# Adaptation strategies of smallholder rice farmers in the context of trade liberalization

## Bajo Yuna, Dominican Republic

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# Introduction

In the Dominican Republic, farmers who supply the local market are facing an increasing number of ecological and economic challenges that affect their survival. In the context of unfavorable climate conditions, we highlight two additional limiting factors: (1) a decline in state support and (2) changing macroeconomic conditions due to the liberalization of trade and investment in agricultural industries. This study explores the social adaptation strategies developed by small and medium farmers to address these challenges. It takes economic geography as its focal point, investigating whether the region's social and organizational resources, together with those of the government, create opportunities to produce food sustainably and profitably for a range of actors in the country.

# The significance of rice cultivation in the Dominican Republic

Rice cultivation forms a key part of the Dominican Republic's agri-food sector. According to the Ministry of Agriculture, Dominicans consume 123 pounds of rice per year (2016) and the country has been self-sufficient in this crop for nearly a decade. The country is the most important rice producer in Central America and the Caribbean. The Ministry of Agriculture reports that rice is the most widely cultivated crop, grown on plot sizes that average below 5 hectares. The Dominican rice sector benefits from tariff protections and limited state support to access credit as well as a warehouse receipts program to stabilize prices. Some of these protections are being eliminated, however.

With the implementation of the Dominican Republic, Central America and United States free trade agreement (CAFTA-DR), reduced-tariff import quotas are expanding, and, more significantly, gradual tariff elimination began in 2016, with the aim of eliminating duties among the agreement's member countries by 2025 (see Table 1). Despite some key government programs, particularly the National Warehouse Receipts Program, the lack of public investment in research and development as well as low investment and insufficient maintenance of basic infrastructure, such as irrigation canals and roads, also hamper producers.

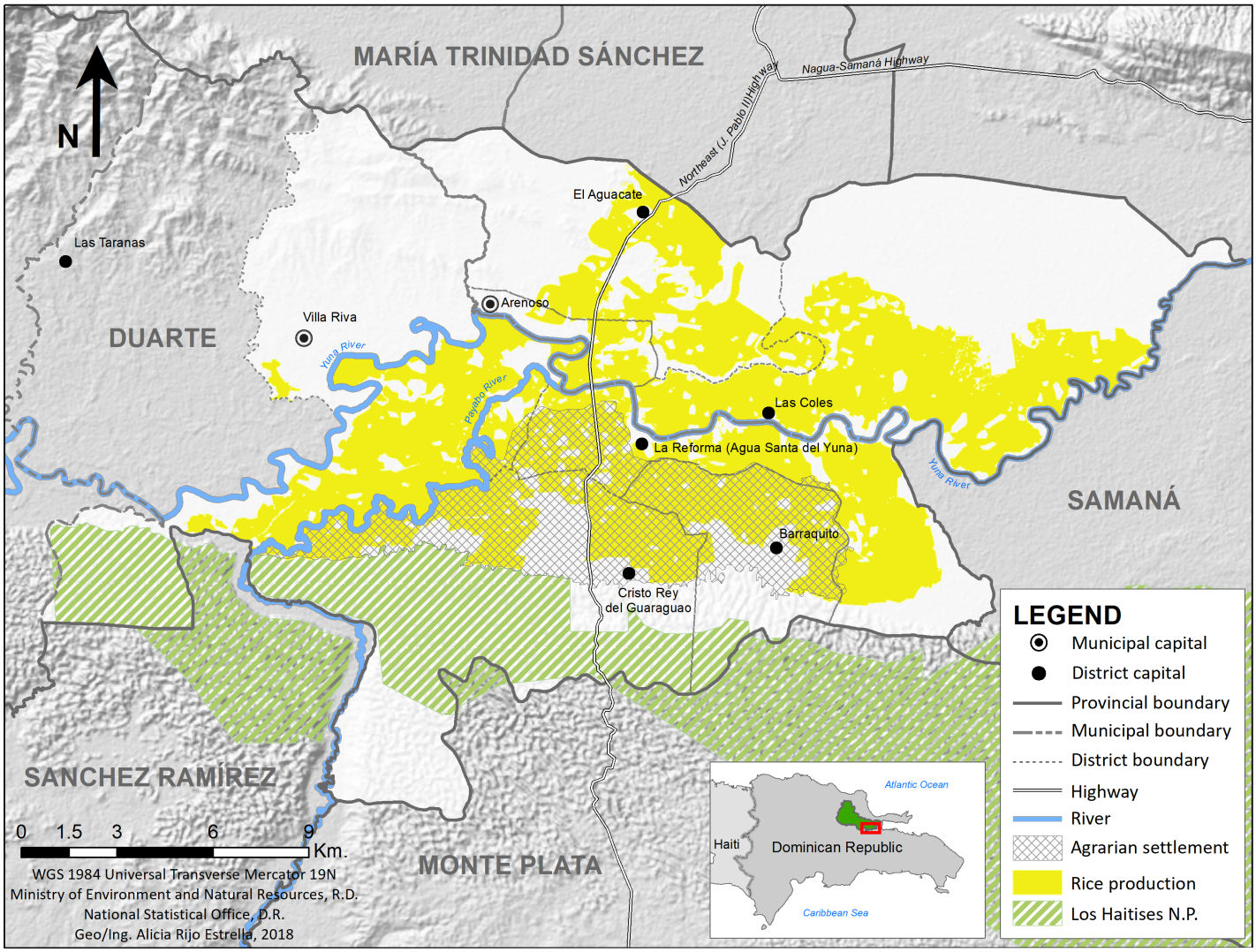
Table 1: Tariff schedule under CAFTA-DR for white rice (Basket V)

