

Underlying causes for farm abandonment among small-scale cane growers in a farmer regrouping project in Mauritius

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Abstract. Sugar cane in Mauritius currently occupies 56,000 ha, an area which has declined at an accelerated rate in the last decade. The Field Operations, Regrouping and Irrigation Project (FORIP), funded by the European Union, was implemented in 2006 to sustain cane production in the small-scale grower sector. By 2015, the Project covered 7,300 hectares. However, some growers who benefitted from the scheme started abandoning the rehabilitated fields. This study aimed at assessing the area abandoned and identifying the main reasons for abandonment. An island-wide survey involving 259 beneficiaries was carried out in different agro-climatic zones. The survey revealed that farm abandonment was more prevalent in the very humid and humid zones and among part-time growers cultivating less than one hectare. The main reasons for abandonment were low yields and high costs of labour and transport, leading to low profitability. The findings should help relevant authorities to take necessary remedial measures.

Keywords: Farm abandonment, sugar cane, FORIP, European Union, agro-climatic zones

Introduction

Agricultural land abandonment may be defined as 'a cessation of agricultural activities on a given surface of land which leads to undesirable changes in biodiversity and ecosystem services' (European Union 2013, p. 22). Abandonment of agricultural land has been a commonly observed trend in many parts of the world and it constitutes a depreciation of environmental capital stock with many negative socio-economic and environmental consequences (Khanal & Watanabe 2012). In Mauritius, in marginal areas where sugar production is less profitable, abandonment of sugar cane land presents a risk of accelerated soil erosion on sloping terrain causing pollution of nearby lagoons, disrupting the beach-lagoon-reef equilibrium and impacting adversely artisanal fishing and tourism sectors (Tonta & Ramasamy 2006). Since 2001, the area under cane cultivation has decreased from 77,321 ha to 63,780ha in 2010 (SIFB 2011). In this study, the cane fields considered as abandoned were those where sugar cane harvesting was no longer being carried out. Previous studies have revealed that land abandonment was mainly due to lack of irrigation, land speculation, rocky fields, lack of time and scarcity of labour (MSIRI 1996).

Following the 2006 reform of the European Union (EU) sugar regime, there has been a gradual drop in the sugar export price to the EU, starting with a 5% drop in 2006 to reach a 36% drop by 2009. Support measures were put in place by the EU to enhance the competitiveness of the sugar sector in sugar protocol countries to adapt to the new market conditions (MIPAMSP 2011-2013). Thus, the Field Operations, Regrouping and Irrigation Project (FORIP) financed by the EU, was initiated by the Mauritius Sugar Authority (MSA) in 2006 with a view to improve cane and sugar production among the small and medium growers cultivating sugar cane up to 25 ha. The aims of the scheme were to increase cane yields through adoption of better or promising cane varieties, better cultural practices, and timely harvest and delivery of cane to the mills and decreased cost of production through economies of scale involving better hiring services for land preparation equipment, transport of inputs and contracting out harvesting operations. Some 12,000 ha of sugar cane lands were targeted to be rehabilitated by 2015.

The scheme, under the responsibility of the Mauritius Cane Industry Authority (MCIA), provided free de-rocking and land preparation facilities as well as inputs for planting the fields of the beneficiaries. All field operations were contracted out as the works were carried out on large blocks ranging between 8 and 65 ha. The fields were handed over to the beneficiaries three to four months after planting. By the end of 2015, some 7,300 ha were rehabilitated. According to the contract agreement, it was understood that the beneficiaries should keep their fields under sugar cane for at least seven annual harvests.

However, it was observed that several beneficiaries had abandoned their fields after the implementation of the project, despite the free facilities provided. Farm abandonment in FORIP is a matter of concern for socio-economic, environmental and political reasons. In view of the massive investment made by the EU and the Government of Mauritius into the project, there was need to identify the areas that were most affected and the reasons for cane land abandonment, so that appropriate remedial measures can be taken.

