Does history matter? Weeds, power, and value chains in a watershed in Martinique

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Abstract

The recognition of power relations, conflicting self-interests, and potential inequalities over time, is a first step towards sustainable and responsible value chains. In this paper, we focus on a 44 km2 watershed in an Island in the French West Indies, Martinique. This watershed concentrates different competing value chains, different power relations, different access to factors of production, and different business models. The elements in common between the stakeholders are the geographical location, the constraints of stringent norms and standards towards less dependence on synthetic pesticides, and a strong attachment to the island. We interviewed 54 farmers in vegetable, sugarcane and banana production. We analyzed the main drivers of change over time in the watershed and their impact over the current value adding and innovation management for pesticide reduction. We built a cartography of the stakeholders. The results show systemic inequalities in land access, labor, technology, and access to credit between export-oriented farms and the other non export-oriented farms. These systemic inequalities find their roots in the course of an history of power relations. These power relations are also influenced by the structural rent-seeking strategies provoked by the ultra-marine status of remote islands attached to the European Union. We discuss the opportunities for new alliances between the different stakeholders based on 1) higher farm-gate prices to small farms in order to influence the opportunity costs in favor of new certification schemes, 2) investments in human capital among extension services, and 3) higher and better targeted subsidies to small vegetable farms in order to reduce the current transaction costs to access the subsidies. Supply chains could not only compete for natural resources, including land, but also for labor.

Keywords : inequalities, power relations, added value, weeding, weed management, Martinique, economic performance.

INTRODUCTION

The recognition of power relations, conflicting self-interests, and potential inequalities over time, is a first step towards sustainable and responsible value chains because it helps understanding the roots of market asymmetries (e.g., large farms versus small farms). At this regard, considering history provides an understanding of some of today's beliefs and cognitions (Chauleau, 1973; Larose, 2015; Stanhill, 1976). These beliefs and cognitions shape and influence today's behavior (Parrot and Keleher, 2019). We state that alliances between the different stakeholders should consider the role of price incentives (Ahumada et al., 2012; Grémillet and Fosse, 2020; Vidogbéna et al., 2015), investments in

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human capital among extension services (Labarthe et al., 2013; Morgan and Murdoch, 2000; Parrot and Keleher, 2017), and 3) higher and better targeted subsidies to small vegetable farms in order to reduce the current transaction costs to access the subsidies (Grémillet and Fosse, 2020).

In this paper, we focus on a 44 km2 watershed in an Island in the French West Indies, Martinique. This watershed concentrates different competing value chains, different power relations, different access to factors of production, and different business models. The elements in common between the stakeholders are the geographical location, the constraints of stringent norms and standards towards less dependence on synthetic pesticides, and a strong "*place attachment*" to the island (Lewicka, 2008). We interviewed 54 farmers in vegetable, sugarcane and banana production. We analyzed the main drivers of change over time in the watershed and their impact over the current added value and innovation management for herbicide reduction. We built a cartography of the stakeholders. We focused on weeding because 1) it remains problematic to manage and 2) because herbicides represent about 80% of all synthetic pesticide sales in Martinique (DAAF, 2021).

The results show systemic inequalities in land access, labor, technology, and access to credit between large export-oriented farms and the other (all small) non-export-oriented farms. These systemic inequalities find their roots in the course of an history of power relations. These power relations are also influenced by the structural rent-seeking strategies provoked by the ultra-marine status of remote islands attached to the European Union. We discuss the opportunities for new alliances between the different stakeholders based on 1) higher farm-gate prices to small farms in order to influence the opportunity costs in favor of new certification schemes, 2) investments human capital among extension services (Labarthe et al., 2013; Morgan and Murdoch, 2000; Parrot and Keleher, 2017), and 3) higher and better targeted subsidies to small vegetable farms in order to reduce the current transaction costs to access the subsidies (Grémillet and Fosse, 2020).

A HISTORY OF VEGETABLE PRODUCTION IN A WATERSHED

We present in this section the island of Martinique, the watershed and a short history of vegetable production.

