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Title: Why adopt Integrated Crop Production? A Perspective from the French Fruit Sector

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With a half a century of research, decades of favorable government policies and an ever-growing concern in the general population about the environmental impact of pesticides, one could hypothesis that there would be wide-spread adoption of integrated production (IP) practices like integrated pest management (IPM) and integrated crop management (ICM) on European and North American farms. But the empirical evidence is quite the opposite and farmers have not embraced IP on a large scale on either continent. For example, by one recently published estimate, "true IPM is probably being practiced on only 4 to 8 percent of the U.S. crop acreage (Ehler and Bottrell, p. 3)." The adoption rates in Europe are, for some commodities in some regions, much higher than this, but the global picture is roughly the same: "conventional" agriculture is still not defined by "integrated" practices.<sup>1</sup>

The literature offers numerous explanations as to why there is low adoption. These can be grouped into two broad classes: technical and economic. Technical reasons are related to the "science" of IP in terms of the biological, entomological, and ecological difficulties of developing generic guidelines that can be readily applied to the highly site-specific nature of on-farm situations. Economic reasons focus on continued lack of clear financial incentives for farmers to adopt these practices, particularly in terms of price premiums for IP products and cost savings in production (e.g., lower chemical costs are often overwhelmed by higher monitoring costs and reductions in marketable production).

But are these constraints static? In this paper, we hypothesize that they are not. As agronomic-related research continues, the technical constraints are being overcome, and emerging trends in the market suggest that there may be an evolving market structure that will

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<sup>1</sup> For example, in apples, a 1994 study estimated that 35% of land in apple production in 12 Western European countries was cultivated with integrated fruit production systems (or similar quality assurance schemes). However, country-by-country adoption of IP varied considerably: 1% of land in apple orchards in France, 82% of land in apple orchards in Austria (Cross, et al.).

provide the necessary economic incentives for more wide-spread adoption of IP practices. This paper poses the following research question: Are changes in consumer demand and greater concentration in the food retail sector creating a market-place in which IP practices will become not only more widely adopted, but essential if farmers want to maintain access to key markets?

To address this research question, we consider the following hypotheses:

H1: The determinants of IP adoption are shifting from on-farm profitability to retailer-imposed constraints on market access.

H2: The operative definition of "integrated production" is shifting from being strictly "science-based" to being primarily defined by dominant market actors.

The paper's analysis begins with an overview of the incentives for adoption from the perspective of several vested interest groups: growers, retailers, agro-chemical manufacturers, local governments, national governments, international governing bodies, and consumers. We then examine the current structure of European fresh fruit markets, particularly in terms of market concentrations, globalization of food retailing, and emerging alliances and other collective action. The paper then discusses the two central hypotheses in terms of how incentives paired with access to market power will lead to changes in market performance. This discussion is largely qualitative in nature and is meant to establish the context for subsequent data collection (some of which is already in process).

### **Incentives that would motivate adoption**

The literature on "adoption" of agricultural technologies typically models adoption as an incremental process of experimenting and learning, and not as a simple yes/no binary choice. Similarly, to assert that a grower or supply chain has adopted "integrated production" is, by default, also an assertion that there is a universally accepted definition and specification of IP. These issues are taken up later in the paper, while in this section, they are assumed away. Hence,

for each set of market actors, the question is addressed: Why would these actors be motivated to adopt (vs. not to adopt) integrated production practices (however specified or defined)?

*Growers:* Morris and Winter suggest that European growers have a choice of three production systems: conventional, organic or integrated farming systems. They argue that IP provides growers with a “third way” which is “both economically realistic and environmentally beneficial (p. 194).” More simply stated, growers will adopt IP when it is in their economic interest to do so, either because IP increases their net financial returns (as compared to other production systems) or maintains that return but with other desired, non-monetary benefits. It should be noted that most of the IP literature and field research has attempted to address this production decision of growers.