To assess the extent of cane land abandonment and the reasons thereof, a survey of the growers who had abandoned their fields in the different FORIPs across the island, was carried out. The

objectives of the study were to (i) identify the fields abandoned in FORIP between 2006 and 2015, (ii) assess the extent of the cane land area abandoned, and (iii) identify the main reasons for abandonment. It was expected that the evidence-based study would help decision makers to reverse the trend and at the same time to bring other unutilized abandoned cane lands of the growers under productive use.

Methodology

The survey methodology consisted of:

7. A desktop review of FORIPs established since 2006 on a yearly basis up to 2014
8. Field visits to FORIP sites
9. Face to face interviews with beneficiaries at their residence
10. Interviews by phone for those who were not met at their residence, using a simple questionnaire comprising closed and open-ended questions. Questions asked concerned profile of the grower (name, gender, current occupation, contact details), profile of the field abandoned (location, size, variety grown, cane yield), reasons for abandonment.

Analysis included counts and percentages.

The whole population of 259 growers who had abandoned their fields in the FORIP scheme were targeted, with a response rate of 83%, representing 215 respondents. Certain questions remained unanswered for the following reasons:

- questions were not applicable to their situation
- respondents could not recall figures
- no records were kept by the respondents.

The survey started in February 2016 and ended in June 2016.

Results

Area abandoned

From the desktop study (i.e. from lists of FORIPs available at the Policy Unit (MCIA) and the Farmers Service Agency) and field visits to the FORIPs, it was apparent that after harvest 2015, some 259 beneficiaries had either abandoned their fields or had put them to other uses. Thus, a cumulative area of 259 ha of land under sugar cane had been abandoned, representing a total loss of some 20 000 tonnes of cane over the period 2006 – 2015 (Table 1).

The first abandonment of sugar cane fields in FORIPs was recorded in 2008, only two years after the start of the project. The figure progressed yearly to reach 92 cases in 2015, bringing the total area abandoned in FORIPs to 259 ha at the end of that year. Cane land abandonment was more prevalent in the south, the east and the centre, the west and the north being affected to a lesser extent.

Nevertheless, the extent of abandoned cane land as a percentage of the total area planted revealed that the south was most affected, followed by the centre (Table 1). This situation could be attributed to several factors including the prevailing climatic conditions, land suitability for cane growing, and varietal adaptability.

Table 1. Area abandoned as a percentage of total area planted in FORIPs

Sector	South	East	West	Centre	North	Total
Area abandoned (ha)	87.6	81.1	4.5	64.2	21.6	259
No of Growers	79	76	3	77	24	259
Total area planted (ha)	1648.3	3170.7	285	1258	934.2	7296
Area abandoned as % of total area planted in sector	5.3	2.6	1.6	5.1	2.3	3.5

An important part of the land under cane cultivation in the southern regions is on sloping terrain. The central region is located within the super-humid zone with an average of 3,500 mm of annual rainfall, considered as moderately suitable for cane growing,

The northern and western regions are in the drier sub-humid zone with less than 1,500 mm of annual rainfall where the soil is very suitable for cane growing under irrigated conditions. Most of the eastern region is flat terrain located within the humid zone with an average annual rainfall of 2,400 mm. The varying agro-climatic conditions could be a major cause for the differing rates of abandonment observed.

Cane varieties planted in FORIPs

By end of year 2014, 7,296 hectare+s had been planted, one third of which was under variety R570, followed by varieties M1400/86, R579, and M3035/66 (Table 2). Among the different varieties planted in the FORIPs, the largest area abandoned was under variety M1400/86. The second most abandoned variety was R570. Other significant areas abandoned were under varieties M703/89 and M387/85.

Total area planted by variety vs area abandoned in each sector

An analysis of the area abandoned for each variety as a percentage of the total area planted for that variety shows that the highest percentage of land abandoned was with variety M1394/86 followed by varieties M703/89 and M387/85 (Table 2).

Varieties R570 and R579 had less abandonment although they were planted over larger areas. Variety M1400/86, also planted over a large area, mostly in the super-humid and humid zones, had 4.3% of abandonment. For variety M1394/86, 21.5 % of the area was abandoned in the south, while abandonment of variety M703/89 was observed in the southern and central parts of the island (Table 2). A larger proportion of variety M2593/92 planted in the south was abandoned in comparison with variety M1400/86 in the same sector. Subsequently variety M703/89 was no longer recommended for the high rainfall areas (MSIRI 2011).