Martinique

The island of Martinique is a French overseas department, which is bordered by the Caribbean Sea to the west, the Dominica Channel to the north, the Saint Lucia Channel to the south and the Atlantic Ocean to the east. Martinique extends over 60 km. Martinique is about 1,130km^2 large and is dominated by Mount Pelee in the north, which rises to 1,397m. There are two main climatic and topographical regions: the northern part has a more important relief and a rainier climate. While in the south it is more hills and eroded dunes, where the highest relief is the Montagne du Vauclin (504m). The South is drier and has less dense vegetation. With two climatic events, the Foehn effect and the orographic effect, we have an island with two very different landscapes. Indeed, the warm currents blocked by the topography of the north of the island via the foehn effect will descend to the south and this will give a drier result. While the orographic effect will lead to a higher humidity and rainfall near the relief in the north (especially on the Atlantic coast).

The Galion watershed

The Galion watershed is one of the 7 watersheds on the island: the Lézarde (approx. 116 km^2), the Capot (approx. 57 km^2), the Lorrain (approx. 35 km^2), the Galion (approx. 45 km^2), the Rivière Salée (approx. 36 km^2), the Rivière Pilote (approx. 35 km^2), the Roxelane (approx. 20 km^2). The Galion area, with 7,700 inhabitants, is organized around the Galion river. The cover of the grounds as well as the infrastructures present on the Watershed of Galion are independent of the structure of the ground and the pedology. Indeed, it depends mainly on the relief; at the level of the weak slopes, the cultures are more mechanizable and the urban density is more important. This is in contrast to the northwestern part of the watershed, where the slopes are steeper and the production systems are, by default, vegetable farming for food crops.

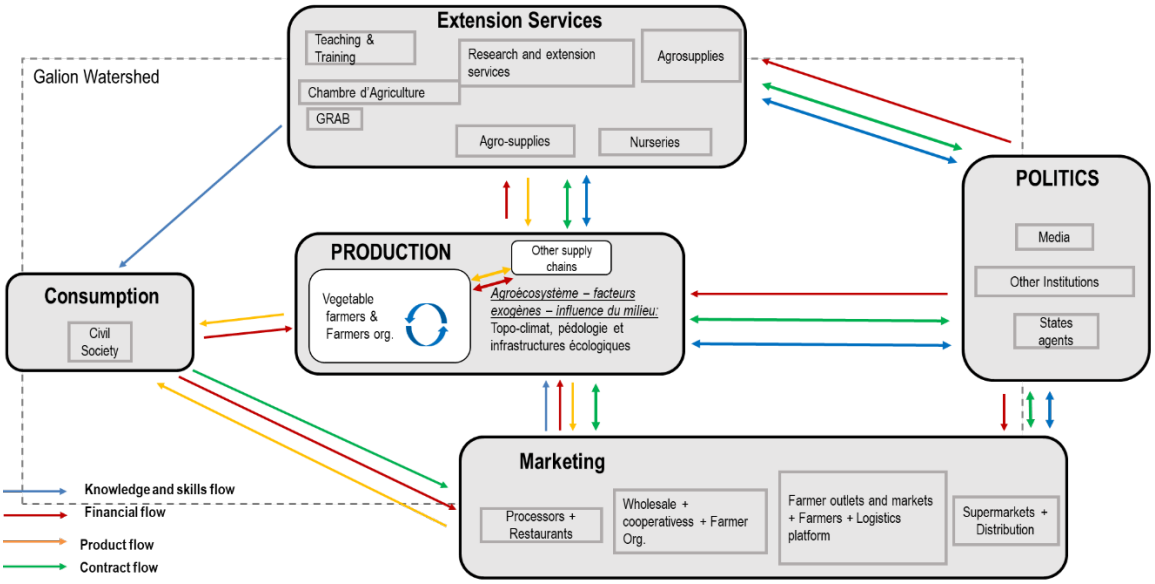

Figure 1. The main stakeholders in the watershed of the Galion, in Martinique. Source: the authors.