*Retailers:* Retailers, as gatekeepers to the final consumer, seek to meet the demands of these consumers so as to maximize retailers’ net returns. But retailers have some influence over consumer demand via advertising, promotion and the choices they make about what to stock in their stores. Retailers can “adopt” IP by stocking produce grown under IP systems and signaling this attribute to their customers. Retailers will do this if consumers are expressing preferences for IP products and/or if IP adoption complements or enhances the advertising and promotion strategies of the firm.

*Agro-chemical manufacturers:* Agro-chemical companies have a vested interest in the development and adoption of IP systems. Even though IP emphasizes the reduction of pesticides and other chemical applications, it never advocates the elimination of their use. As the agro-chemical industry faces growing public criticism and potentially more stringent government regulations and control, IP actually can be used as an example of the beneficial nature of chemical usage within the context of an “environmentally beneficial” production system.

*Local governments:* Local governments in agricultural producing regions are faced with policy choices which directly affect the assignment of costs to growers and other local constituents. For example, in the case of groundwater contamination, some policies may lower net costs for growers but increase the costs of maintaining the local supply of clean drinking water. If IP systems can be developed that are economically viable for growers, local governments also will see net benefits. If the benefits to local governments that arise from grower adoption of IP are sufficient, these governments would have incentives to subsidize the costs of adoption or in some other way compensate those growers that adopt IP practices.

*National governments:* Like local governments, national governments must make policy choices which ultimately determine the assignment of costs and benefits, and the desire of various market actors to capture benefits and avoid costs drives much of the political process. But the policy choices of national governments are also influenced and constrained by their general mandates (e.g., defense, diplomacy, etc.). The assurance of a safe and sufficient food supply is generally considered an important component of these national mandates. In recent decades, European governments have also begun to adopt a mandate for the preservation of the natural resources of their countries. The degree to which the adoption of IP facilitates the abilities of national governments to meet these mandates is an indication of the degree to which governments will provide incentives to growers and food systems to adopt IP.

*International governing bodies:* At the international level, several issues are at stake: the harmonization of regulations of agro-chemicals and of agricultural grades and standards, the regulation and monitoring of large international corporations, and the creation of a “level playing field” for international trade (e.g., harmonization lowers many forms of transaction costs and supports the development of competitive international markets). The high exclusion costs and jointness in use of environmental goods also necessitate dialog at the international level (e.g., if

Country A is less restrictive in its regulation of chemical inputs, it is difficult for Countries B...n to keep Country A from participating in the market). Consequently, if a country makes IP adoption part of its national agricultural policy, it has strong incentives to advocate similar policies in other countries. Hence, coalitions of national governments (and at times, business coalitions) have incentives to impose mutually agreed upon regulations and standards for IP systems on all members of a given international body.

*Consumers:* Consumer preferences in Europe are quite complicated and price considerations are only one of a range of product attributes important to their food purchasing decisions. Numerous studies of European consumers indicate that in addition to wanting good tasting, fresh foods at reasonable prices, they also want foods with minimal to no chemical residues and that they voice strong support of efforts by the agri-food sector to reduce any negative impacts to the environment arising from the production and delivery of food products (e.g., Crèdoc). The degree to which consumers perceive that IP meets these preferences will largely influence their willingness to “adopt” IP-products in terms of their purchasing decisions.

### **Current structure of European fresh produce markets**

Given these incentives and subsequent preferences of each set of market actors, the question now becomes, “who gets to express their preferences, especially if the preferences of some are in conflict with the preferences of others?” Market structure and the distribution of market power largely determine the empirical answer to this question. As Schmid notes,

Power is inevitable if interests conflict. If everyone cannot have what they want simultaneously, the choice is not power or no power, but who has the power. Power is the ability to implement one’s interests when they conflict with those of others. With respect to a single issue or resource, equal power is impossible (p. 9)

In this section, an examination of market concentration in the retail sector, globalization of food supply chains and retailing, and international coalitions and alliances within the agricultural sector are used to assess how market power is shifting in the European marketplace.