Table 2. Area abandoned by variety as % of area planted

Variety	Area planted (ha)	Area abandoned by sector(ha)					Total area abandoned (ha)	Area abandoned as % of area planted with the variety
		South	East	West	Centre	North		
M703/89	258.8	14.9	-	-	17.4	-	32.3	12.5
M1394/86	34.0	7.3	-	-	-	-	7.3	21.5
R573	78.7	-	-	-	0.8	-	0.8	1.0
M1400/86	1,508.7	23.7	2.5	4.5	22.6	11.3	64.6	4.3
M52/78	73.3	0.2	-	-	-	-	0.2	0.3
M2593/92	443.5	15.9	2.3	-	1.1	1.0	20.3	4.6
R570	2,394.0	15.0	22.1	-	-	9.3	46.4	1.9
M387/85	302.9	-	21.4	-	7.3	-	28.7	9.5
R579	1,063.5	10.1	4.5	-	-	-	14.6	1.4
M3035/66	964.0	-	28.3	-	15.0	-	43.3	4.5
M1176/77	151.0	-	-	-	-	-	-	-
Others	23.6	-	-	-	-	-	-	-
Total	7296	87.1	81.1	4.5	64.2	21.6	258.5	3.54

Cane category before abandonment

The term cane category used here defines the number of crops harvested during one crop cycle. It was observed that 70% of the respondents had abandoned their fields after the 4th harvest and almost 11% had abandoned after the first harvest (Table 3), although the normal cane cycle in Mauritius spans over 7 years.

Table 3. Cane category before abandonment

Cane Category	PC	1R	2R	3R	4R	5R	6R	Total
No of respondents	21	35	41	43	28	22	11	201
% of total	10.5	17.4	20.4	21.4	13.9	10.9	5.5	100

PC: Plant Cane R: Ratoon

Cane yield before abandonment

Ninety-one per cent (91%) of those who had abandoned their fields experienced yields below 70 t/ha. It was nevertheless observed that 9% of beneficiaries with fields yielding above 70 t/ha had also abandoned their fields (Table 4). At a sugar price of Mauritian Rupees (MUR) 15,000 per tonne, a yield of 70 t/ha is above the break-even costs for rainfed regions in Mauritius. This would suggest that factors other than low cane yield could also be responsible for cane land abandonment.

Table 4. Cane yield before abandonment

Cane yield (ha)	< 25	>25 ≤ 50	>50 ≤ 70	>70	Total
No of growers	31	93	50	17	191
% of total	16.2	48.7	26.2	8.9	100

Size of abandoned fields

Investigation on the size of the fields showed that land abandonment was most prevalent among beneficiaries who were cultivating plots less than 1 ha. Nevertheless, a few growers with larger farm sizes (>4 ha) had also abandoned their fields (Table 5). Though farm size as well as absence of scale economies would be a driver of land abandonment, there could be other underlying reasons.

Table 5. Field size abandoned by growers

Field size (ha)	≤ 0.422	0.422 ≤ 1	1 ≤ 2	2 ≤ 4	>4	Total
No of growers	64	79	40	19	3	205
% of total	31.2	38.5	19.5	9.3	1.5	100

Place of residence

The place of residence of a grower and the location of the field could impact on the management of the field operations. For the survey, the place of residence was defined as being within or outside the factory area (FA) where the field was situated. Most of the small growers do not reside on their farms. The survey results show that the majority of respondents (72%) living within their factory areas had abandoned their fields. Hence, it cannot be inferred that place of residence was a major factor influencing land abandonment.

Gender status and cane abandonment

The respondents who had abandoned their fields were mainly males. It is generally believed that women are more vulnerable to adverse situations. They usually face problems regarding harvests and transport of their cane. However, the survey results did not confirm this perception (Table 6).