| | Tariff/Quota Base | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Tariff out of quota | 99 | 92 | 84 | 76 | 68 | 60 | 48 | 36 | 24 | 12 | 0 |
| Reduced-tariff import quota (M.T.) | 8560 | 14160 | 14720 | 15280 | 15840 | 16400 | 16960 | 17520 | 18080 | 18640 | unlim. |

# Study Area

Rice production forms a key part of the economy in three of the country's farming regions. Among them, the northeastern region concentrates 47 percent of national rice production. The Bajo Yuna area in the northeast has an important number of small and medium-sized rice farmers, organized into several different associations, cooperatives and irrigation boards. Rice production is the core of the area's economy.

Rice farmers in Bajo Yuna, as well as in the country's other regions, work under two different institutional frameworks. The 'land reform' sector is made up of smallholders growing crops on land redistributed by the State in the 1970s and formally supported by the Dominican Agricultural Institute (IAD in Spanish). The private sector is made up of rice farmers cultivating private lands. The study area includes the land reform project Asentamiento Campesino 46 (AC-46) in Limón del Yuna, comprised of 1,391 smallholders. The area studied also includes private sector farmers (see map). Census data on plot size in unavailable, but official data from IAD reports average farm size of AC-46 to be 4.3 hectares. Study participants' farm sizes ranged from 1.56 to 6.25 hectares, plus one producer who farmed 18.75 hectares. Discounting the latter, average plot size of study participants was 3.4 hectares.



# Methodology

This report shares the results of a questionnaire administered between July and October 2016. The authors asked those surveyed for basic information about their homes, farming plot(s), their assessment of the obstacles they face to farm and how they deal with these challenges, manual labor use, sales and marketing and finally their opinions on gender, community and horizontal associations. Community leaders identified farmers from both the land reform and the private sectors who were willing to take part. More participants from the land reform sector were interviewed due to their preponderance in the area compared to the private sector. In addition, smallholders from the land reform sector generally grow rice on smaller plots. Participants were not paid. The questionnaire took between an hour and an hour and a half to complete, depending on how much information was provided by the respondent and how many parcels he or she cultivated. In October 2017, the researchers held two feedback sessions in the hamlets of Arenoso and Guaraguao to share their initial findings and receive feedback from producers, which has been included in this report.

# Summary of Basic Information:

Number of participants (total): 81

Table 2: Summary of Study Participants

| | Land Reform Sector | Private Sector |
|---|---|---|
| Men | 51 | 24 |
| Women | 4 | 2 |
| Total | 55 | 26 |
| Average Age | 56 | 60 |

Feedback session with smallholders in Guaraguao, October 2017.

# Main Obstacles

The questionnaire asks respondents to specify the obstacles that most affected production. Here we highlight the obstacles that were mentioned most frequently by participants.

