sustainable practices and potential for loss of yields is an issue. There are conversion costs and the perception that organic farming systems are labour intensive, difficult and time consuming to implement. Growers face structural barriers to change as they are price takers and lack power in the supply chain. This study makes an empirical contribution to the literature on sustainable food systems by exploring barriers faced by growers in Queensland, Australia, in particular, the characteristics of the innovation itself such as relative advantage (Guerin, 2000; Rogers, 1995).

Keywords: Organic Farming, Adoption of Innovation, Sustainable Agriculture

Track: Food Marketing

Introduction and Literature Review

Sustainable horticulture is a ‘multifaceted concept’ and is likely to reflect a variety of motivations and practices, such as integrated pest management (IPM), organic farming, bio-dynamic farming and local food supply. It generally refers to a form of agriculture that minimizes environmental problems, whose farms earn stable and profitable returns, where workers and animals are treated fairly, and the food produced is of high quality (Lee, 2005). It is argued that increasing the efficiency of production is eminently rational as it secures a win-win result for both the environment and the farmer (Hamblin, 2009). While Australian agriculture is one of the least distorted and most efficient systems in the world (Bjorkhaug & Richards, 2008), some writers argue that the productivist model of agriculture is undermining environmental goals (Pillarsetti, 2002; Hochman et al., 2013), endangering national food security and accelerating rural decline (Dibden & Cocklin, 2005; Bjorkhuag & Richards, 2008; Dibden, Gibbs & Cocklin, 2013; Lawrence, Richards & Lyons, 2013). There are well documented concerns around global agriculture, food and distribution systems and their environmental impacts in terms of energy use, land disturbance, water use and emissions of greenhouse gases (Lang & Heasman, 2004; Notarnicola et al., 2012).

Very little is known about Australian growers and their attitudes towards sustainable horticulture, at least in the academic literature. Organic farming is one approach to sustainable agriculture and is classified as “deep sustainability” (Hill & MacRae, 1996). In Australia, organic farming is experiencing rapid growth (Department of Agriculture, Fisheries and Forestry, 2011), but it lacks government support (Wheeler, 2011). Market reports show that lack of consistent volumes of supply is hampering growth and producers cite pricing and cutting of margins to the point where it is not viable for them to risk production of a given crop (Biological Farmers Association, 2012). There is a small, but growing body of literature on understanding the attitudes of farmers towards sustainable farming in Australia (Lockie et al., 1995; Lockie, Lyons & Lawrence, 2000; Cocklin, Mautner & Dibden, 2007; Higgins, Dibden & Cocklin, 2008; Wheeler, 2008; Greiner, Patterson & Miller, 2008; Patrick, Barclay & Reeve, 2009; Andréé, Dibden, Higgins & Cocklin, 2010; Lankester, 2012; Alonso &

Northcoat, 2013). The primary barriers to the adoption of organic farming are market issues such as lack of price premiums and small market size along with on-farm issues such as lower yields, pest and disease problems (Wheeler, 2008). Other barriers relate to the knowledge generation process (McKenzie, 2013) and the characteristics of the innovation itself such as complexity, relative advantage and observability (Guerin, 2000).

The study's objectives and methodology

The objective of this study is to explore the key factors that prevent growers from adopting more sustainable practices. A total of 12 semi-structured interviews have been conducted to date. Four interviews were undertaken with growers and eight interviews were conducted with key informants. As the research is ongoing, the findings are preliminary in nature. Key informants were defined as agricultural professionals, such as extension officers, scientists, academics and members of natural resource management groups, who conduct research and/or provide advice to horticulturists. Respondents were recruited by using the authors' professional networks, attending the AUSVEG trade conference and through snowball sampling (Dragan & Isaie-Maniu, 2012). In keeping with the conventions of the key informant method (Tremblay, 1957), interviews were semi-structured with some open-ended questions and the interviews began with a set of 'grand tour' questions (McCracken, 1988) about participants' personal backgrounds and interests and then turned to their experiences and beliefs regarding sustainable horticulture. The duration of the interviews ranged from 50 minutes to one hour and 45 minutes. All the interviews were audio-taped and transcribed.

Research Findings

The study reveals four major barriers to the adoption of sustainable horticultural practices and these are outlined in Table 1.