Table 6. Gender status of FORIP beneficiaries (2006-2014)

Gender of growers	Male	Female	Total
No of FORIP beneficiaries	4162 (66.5)	2009 (33.5)	6261
No abandoned	155 (3.7)	60 (2.9)	215

Figures in parenthesis represent % of total FORIP beneficiaries

Reasons for abandonment of fields

The respondents were asked about the reasons for abandoning their fields. The different answers are listed in Table 7. The responses comprised mainly economic and social issues. Technical aspects were mentioned in about 8 % of responses (varieties, wrong planting), while 12 % of the responses were related to resources such as labour shortage and input costs.

Low yields and low revenue were the main reasons for field abandonment. Almost 14% said that cane cultivation was not profitable. High labour cost was considered as an important cause of abandonment. Other lesser important factors contributing to farm abandonment included "wrongly" planted fields (insufficient fertilizers, planting time not conducive to germination) and cane fires. As discussed earlier, the responses confirm that distance from residence to field was not viewed as an important reason for field abandonment.

Table 7. Reasons for abandonment of fields

Reasons	No of responses	% of Total
Low yields	125	16.9
Low revenue	116	15.6
Not profitable	103	13.9
Labour unavailability	69	9.3
High labour costs	68	9.2
High transport cost	51	6.9
Variety not good	49	6.6
Old age	40	5.4
Succession problems	23	3.1
High input cost	21	2.8
Sickness/Death of grower	20	2.7
Not enough time	17	2.3
Crop damaged by monkeys/pigs	12	1.6
Converted to food crops	9	1.2
Planting not well done by contractor	8	1.1
Criminal cane fires	8	1.1
Field far from residence	3	0.4
Total	742	100

Discussion

Agro-ecological aspects

The total area abandoned by the end of 2015 represented around 3.5% of the total area planted and 4% of beneficiaries. Land abandonment was more prevalent in the super humid and humid zones than in the irrigated areas of the North and West. The mountainous regions of St Felix/Bel Ombre in the South West were also affected. In these sloping terrains, land abandonment could have a damaging ecological impact due to erosion and mudslides leading to soil degradation and productivity loss.

An analysis of the varieties planted show that M703/89, M1394/86 and M387/85 were most affected. The procumbent growth habit and limiting harvest periods of these varieties would be drawbacks for the small-scale grower: cane cutters are reluctant to cut canes which are lodged. Moreover, labour unavailability at the appropriate time for harvest lead to late harvests of fields impacting on yields as well as on labour and transport costs. It is worth mentioning that variety M703/89 is no longer being recommended for the high rainfall zone (MSIRI 2011). Variety M2593/92 performed well under irrigated conditions. Prevailing climatic conditions during the time of planting would also influence cane growth and ultimately cane yields. During initial stages of the project, the variety to be planted in a FORIP was based on its performance on the estates and the decision to plant was taken by a Project Implementation Committee (PIC). Initially growers were not represented on this committee. Selecting the right variety in collaboration with growers for the given locality is therefore of utmost importance. Indigenous knowledge should not be ignored. It is also to be reckoned that date of planting influences germination and subsequent growth of the cane (MSIRI 1996).

Socio-economic aspects

The survey has confirmed that the growers are an aging group. Aging as well as part-time growers generally utilize hired labour for the cultivation of their fields; hence, with the increasing costs of labour, their costs of production turn out to be high and uneconomical. With lower sugar prices, the sugar industry is finding itself in a cost-price squeeze situation just as in neighbouring countries like South Africa. According to Thompson (2010), declining profits affect growers' livelihoods and lesser inputs go into the fields, thus, underinvestment leads to lower yields, ultimately mining the crop down to unsustainable levels. Price of sugar which was MUR 18,620 in 2007 dropped to MUR 14,612 for the 2009 crop and ultimately to MUR12,694 in 2014 (MSS 2016) while the cost of production has been ever increasing. The cost of production in Mauritius is one of the highest in the sugar world. Mauritius being a small country with relatively good road network and transport facilities, place of residence of the growers did not seem to have an influence on land abandonment.