*Market Concentration:* Market concentration in the European food retail sector has increased significantly in the last decade. Using 1996 data, a EU-commissioned study found that five-firm concentration ratios in 14 European countries ranged from 30% in Italy to 96% in Finland. Three of the largest food retail markets, Germany, France and the United Kingdom had ratios of 75.2%, 67.2% and 67%, respectively (Dobson Consulting).<sup>2</sup> Trends towards higher levels of retail concentration are also reported for the U.S. Kaufman, et al., report that the U.S. four-firm concentration ratio for food retailing has shifted from 17.1% in 1987 to 26.8% in 1998. Although the U.S. ratios are not nearly as large as those observed in Europe, even these authors note, “consolidation and structural change is taking place over a wide range of agricultural and food industries and has implications for both producers and consumers (p. iv).”

Since grocery retailers are the primary gatekeeper to a large portion of European consumers, their relative market power in terms of control of access to final consumers and the specification of product attributes is considerable. This is compounded by the general lack of market concentration in fresh produce shipping and production sectors. Upstream market sectors of growers, wholesalers and other shippers are still atomistic. The implications of these power relationships are discussed later in the paper.

*Globalization of food retailing:* Europe is home to a number of global food retailing giants, including Carrefour, Sainsbury, Tesco, Ahold, and Metro. As an example of the size and scope of these stores, the French retailer Carrefour operates in 26 countries and has annual sales of \$56 billion (Luck, 2000b). These companies are intent on dominating the global food retailing



sector, as is evident in a speech given by Alfons Schmid, vice-president Public & Environmental Affairs of Royal Ahold, where he declared:

Looking at global concentrations it is obvious that so called “life science” companies like Novartis, Dupont and Monsanto have conquered large market shares in their relevant sectors world-wide. Same goes for the food manufacturers, where companies like Unilever, Nestlé, Proctor and Gamble and Coca Cola are globally represented. In food retail this game has just begun, but it will continue at rapid speed (Luck, 2000a, p.50).

The implication of this trend is also evident in Mr. Schmid’s speech, as he further elaborates that Ahold wants to have “the best food distribution know-how and to spread this world-wide through spreading best practices. This goes for our own internal organisation, but also for the way we cooperate with suppliers (ditto).” In other words, the system of retailer-specified good agricultural practices and production protocols that are being adopted by (imposed upon?) European supply chains are the fore-runners for a global system of retailer-specified practices and protocols. This will only be possible with a global system of food retailing and it has wide-ranging implications far beyond the adoption of IP practices.

*Emerging Alliances and Collective Actions:* Even though these retailing giants already have considerable market power, they still recognize that they can attain further economies to scale by acting collectively on certain mutually shared needs. The oft-cited example in the fresh produce industry is the need for standardized packing crates and boxes. However, this classic example is dwarfed by the efforts of 21 European grocery retailers, who have formed an international organization to standardize “good agricultural practices.” As fresh produce supply chain participants wanting to sell to these retailers adopt standardized practices, the need for individual suppliers to meet an array of 21 different protocols (one for each retailer) is reduced to the need to only meet the one standardized protocol. This organization, the Euro-Retailer

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<sup>2</sup> Anecdotal evidence suggests that market concentration has actually increased since 1996.

Produce Working Group (EUREP), is in the process of developing a set of good agricultural practices which its members will use as a base referential for all of their fresh produce sourcing.

Growers are responding to the increased market power of retailers by organizing grower groups to collectively market their produce (often under a certified set of commonly shared quality attributes).<sup>3</sup> Growers have also attempted to preserve their power to dictate how production protocols will be specified. In France, the “Forum de l’Agriculture Raisonnée Respectueuse de l’Environnement” (FARRE) represents a collaboration between growers, various governmental organizations and other sector participants (e.g., some agro-chemical companies and food processors) which have developed their own general set of production guidelines. And FARRE has linked with similar grower-oriented organizations in five other European countries to form a loose confederation of upstream market participants (FIP in Germany, LEAF in England, ODLING I BALANS in Sweden, FILL in Luxembourg and l’Agricoltura che Vogliamo en Italie in Italy).