Topography and land access explain the economic distribution of the agro-industries. We can mostly understand the spatial distribution by looking at the topography. To the east there is a relatively flat area, close to the Atlantic side. The area is not very dense with dwellings, a national road crosses this plain, and connects the city center of Robert to the city La Trinité. The density of the road network is low. The plain is mainly composed of banana plantations, which are distributed around the Galion River. On the slopes, there is mainly sugar cane. The only sugarcane processing plant on the island is actually located at the outlet of the Galion. The south of the Watershed is bounded by a departmental road, on a ridge. To the southeast is Le Robert, part of this watershed. The southern part of the watershed is heavily forested and urbanized, and it is difficult to get an overall view of the landscape at the ridge. If one moves further into the higher elevations of the watershed, the wooded density increases as well as the topography which becomes more irregular. The western part of the watershed is forested and very hilly. In fact, there are several hills of volcanic origin ("*mornes*"). The vegetable farming and food crops are mainly found in this area. The outlets are outside the area, either on markets (Schoelcher, Fort de France), at wholesalers, on the roadside or in the supermarkets (in Lamentin). Finally, the north of the watershed is at the border with the commune of Sainte Marie, and will extend to the outlet which is located near the Galion sugar factory. This area is upstream in the forest and on the commune of Trinité

which will then be more in the plain, in a less hilly relief. In this watershed, the main activities are agricultural, mainly banana and sugar cane, followed by livestock and vegetable farming.

A history of vegetable production

Vegetable farming in Martinique is fairly recent: it dates back some 60 years, and was defined in opposition to banana and sugarcane crops (Chauleau, 1973; Larose, 2015). This is why it is classified as "crop diversification. Although recent, this vegetable farming was present long before, without being named as such. In fact, traditional agriculture in Martinique is a diversification copping system (except for sugarcane and banana exports), of mixed farming or mixed breeding, mainly for food production, for the local livelihoods. It is characterized by crop rotations, fallow periods, crop associations, the use of organic amendments, the limited use of chemicals, integrated pest management, manual or mechanical weeding, restriction of inputs and limited and rational mechanization.

Food crops corresponded to the products consumed by the family. In the 18th century, on the sugarcane plantations, food crops were self-consumed. From a Marxist perspective, in which the capitalist provides the minimum wage to ensure the mere reproduction of labor, the same principles were applied on the plantations. The food production was regulated and controlled by the employer so that the workers had 1) just enough protein intake to work, but also 2) self-food production of food, i.e., on their own time, at virtually no cost for the employer, who didn't have to spend money on food for the workers. This logic was pushed to a point that the protein balance was hardly achieved and families were forced to depend on imports of salted meat and cod, a source of considerable profits for the traders. This disequilibrium between local consumption and imports is currently weighing on the trade balance in the West Indies because what is produced will be exported and what is consumed will be imported.

Then, when the sale of food products began, notably with cassava and yams, these products were always called food crops. Today, they correspond to tubers, mainly yams, sweet potatoes and dachines. The term vegetable farming appeared in the 18th century, to designate the activity of gardeners cultivating around Paris (Stanhill, 1976). But in the French West Indies, this term was used more recently, when other crops, other than tubers, were developed. A third term designating horticultural crops has been added, that of "*diversification*". This term has a political connotation in opposition to bananas and sugarcane, in which "*diversification*" would mean "*other than bananas and sugarcane*" all-together. Not using this term would allow for a greater emphasis on vegetable farming. This is especially true since historically, this term was used to refer to the plurality of production systems.

The market gardening sector developed especially when sugarcane declined and the agricultural workers in the cane industry decided to develop and market the crops they produced in their Creole (local) gardens. Moreover, with the policies of land fragmentation, land was then accessible and allowed in the years 1965's to launch a dynamic of installation.