TABLE 1: Barriers to the Adoption of Sustainable Horticultural Practices

Barriers To Adoption of Organic Farming	Example	Level of agreement amongst respondents
Financial	Lack of profitability. Technology is too expensive. Investment in farm infrastructure is high (i.e., irrigation) Loss of income during conversion period to certified organic farming. Compliance costs (certification fees, labelling, paperwork). High labour costs. High cost of certified organic inputs.	High
Market demand and consumer behaviour	Niche market for organics. Consumers are unwilling to pay premium prices.	High
Industry/Structural Barriers	Lack of power in supply chain. Price-takers. Low farm gate price	High
Lack of assurance in, or questioning, of sustainable farming systems	Lower yields. Cannot trust that the new methods will work. Problem in using only certified inputs. Changing farming practices is time consuming, requires more effort. Chemical usage. Farm size. Learning by trial and error. Lack of extension services, government support. Negative image of organic farming.	Moderate. Disagreement over chemical usage.

Financial barriers

A major barrier to the adoption of more sustainable practices was financial. Growers were faced with low profitability and high costs and could not afford to pay the upfront costs associated with new technologies or precision agriculture. In the words of one grower:

“I don’t think that technically any farming businesses around here are technically sustainable. There is always an input, especially as we move toward higher technology, diesel and fuels. You can’t farm in Australia without high fuel inputs. There are also labour issues, particularly in the north here... You had to have an outside job to sustain the farm. And that’s not the way to do it.”

Consequently, effective extension services (which refers to technology transfer in a rural context) were said to be those that focus on the economic dimension, in other words, growers would adopt certain practices if they saw economic advantages in adopting them. Organic growers were faced with problems: loss of income during the three year conversion period to certified organic farming; concerns over how to pay existing overheads; the cost of compliance; high cost of organic inputs and high labour costs (organic farmers relied on backpackers and the *Willing Workers On Organic Farms* program).

Market demand and consumer behaviour

There were also significant barriers in relation to market demand and consumer behaviour. The organic food market was seen as niche and small-scale. Organic growers targeted upper middle class consumers and sold into non-local markets such as Brisbane and Melbourne. Key respondents felt that there was a limit to the price that consumers would pay for organic produce and the lack of premium prices would restrict entry of more growers into the sector. One respondent was worried that the widespread adoption of organic farming would result in a fall in prices, and consequently, it wouldn’t be economically viable.

Industry barriers

Industry or structural barriers were evident. Growers were described as price takers who were selling a commodity product and they lacked power in the supply chain. A few banana growers remarked that they were willing to sell food at below the cost of production rather than throw it away. One grower claimed that they were competing against a large multinational grower who was engaged in predatory pricing practices; furthermore, price-fixing allegations in the wholesale and retail trade were made. There was a perception that the large gap between farm gate prices and wholesale/retail prices was restricting consumer demand for organic produce.

Lack of assurance in, or questioning, of sustainable farming system

For some growers, there was a lack of acceptance, or at the very least, some questioning of organic standards. One grower felt that the local certifying body was inflexible, not open to innovation and as a result he was prohibited from using an input that was available locally. At the same time, he was worried about the integrity of international organic standards. He explained how an allowable input, such as liquid nitrogen, can “force growth” in the banana crop and compromise taste. Barriers cited included the lack of support from accreditation bodies and the government, learning by trial and error and the negative image associated with organic farming (“hippy” connotations, lifestyle farming that was not financially viable). The hard work associated with organic farming was highlighted:

“When I spoke to the auditor last time he said that it’s [organic farming] in decline. A lot of farmers have just given up. It is too hard. It’s not worth it. [Too hard in terms of] Physical labour, making money. The inputs are just too expensive”.

Farm size was also put forward as a possible barrier to adoption of sustainable practices (applicable to both organic farming and integrated pest management techniques):

“We have to do a lot more slashing and a lot more hand work with whipper snipping but you get a different mix of weeds and different mix of native plants recolonising the area. If you can manage that, and not every farm operation can do that. Not all farms can do that, but because we are on a small farm we can have a very intimate knowledge of different parts of the property and manage different parts of the property in different ways”.

For conventional growers, chemicals were primarily used to control pests and protect yields. One comment was:

“The pesticide is like a handful of urea – you throw it on today, and you’ve got a result tomorrow. You don’t always see a quick response with other, softer approaches. So chemicals are seen as cheap insurance and when it comes to horticulture, high value crops, chemicals are not a very dear part of the cost of production, so I don’t think they (farmers) are slowing down their chemical usage that much or it’s happening very slowly”.