### **Changes in market performance**

*Prevailing determinant of IP adoption:* As noted in the introduction, there has not been widespread adoption of IP practices in Europe. Growers have not viewed IP as a means for increasing their net returns nor have they been offered price premiums or preferential access in the marketplace for IP-grown produce. From the grower’s perspective, the incentives for IP adoption have been mostly negative in terms of increased complexity, risk and costs associated with IP systems (Park, et. al).

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<sup>3</sup> In France there are four official national quality signal programs: Label Rouge, AB (Agriculture Biologique), Certification de conformité, and L’Appellation d’origine contrôlée.

Emerging consumer preferences may change this dynamic. Findings from the Crèdoc survey show that over half of the surveyed consumers from four European countries viewed environmental attributes (i.e., guarantees that production processes were non-polluting or protected the environment) as being either somewhat or very important to their purchasing decisions (53.6% of those surveyed in Germany, 67.6% in France, 69.9% in Italy, 79.9% in the U.K). In addition, various consumer studies have found that consumers associate greater food safety with eco-labels and other “pro-environmental” marketing signals (e.g., Blend and van Ravensway). The scientific consensus to support this association does not exist, yet consumers often cite food safety as their primary reason for purchasing organic or other products perceived as pro-environmental. The Crèdoc study found even stronger preferences for products with guarantees about health and safety. Nearly all of the respondents in the four countries indicated that these guarantees are somewhat or very important to them (81.3% of those surveyed in Germany, 85.3% in France, 91.4% in Italy, 93.3% in the U.K).

If 70% of French consumers give at least some consideration to the environmental attributes of the goods which they purchase, can French supply chains ignore this? Similarly, if many consumers link food safety to pro-environmental attributes, why should retailers invest in education programs to dispel this linkage? “Give the consumer what he/she wants!” is the modern-day mantra of the retail sector. Is it any surprise then that French food retailers have developed product lines, marketing strategies and brand images that emphasize pro-environmental attributes? But these retailer efforts require a guaranteed supply of products that are, in fact, pro-environmental. This is what is driving retailers to introduce/mandate specific good agriculture practices and production protocols that permit them to legally make claims about the environmental attributes of their products.

*Defining IP:* Historically, the definition of integrated production has been provided primarily by the research community. For the past 40 years, the International Organization for the development of Biological Controls (IOBC/WRPS) has been the scientific clearinghouse for European researchers interested in developing IP. But these efforts have often been criticized by the agricultural sector as being too rigorous, too removed from the highly variable settings of commercial agriculture, too unrealistic to be of practical use.

The research community has taken these criticisms to heart and has striven to develop IP practices and farming systems that both meet the rigors of the IOBC-definition of IP and meet the economic constraints of growers. The research presumption has been that IP must be made workable for growers but also must remain true to its core principles of strict limitations on the use of agro-chemicals and other synthetic inputs.

In recent years, French retailers and their affiliated supply chains have been demonstrating a greater willingness to compromise on these core principles. As these market actors have developed protocols and guidelines for good agriculture practices, they have typically started with the IOBC's definition of IP, but then moderated it to permit a more flexible set of acceptable levels and types of chemical-based input usage. As a result, the adoption of IP (as defined by the IOBC) is happening incrementally, as supply chains experiment with different levels of limits and selected adoption of core attributes of the total IOBC-based system.

These recent efforts are attempts to balance the retailers' demand for what some critics would call the proverbial two-udder cow: produce that has the desired "commercial" attributes (e.g., low price, freedom from blemishes and insect damage), and produce that can be sold as having been grown in a "pro-environmental" manner. Since few consumers know exactly what IP is, let alone the differences between an IOBC-defined IP system vs. a retailer-defined IP system, retailers and their supply chains are at liberty to define IP independent of the IOBC.

Compounding this situation is the growing market power of the grocery retail sector.

Governments and researchers are now left with the unpleasant choice of either endorsing the incremental adoption of some IP practices (thus supporting some reduction in the use of chemical inputs), or crying foul, and disavowing and discrediting the recent efforts of retailers and their supply chains.