Today, vegetable and livestock productions represent about 3,594ha in 2018, with the majority distribution mode for retailers, wholesalers and supermarkets, up to 42% for fruits and 65% for vegetables and 89% for food crops and tuber.

Age, through times: a tentative typology method for vegetable farmers

History allowed to choose the relevant criteria, namely "age", which will raise the question of transmission, types of production, namely either traditional food crop or vegetable farming. It will allow questioning which farming model (family or other) tends to develop, the type of marketing and the type of equipment, which is also linked to age. These different criteria are all linked and have been ordered on a choice tree in order to define a typology. What is important to remember in this typology is not so much the entry point, which is age, but rather the different criteria that correlate with it and that make it possible to understand the production system. 24 vegetable farmers were interviewed out of a total of about 150 farmers among all the food supply chains (banana, sugarcane, livestock, tree crops, etc.). We used the following variables for the typology: the hourly wage, daily employment, full time equivalency, unit time equivalency (Signarbieux, 2022).

BUILDING NEW ALLIANCES

Labor conveys political aspirations. Non-family permanent workers represent more than half of the workforce in farming in Martinique (Annual Census, 2020). Recognizing conflicting issues is a first step towards alliances (Parrot and Keleher, 2019). We briefly described in the previous section a Marxist dialectic, i.e., a contradiction, in the form of labor versus capital. We also made an analogy between vegetable production and the minimum assets to permit the reproduction of labor over time. In this section we briefly present the typology, and we suggest several agricultural sectoral policies, not to erase the underlying conflicting issues, but to promote vegetable farming and farming attractiveness to the youth.

A typology of the vegetable farms

We identified 8 types of vegetable farmers (Table 1).

Table 1. Typology of the 24 vegetable farmers in the Galion watershed. Source: Signarbieux (2021).

First class.	Second classification	Third classification	Prospects
> 50 years old	Food crops	Formal medium farms, family labor	Low income: decline
> 50 years old	Food crops	Formal small to medium farms, paid labor	Low income: decline
> 50 years old	Diversification	Formal medium farms, mechanized	Medium income, livestock: rise
< 50 years old	Vegetable farm, livestock, and off-farm income	Formal small farms, family labor	Medium income: rise
< 50 years old	Vegetable farm and off-farm income	Formal small farms, mechanized	Medium income: rise
All ages	Jardin Creole	Informal farms, self-consumption	Low income: resilient
All ages	Niche market	High value vegetable niche market	High income: rise
All ages	Niche market	High value tree crops niche market	High income: rise

The typology reveals that most farms with intensive family labor will probably decline in the near future because the income does not cover all transactions costs to access the factors of production: paid labor, land, processing units, and public aid. The *"Jardin Creole*", is part of the history of Martinique, the folklore, the cultural heritage, a reservoir of unmatched biodiversity, and a source of food. This pure agroecological farming system is not destined to be marketed, it is therefore highly resilient to external shocks. The younger farmers have better prospects in diversifying their sources of farm and off farm income, invest in livestock, motorized equipment to manage weeding, and invest in processing units to capture more added value. However, these investments come at a "price" as described hereafter.

Promoting high and stabilized farm-gate prices to reduce uncertainty and risks and thereby to promote investments

It has been demonstrated that the higher the price, the higher the chances of a farmer to change its farming practices (Grémillet and Fosse, 2020). The questions are "*an increase by how much*" and "*an increase for how long?*". Farm gate prices need to be sufficiently high to provide an incentive for the farmer to produce, but hey also need to be sufficiently stable over time to determine investments. Farm gate prices stable over time and at a high level 1) determine tangible and intangible investments and thus the adoption of techniques (machinery, robotics, greenhouses, training, certification schemes, etc.). More specifically, farm gate price stability over time reduces uncertainty and financial risk-taking for investment (Ahumada et al., 2012; Vidogbéna et al., 2015). Price stability over time thus favors investment and the adoption of new techniques. Inversely, price instability is detrimental to productive investment. The farm gate price 2) therefore indirectly determines the level of agricultural output through productive investment. In other words, the agricultural yields adapt to the farm gate price.