## 1. Water and a lack of irrigation infrastructure maintenance

Half of those who answered the open question – 32 out of 64 – identified this factor as a major obstacle and offered the following observations.

i. *Lack of canal and river maintenance makes the problems associated with flooding worse:* "INDRHI [the state irrigation agency] does not clean the drains"; "the canal is really neglected by the irrigation agency"; there are "abandoned, dirty canals"; "canals that flood easily". The area lacks machinery to clean the canals and, in particular, the Payabo and Guaraguao rivers frequently burst their banks because of a lack of dredging.

*ii. Lack of additional work on infrastructure:* Although the area is abundant in water, the lack of it and even drought was indicated: "We have water but we don't have water – we don't have any way of storing it … there's no dam". When rainfall diminishes, water levels drop in the canals because the area does not have any reservoirs. This was a specific problem for Limón del Yuna, which constitutes AC-46's irrigation area and its surroundings. Those interviewed signaled serious problems associated with the dilapidated infrastructure: "There are farmers who have been treated badly and even hurt because of [confrontations between farmers in times of] lack of water".

*iii. Flooding (feedback session, October 2017):* Flooding is becoming more frequent and is occurring out of season. "There's talk of seasons here but now there aren't any seasons … you can have bad weather here at any time". Some of the land reform farmers who farm on the right (south) bank of the Yuna River argue that there are differences between the retaining walls on the two sides, with water overflowing more frequently on the southern bank of the river where AC-46 is located. "Everyone with a [private] farm builds a retaining wall and now when the floods come, it is the Limón del Yuna project [AC-46] that is damaged". "Building [retaining] walls on the Yuna [river] causes problems".

## 2. Weeds, pests, and 'vaneamiento'

Almost half of those who responded – 29 out of 64 – indicated that weeds, pests and diseases are a major obstacle to production. Among the pests reported, respondents mentioned rodents, snails, worms, mites and the bugs tibraca (tibraca limbativentris), sogata (Tagosodes orizicolus) and hiede vivo (Oebalus spp.). Among the diseases

mentioned were the picularia fungus and, among the weeds, masetua (or 'quita parcela'), popa and 'pelo de mico'. The insects and pathogens "attack when the rice is growing", significantly lowering yields. Vaneamiento refers to the specific symptom of diseases and pests that prevent the rice kernel from filling with grain and also affect the grain's quality. It has emerged as a serious condition in the area, particularly during the second harvest and also has a negative effect on yields.

## 3. The high costs of agrochemical products and their lack of effectiveness

Ten (10) farmers indicated the cost and quality of agrochemical inputs as a serious obstacle. The problem of their cost in general was mentioned, but this cost is increased by two other factors. First, some pests, weeds and diseases are resistant to agrochemical products -- herbicides, pesticides, fungicides, etc. Therefore, the initial outlay does not solve the problem and the use of greater quantities increases production costs. Second, the participants also indicated a lack of quality control in the supplier market: there is an "uncertainty when purchasing chemical products – they sell them to us in a bottle but we don't know what's in it; there's no quality control in the market"; "the herbicides lack effectiveness", "the herbicides don't work". Farmers emphasized the high price of agrochemicals. As one farmer commented, "some years I work only to pay for the agrochemicals".

## 4. Problems with sales and marketing

Eight (8) of the participants indicated aspects of the sales and marketing chain as a limiting factor. In particular, they focused on the deleterious role of brokers, the low prices offered and the high 'tara', or impurity rate, set by brokers and mills (a determination of the harvest's level of quality). Farmers indicate that they are forced to accept high and unfavorable impurity rates. The determination of quality is poorly regulated and largely informal, therefore favoring brokers at the moment of harvest. The brokers in this chain may also be a source of informal loans at very high rates of interest.

Next, we reviewed a list of 18 factors that could affect farmers negatively and we asked for their subjective evaluation – if they were affected negatively by each factor greatly, a little or not at all. Table 3 shows the factors the farmers indicated as obstacles. Flooding is not included because participants discussed this topic in response to the open question (see above).