Views on chemical usage varied depending on whether the grower was conventional or organic. Some agricultural professionals and organic growers saw it as a major problem, i.e. increase in pest resistance, non-selective nature of chemical treatments, implications for soil fertility. Organic growers strongly believed in improving soil health and saw no conflict between their environmental goals and business goals. In other words, if the soil was healthy then that would eliminate major pest problems and everything else would fall into place. If the soil was not healthy then the financial viability of the business would be jeopardised. They were inclined to adopt a long-term view and condemned the market-driven, “high-yield now, less-yield later” prevailing chemical practices. In the words of one grower:

“The whole system was falling apart...So I was buying more, more pressure from the marketplace, but I had to make sure that I was getting the returns to pay for the inputs that I was putting in. At the same time what was happening was that it was at the expense of my farm...In terms of my *natural capital*. It’s all about my biodiversity. It’s all about my soil. All about that. It was coming at a cost to that. Who was going to pay for me to replace that or was I at a point that the damage was so great that I am not able to stay here anymore, I am going to have to go somewhere else to farm...chemicals are a recipe for imbalance and *greediness* of wanting more things to the point that nature cannot deliver. Nature is always trying to find a way to correct itself. But we are *trying to beat nature*, instead of trying to work with nature, we are trying to beat it. The thing with that is it is all about money. How to produce more. How to get more. Coming from the *marketplaces*, bigger, more”.

Implications and Conclusions

In this study, the views of growers and targeted agricultural professionals were very similar. Both groups were likely to name demand constraints (niche market, lack of premium prices), financial constraints (low profitability), conversion costs (learning by trial and error, hard work) and lack of power in the supply chain. Australia has one of most concentrated supermarket sectors in the world, so suppliers selling commodities such as fruit and

vegetables are price takers and face uncertain prospects (Australian Food and Grocery Council, 2011). Growers were quick to stress the actual reality of being primary producers and talked about their willingness to sell food below the cost of production rather than throw it away. There were also allegations of predatory pricing and price fixing in the banana sector. Organic growers were highly critical of conventional farming practices with its reliance on chemicals that had led to soil problems and decline in land value.

Our findings are consistent with other studies on the adoption of sustainable farming practices. Multiple authors highlight the “cost-price squeeze” on farmers and reducing inputs is the main reason for converting to low-input farming (Sutherland, 2011). This is the ‘relative advantage’ (Rogers, 1995) of adopting a new farming method, but it is compromised by other factors, such as labour intensity, risk of low yields and uncertainty about one’s ability to learn a new system of farming (de Buck et al., 2001). Similar to Wheeler’s (2008) study, financial constraints and market issues are two key barriers. Other studies show that financial benefits and environmental factors (i.e., improving soil quality) are key drivers of practice change, with lack of funds, age and lack of time and workload being limiting factors (Ecker, Kancans & Thompson, 2011). A UK study (Burton, Rigby & Young, 2003) found that attitudes to the environment, along with information networks (e.g. reliance on other farmers) and gender (e.g. being female) influence the adoption of organic farming. In the literature, it is recognised that sustainable farming methods are knowledge-intensive, transitions are non-linear and they demand strong linkages between stakeholders, farmers and advisors (Hochman et al., 2013; Lamine, 2011). The literature shows that most ‘barriers’ to the adoption of innovation have a rational basis such as costs of implementation, risk, complexity and incompatibility with other aspects of farm management (Vanclay and Lawrence, 1994); adoption is complex and conditioned by the accumulation of experience, information, technical skills and physical capital, along with economic or social circumstances that exist at the time of adoption (Burton, Rigby & Young, 2003). Foster (2013) concludes that, while significant funds for Australian research and development go into IPM related areas, much more could be done to promote sustainable agriculture. As state departments have moved towards a market-driven or client-driven philosophy of service provision (where farmers have to pay for advice), researchers have predicted that this loss of extension officers will have far-reaching consequences for Australian agriculture (Guerin, 2000). Recommended strategies for overcoming barriers include market incentives, investigation of anti-competitive behaviour and further investment in extension services. Market incentives could include co-payments or tax concessions for improving soil quality, farm sustainability and investing in value-added processes that reduce food waste. Furthermore, taxes on synthetic pesticides could potentially be used to fund research and development. Consumer education campaigns would also be worthwhile. A more serious evaluation of support measures for farmers making the transition into sustainable agriculture should be taken by Australian policymakers.

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