Investment can consist in certification schemes, which can certify the quality of the production process and the quality of a crop. Organic Farming is such a certification scheme. But it comes at a cost. For example, control costs range from 450 to 1,000 euros, to be compared to the yearly gross margin of 850 euros for weeding with a cultivator. The farmers can sell at a higher price organic crops, but he needs a guaranty for a price premium for quality. The certification agencies do not guaranty a price premium. Another factor comes into consideration to justify attractive farm gate price incentives: the opportunity costs. The more time the farmer spends on paperwork, the less time he can spend on the farm. However, spending time on the field is crucial in agroecology, because observation is a central component for pest management. We estimated that 20% of the total working hours is devoted to observing the farm land in order to make the correct decisions. This shadow time is rarely considered in cost benefit analyses. However, it should be, as observation is the shadow cost for not using synthetic pesticides. Therefore, farm gate price incentive need to consider both direct costs and indirect costs.

Investments in human capital among extension services to cope with knowledge intensive innovations

It seems that the more agroecology is recognized as a complex, the less extension services get enough funding to collaborate with farmers on the field. Agroecological innovations are knowledge intensive. Farmers rarely adopt beneficial innovations in agroecology despite expressing an understanding of the benefits and a desire to do so. It has been argued that the farmers lack sufficient knowledge to implement complex innovations. We believe that in many cases such knowledge is necessary, but is ultimately insufficient for complex innovation adoption. Agro-ecological innovations require specific forms of knowledge which differ from innovations based on agro-chemical inputs. Agro-chemical inputs use codified, and standardized forms of knowledge which facilitate their diffusion among farmers. Agroecological innovations are based on tacit or local knowledge from the farmer, interacting strongly with the local environment which improve the sustainability of the farm but which impedes large scale diffusion. As stated by Morgan and Murdoch (2002) farmers need to become "*knowing agents*" again and rediscover their environmental system

in which they farm. In many cases such local or tacit knowledge may be necessary, but is ultimately insufficient for a knowledge intensive innovation adoption process.

Human capital, in its classical form of knowledge and skills, should be at the center of agroecological diffusion strategies. The gap between the need for knowledge and the lack of extension officers on the field is impressive. Moreover, the privatization of agricultural consulting has led to the creation of new service firms (Labarthe et al., 2013). The emergence of new types of service providers (consulting firms, decision support software providers) have performance logics and back-office configurations that are very different from those that prevailed in public advisory systems or those that exist in upstream and downstream companies which provide advice (cooperatives, traders).

Overcoming the current transaction costs with higher and better targeted subsidies

In Martinique transaction costs act as a barrier to entry for farmers to have access to public support. For example, only 9% of the total farmland benefited from an agroecological measure (MAE). Unlike organic farming, the implementation of MAE does not allow the farmer to benefit from more advantageous prices on the market compared to conventional farming. As a result, the economic performance depends mainly on costs. There is a scissor effects between little or no price incentive, and high time costs (paperwork) which do not cover the low amounts of financial support. Put simply, the potential gross margins generated by public aid, should come from much lower transaction costs (e.g, lower entry costs, less time devoted to paperwork) and higher aid amounts.

CONCLUSION

History matters as it helps to understand the underlying beliefs and cognitions which shape and influence today's behavior. Labor interconnections between sugarcane (large) farms and vegetable (small) farms can be analyzed through the lenses of labor scarcity and labor wages. Cheap labor is bad for small farms as it does not contribute to high income. On the other hand, expensive labor is a handicap for large farms. It would be interesting to analyze the impact of high farm gate prices and therefore, high farm income in the vegetable supply chains on the overall supply of labor among different supply chains. Price incentives, human capital, and public aid, are several of the means to improve the livelihoods of small farms and attract the youth. However, such an attractiveness of vegetable farms may have an impact on the overall supply of labor. This could means that supply chains would not only compete for natural resources, including land, but also for labor.

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