Table 3: Evaluation of limiting factors

| Factor | Strong negative effect (%) | Mild negative effect (%) | No negative effect (%) |
|---|---|---|---|
| Cost of seeds | 55 | 30 | 15 |
| Cost of other supplies | 54 | 28 | 19 |
| Dealings with brokers | 43 | 15 | 42 |
| Cost of fertilizers | 38 | 38 | 23 |
| Low yield | 35 | 30 | 35 |
| Imports | 32 | 14 | 54 |
| Low farmgate prices | 27 | 33 | 40 |
| Lack of technical support | 27 | 27 | 46 |
| Labor costs | 25 | 36 | 39 |

Regarding seeds, many farmers, especially land reform smallholders, reduce costs by using non-certified seeds, called semilla bronca, or 'rough seed', or by saving seeds from the previous harvest. The latter practice negatively affects yields. Finally, although fertilizers continued to be a limiting factor, many producers indicated that the price of fertilizers had gone down significantly and one producer indicated that fertilizers are more effective nowadays.

# Main individual strategies

We asked the farmers to explain the strategies they use to overcome obstacles. Here, we focus on the individual strategies used to deal with the four main obstacles.

## 1. Water and a lack of irrigation infrastructure maintenance

i. Sowing a variety of short-cycle seeds. To prevent flooding, some farmers sow varieties adapted to early planting and a short cycle (~ 105 days). Since the first harvest is usually the best, farmers aim to harvest in March to avoid the rain. The most common variety in the region is puitá. After a flood, producers sow again if there is time but, in order to do so, the farmers must depend on high-interest loans, plus higher agrochemical loads.

ii. Accessing machinery to clean canals. First, smallholders ask public institutions – such as the INDRHI and the IAD – for heavy machinery (excavators and diggers) to maintain the canals. To use machinery provided by the IAD, farmers may have to pay the operators' expenses (food, allowances) and fuel costs. Public agencies in the area have very little machinery so, in rare cases, the producers may rent machinery from private companies, a practice that is economically impossible for the majority of farmers in the region.

iii. Cleaning drainage canals by hand or with herbicides. Farmers aim to solve the problem by doing it themselves (using machetes) or by using herbicides, due to a lack of machinery at an affordable price.

iv. Using pumps for irrigation. A significant number of farmers use pumps to water their fields, demonstrating the clear need to modernize the irrigation infrastructure especially for AC-46. Pump irrigation increases production costs because of the high price of fuel.

v. Turning rice fields into pasture. Fields vulnerable to frequent flooding are being converted to pasture for cattle. The cost of insuring these fields for cultivation is high due to the associated flooding risk.

## 2. Weeds, pests, and 'vaneamiento'

i. Applying agrochemical products. Farmers apply agrochemical products to manage weeds, pests and vaneamiento. Generally, any expert advice they receive about agrochemicals is from the commercial distributors themselves, who advise them on what products to apply. Many farmers say that they help each other out: "We've become our own experts".

ii. Agricultural insurance (AGRODOSA). Some farmers indicated that insurance is an obstacle because coverage is minimal. State-subsidized insurance does not always cover losses, although it should cover 80 percent of them. Other farmers see insurance as an important resource for the area and are

generally pleased with its rollout in the country. For losses caused by an unknown infestation, insurance covers damages. Generally, if the farmer takes appropriate action to address known diseases, the insurance pays damages, even if, as some farmers claimed, coverage does not cover the complete cost of damages.

## 3. High cost of agrochemical products and their lack of effectiveness

i. Finding cheaper supplies. This strategy is highly limited because of the lack of quality control in the market.

ii. 'Personal quality control'. Farmers have sometimes carried out a type of 'local' quality control. In one case, a farmer took a tibraca bug that was attacking the crop and put it in a barrel with a liter of pesticide that he was sold to control them in order to measure the product's effectiveness.

iii. Buying from one trusted supplier.** The aim is to build up trust between the farmer and the agrochemical supplier through an ongoing business relationship. This relationship is often combined with the sale of the harvest to a specific agrochemical supplier in exchange for the company providing loans for inputs, which are paid back as part of the sale of the harvest. This practice can be interpreted as a farmer strategy or as an indication of farmer dependency on agrochemical suppliers.

iv. Using manual labor to remove resistant weeds. Sometimes, farmers resort to weeding by hand or hiring crews of workers to hand weed fields because agrochemicals are ineffective. "You pour on expensive liquid and you still have to use manual labor anyway". Hiring workers to weed drives up production costs significantly.