More than 91% of the respondents who had abandoned their fields experienced yields below 70 t/ha. Would this mean that with yields below 70 t/ha, it is not cost-effective to grow cane in Mauritius? It is also apparent that the plot size of the growers is too small to provide them with returns for a decent livelihood. Growers' reluctance to operate in groups has hindered achieving economies of scale. Leasing out the land or management contracts with millers have been suggested as a solution in the past (MSIRI 1996) but there has not been any significant adoption. It is opined this might be due to lack of trust of farmers towards millers.

The main reasons for abandonment put forward by the respondents were of socio-economic nature (low returns, high labour and transport costs, aging growers, lack of time). Nonetheless, low cane yields and the variety grown were also perceived as drivers of cane abandonment.

This survey has revealed that fields abandoned in FORIPs were mainly in the super humid and marginal areas resulting in low yields hence lower returns to the grower. Nevertheless, it is to be noted that other growers in the same areas continue to cultivate their fields despite uneconomic farming, probably because of social and cultural reasons. Further investigation of this group of growers would help to know their socio-economic background and their resilience to adversities.

The way forward

With growers' resistance to lease land to or enter management contracts with the corporate sector, alternative solutions may be contemplated. With the changing socio-economic profile of the small-scale-growers (part timers, aging) and increasing cost of production they would be more inclined to adopt novel leasing arrangements. Efficient growers within a given cooperative could be selected to take on lease fields of other members who are unable to manage their fields. Such an approach would allow the contractor-grower to gain from economies of scale, at the same time preventing the lessor to abandon his/her field. Certain contractors who are also growers are presently operating along this line. Such an approach has been successful in government funded irrigation schemes in South Africa, which was based on agreed principles including grower-led and ownership of solutions and voluntary participation. (Thompson. 2010).

Credit Cooperative Societies might take on lease farms of its underperforming growers and operate like the "*Cooperative d'utilisation de materiel agricole*" (CUMA) (Wikipédia 2020) in certain neighbouring countries. In a CUMA, a few progressive farmers within a cooperative invest in mechanical equipment to cultivate their farms and offer services to their fellow members. The Fair-trade certified cooperatives, which are eligible for an extra premium of 60 US dollars per tonne of sugar, could be those groups targeted for such schemes. To kick start them, seed capital could be raised from the premium. However, for this to happen there needs to be a paradigm shift at the level of growers, cooperative management and service providing institutions, who need to assist the groups through the change process.

Close monitoring actions need to be developed for the fields planted in the grouping projects to ensure a continuous and proper management of the fields. A Site Monitoring Committee was set up in 2010. However, the team must be well motivated for this task.

Marginal areas for cane growing should not be included in future FORIPs or similar schemes. Areas not suitable for cane planting should be targeted for alternative uses such as agro-forestry. The MAAS report had recommended inter-alia growing of palm and reforestation of areas unsustainable for farming in the very difficult areas (AGRECO,2007). Government has come up with a macadamia planting project and growers whose lands are not sustainable for cane could opt for this remunerative crop. Appropriate support schemes (financial and technical) need to be devised for these growers. A good marketing strategy is essential for the alternative crops.

To adapt to the changing socio-economic circumstances, training, information and advisory services need to be reinforced. Advisory staff should be trained to be more effective in disseminating improved farming and managerial techniques.

Conclusions

Abandonment of agricultural lands seems to be a global phenomenon and Mauritius is no exception. Nevertheless, from the survey results it can be inferred that the area abandoned in the FORIPs was low compared to the total area planted. The FORIP has been instrumental in maintaining the small-scale cane growers in business up to now.

This study has also confirmed that farm abandonment was mostly due to a combination of socio-economic factors and agro-ecological dynamics in particular areas viz the centre and the sloping terrains in the south. Despite financial incentives provided to growers with conditions attached, farm abandonment could not be prevented. Therefore, investments in projects in low potential areas resulting in low returns should be avoided. Inclusion of beneficiary representatives in the

design and implementation process is of utmost importance in decision making. A bottom-up approach would allow beneficiaries voice out their opinions and thus indigenous knowledge could be tapped. Since Mauritius is committed to produce sugar for its traditional export markets, cane production needs to be sustained. However, the livelihoods of the growers also need attention from relevant authorities.

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