### **Concluding remarks – power and choice**

Bartlett, in his attempt to specify an economic theory of power, identifies four types of power: decision, event, agenda and value. Roughly summarizing his ideas: decision power is the ability to make a choice between available options; event power is the control over the choice set available to the person with decision power, as it is related to past events and choices; agenda power is the control over perceived choices—the control of what is perceived; value power is the control over the subjective specification of payoffs, i.e., determining the “value” of outcomes. These concepts are now used to summarize our observations about the European fresh produce market and the adoption of IP in this sector.

Most of the economic research on the adoption of IP has focused on the exercise of decision power: the grower’s choice to adopt or not adopt IP and the consumer’s choice to purchase produce that has or has not been grown under an IP system. Issues of market structure and power are exogenous to this analysis, and the expression of preferences is reduced to simplified models of cost minimization and utility maximization. Growers will choose IP if it will yield the “best” net returns. Consumers will purchase IP-grown produce if it offers the most utility. But this analysis does little to identify the origins of preferences and choice sets, or how these preferences and choice sets might change.

The exercise of event power can change the calculus of choice for growers and consumers. Decisions by retailers and/or governments can change the economic payoffs of each

choice alternative. As Morris and Winter note, “price premiums and preferred supplier status associated with labeling and quality assurance schemes in food production which are based on integrated farming systems are already having an impact in the UK and elsewhere in Europe (p.204).” These retailer-based economic incentives are changing the decisions being made by growers. Similarly, retailers’ efforts at bundling multiple attributes under branded product lines may alter consumer choices. If being IP-grown is bundled with other valued product attributes (e.g., quality, food safety, social accountability), consumers may reconsider the choices they make.

But in the exercise of event power, do retailers actually take away some decision power from growers? Park, et. al, suggest that this will be the case if retailer-driven market incentives are used to motivate growers to adopt IP. In their opinion, such incentives “will mean retail outlets putting pressure on farms by increasing constraints on the way in which they produce food (p.492).” As noted earlier in this paper, European food retailers have already begun the process of specifying good agriculture practices and production protocols. French retailers assert that these guidelines are being developed in collaboration with shippers and growers, and there is some evidence that this is true. However, with five-firm concentration ratios in the retail sector surpassing 70%, the majority of suppliers have little choice but to adopt the retailer programs. The very nature of growers’ decision power has changed. Instead of choosing to adopt IP because of the potential financial rewards in terms of higher prices or preferred treatment, the choice is to adopt IP because it is the only way to access a large portion of the retail market.

In terms of the hypothesis, H1, posed earlier in the paper, we conclude that as retailers exercise event power, they are effectively changing the determinants of IP adoption. If current trends go unchecked, then the operative research question will shift from, "Is IP profitable for growers?" to “Which growers can remain profitable with IP being the agri-food system norm?”

By controlling the agenda, an actor has power over what is recognized and given monetary value in the market (as well as what is not). For example, the relevance and the operative definition of IP is a function of who has the agenda power to introduce the concept into the marketplace and to impose a definition of it. As French grocery retailers begin to incorporate IP principles into their sourcing decisions, both upstream suppliers and consumer perceptions are being altered. For suppliers, it is the specification of what constitutes IP that is being altered. For consumers, it is the introduction of IP (either directly or indirectly) as a proxy for “pro-environmental” production practices (which is the actual attribute consumers want). Researchers, lacking agenda power in the market, are no longer the providers of the operative definition of IP. Or, in terms of the paper’s second hypothesis, H2, we conclude that the operative definition is now being altered to include market considerations as well as scientific-based factors.

Finally, as of yet, neither upstream suppliers nor grocery retailers appear to have much influence over the subjective specifications of payoffs, i.e., they have limited value power to tell consumers what they should want or value. In fact, the opposite appears to be the case since changing consumer preferences are generally perceived to be the principle driving force in retail food markets. With a large percentage of consumers expressing preferences for safe food grown in a manner which minimizes negative environmental consequences, the entire supply chain from growers to retailers have incentives to meet these preferences. Thus, the potential future of integrated production and its adoption by a large number of growers is directly related to this driving force. Will IP become more widely adopted? To answer this question, one must first answer the empirical question, “To what degree will consumers recognize integrated production as an acceptable means for meeting their preferences?”

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