** Agrochemical suppliers play a key role as a source of 'informal' credit in the area, generally at high interest rates.

## 4. Problems with sales and marketing

The problem with brokers gains more or less importance depending on the strength of cooperatives in the region – in this case, FALY (Guaraguao) on behalf of the reformed sector and APABY (Arenoso) on behalf of the private sector. As far as individual strategies are concerned, the participants indicated the following:

i. Finding brokers who pay immediately and who set the tara (or impurity rate) in the field. Some farmers have learnt not to sell to brokers if they do not fix the tara in the field at the moment of sale. They also highlighted the importance of working with brokers who pay straight away.

# Group strategies

The survey asked the farmers if they were affiliated with a cooperative or an association. Out of the 73 who responded to this question, 27 (37%) said they were affiliated. The organizations they mentioned were the FALY (in Limón del Yuna), APABY (in Arenoso), the San Rafael Association, Unidos para Triunfar (in Arenoso), Pedro José, the San Francisco Association, the Alcides Peguero Association, the Mina Vieja Association, Santa Ana, Caña Azul, Percio Medrano, Cacao el Bloque, the JAD (national organization) and La Vega Real, as well as the local irrigation boards. Regarding the associations' and cooperatives' capacity to defend the farmers' interests, the results are the following:

Table 4: Ability of associations/cooperatives to defend farmers' interests

| Farmer evaluation of ability of associations/cooperatives to defend farmers' interests | No. | Percent of total (%) |
|---|---|---|
| Positive | 18 | 28 |
| Positive but with reservations | 16 | 25 |
| Negative, soured by past experience | 19 | 30 |
| Against associations/cooperatives | 6 | 9 |
| No opinion offered | 5 | 8 |

Examples and effects of collective strategies:

### 1. Improved farmers position in marketing chain:

In (October) 2017's second stage harvest, there was a difference of 3 to 5 points in the impurity rate between private and land reform farmers (138 for private farmers and 141-143 for land reform farmers). This difference likely reflects the positive effect of APABY in the Arenoso area, which has a local mill that works as a farmers' cooperative. APABY offers better conditions to farmers in comparison to the treatment that land reform farmers of AC-46 receive from brokers on the other side of the Yuna River in La Reforma, Guaraguao and Los Peynados.

### 2. Petitioning the government to carry out the Payabo River dredging project:

Irrigation associations in Villa Riva and Limón del Yuna have long petitioned the government to dredge the Payabo River in order to decrease flooding.

### 3. 'Pump clubs':

Farmers share ownership and coordinate the use of the irrigation pumps and the maintenance costs with farmers of adjacent fields in order to lower costs.

# Conclusions

The Dominican Republic has one of the strongest agricultural sectors in the Caribbean, a region heavily dependent upon agriculture and food imports. Rice farmers in the Bajo Yuna area make up an important part of the country's agri-food system. Their contribution is not solely due to their production, however. Because rice is generally produced by smallholders, the crop offers a means of livelihood to thousands of households. Nonetheless, these farmers face important obstacles to be able to grow their crop not only profitably, but also sustainably.

It is obvious that the farmers – particularly the small farmers concentrated in the Bajo Yuna region – would benefit from robust cooperatives and associations, which remain weak in the region. The disadvantages of local marketing of their crop and purchasing supplies could be reduced through the reconstruction of cooperatives. Without a strong cooperative basis, it will become more and more difficult to grow rice under the prevailing conditions, particularly as imports begin to enter the market at reduced tariffs from CAFTA-DR partner countries, especially the United States. It must also be noted that, while this study was being done, the government issued permanent titles to land reform recipients in the AC-46 area. Follow-up research is needed to determine the impact of the titling process, particularly if this process exacerbates the process of land (re)concentration, which is already plainly evident among private producers.

Finally, agronomists have noted the use of agrochemicals in higher concentrations since the 1990s, and the problem is clearly getting worse. In addition, agrochemical resistance is increasingly being addressed by hiring Haitian and Dominican workers to weed fields manually. Therefore, it is essential to understand better the effects of the intensive use of agrochemical substances on farmers' and workers' health, all of whom live in the area.

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