Covid-19 management by farmers and policymakers in Burkina Faso, Colombia and France: lessons for climate action

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1. Introduction

All over the world, the lockdown approach, which was used as the primary strategy to mitigate the Covid-19 crisis, affected various productive sectors and resulted in increased poverty (UNO Info, 2020). The agricultural sector was recognized as a priority sector and was less affected by Covid-19 related travel restrictions for food security reasons. However, early policy responses, which varied in type and number, also affected agricultural products' supply and demand (Gruère and Brooks, 2020). Anecdotal evidence suggests that the Covid-19 crisis had short-term positive impacts on natural ecosystem regeneration and greenhouse gas emissions (GHG) reduction because the lockdowns slowed down exchanges and economies. Indeed, the annual estimate in GHG reductions for 2020 suggests a decrease of between 4 to 7% (Le Quéré et al., 2020). Other estimates suggest that, given the slowdown of the economy and the correlation between GHG and Net Domestic Product, GHG emissions may even decrease by 10% in 2020 (Carbon Brief, 2020).

While policy aimed at guiding climate action is currently generally ineffective in stimulating the needed changes (Howlett, 2014), the Covid-19 crisis fostered quicker and massive policy decisions and actions. The complicated relationship between ingrained individual actions and climatic impacts that are cumulative and neither immediate nor equally distributed across the world could explain the slow and ineffective climate action (Galbraith and Otto, 2020).

However, given that climate change is a severe challenge facing our societies and agricultural systems (IPCC, 2018), analyzing the impacts that Covid-19 had on agricultural systems and the decision taken by policymakers to handle its direct and indirect effects can help society draw lessons on how to improve climate action. It also appears of utmost importance to consider whether the enacted recovery measures and plans are coherent with climate action (Hammer and Hallegatte, 2020).

In this paper, we describe the decisions taken by farmers and policymakers in Burkina Faso, Colombia, and France, to mitigate the adverse effects of Covid-19 on the agricultural sector. Inspired by the literature on climate-proofing that aims to assess the coherence of investments in climate change mitigation and adaptation actions, we explored the impacts of the Covid-19 response on GHG emissions from the agricultural sector.

2. Materials and methods

2.1.Surveys

In Burkina Faso, Colombia, and France (Figure 1) surveys were carried out with actors from the agricultural sector, during the first lockdowns conducted in the three countries (Table 1). We enquired about the negative and positive impacts of the health crisis on their activities and strategies adopted to manage initial impacts. The collected primary data were triangulated with information collected in regional or national media, and reports from the respective countries States, different united nations agencies, non-governmental organizations, and professional organizations in agriculture.

In Burkina-Faso, surveys were conducted during April and May in the sub-humid region (n=81). Three types of value chains were investigated: market gardening, livestock, and rainfed crops (cereal and cotton). We interviewed 21 technical advisers from government ministries and the Cotton Company, 27 farmers, 12 leaders of farmer groups and 21 traders (Table 2).

In Colombia, 25 surveys were conducted in August. Of these surveys, 20 were conducted with coffee farmers located in the Cauca region of Colombia. We also surveyed five peri-urban farmers producing organic vegetables and located near the third-largest city in the country, Cali.

In France, analysis of media data was complemented by surveys conducted in the southern part (NUTS-3 Herault, belonging to NUTS-2; Occitanie), with four vine-growers and four cooperatives in May and June. Vine cultivation for wine production is the most extensive land-use in Herault, with 46.5 % of the arable land (Chambres D'Agriculture Occitanie, 2017). Nationally, vine cultivation uses 3% of the arable land and is responsible for 15% of agricultural production value (CNIV, 2020).

2.2. Assessment of Covid-19 management decision on GHG emissions

During crises, adaptation or recovery measures or plans at local or national scales may not necessarily address longer-term or structural problems. The concept of *building back better* stemming from the natural hazard management literature aims to link the post-disaster reconstruction with longer-term disaster mitigation and vulnerability reduction (Kennedy et al., 2008). Checking the emergency plans' coherence is needed to avoid unintended consequences such as harmful subsidies leading to inequitable actions. Thus, we assessed the GHG emissions impacts of farmers and policymakers' decisions and actions in response to the covid-19 crisis.

We used the Cool Farm Tool (version 2.0 Beta 3) to estimate changes in GHG emissions associated with the Covid-19 response. The Cool Farm Tool is a greenhouse gas calculator that has the advantage of considering the farm sources and sinks of GHG emissions, including post-harvest processes and transportation (Hillier 2012). Moreover, the Cool Farm Tool represents an accessible approach to estimate GHG impacts from agriculture (Richards et al. 2016). Specifically, using the Cool Farm Tool, we estimated GHG emissions related to changes that occurred along the value chains of three main cash crops: cotton in Burkina Faso, coffee in Colombia and grapes in France (section 3 and Table 3).

3. Results and Discussion

3.1 Short and medium-term effects of Covid-19 on the agricultural sector at the farm level

3.1.1. Covid-19 effects on case study farms in Burkina Faso

In Burkina Faso, the lockdown was applied in urban areas affected by Covid-19, in March 2020. Consequently, surveyed crop farmers and pastoral farmers in rural areas were not affected in their productive activities. However, they mentioned that products' marketing was

affected as the demand from traders decreased between 20 March and 4 May. The surveyed traders indicated that local markets were able to recover following the adoption of social distancing measures. In contrast, the technical advisers and the representatives of farmer organizations mentioned that export markets for food and cotton in neighbouring countries, Europe and Asia were all disrupted for extended periods (CILLS, 2020; Edmonds et al., 2020; Dugué et al., 2021). For example, the market gardening industry was negatively affected by transport difficulties to Côte d'Ivoire and Ghana; two countries that import large quantities of potato, onion, tomato, pepper, and chilli from Burkina Faso. Market gardeners in the two surveyed areas, consequently, had to deal with a significant drop in the selling price of perishable vegetables such as tomatoes, cabbage, chilli peppers and peppers, which correspondingly decreased by 60%, 70%, 62%, and 80% compared to average prices from January to February, before the start of the pandemic. Farmers that employ temporary labour mentioned that due to high labour costs, harvesting costs were higher than the expected returns and they thus preferred to abandon the plots before harvests. To our knowledge, there was no innovation or approach adopted at the farmer or trader levels to overcome the high labour cost challenge.

3.1.2. Covid-19 effects on case study farms in Colombia

In Colombia, the initial on-farm effects of Covid-19 resulted in the reorganization of labour. The surveyed organic vegetable producers near Cali increased their production to respond to a higher demand for quality and healthy products on the market and their own families as children were continuously at home. They consequently had to reorganize their farm activities and labour to meet the increased demand and workload. In these communities, women and youth generally assume large proportions of home chores (OEA, 2020). Increased labour demands generally negatively affected women and youth, as they took on new farm duties. More drudgery was added to the work as they also had to comply with stricter sanitary measures in the processing and delivery of food products to consumers.

Surveyed coffee farmers also reported a reorganization of farm activities. This reorganization was linked to decreased contacts with the city (for off-farm activities or leisure) and more time available to farm activities. However, workers' mobility during the first trimester affected coffee harvesting (Forbes, 2020). Consequently, despite the selling price of the coffee being exceptionally high, a 7% decrease in coffee production was reported (AsoExport, 2020).

3.1.3. Covid-19 effects on case study farms in France

In France, the initial impacts on vine growers appeared before the lockdown as there were turbulences on international wine markets. Surveyed wine merchant indicated that wine exports to Asia declined in February linked to a substantial decrease in Chinese and Japanese demand. During the lockdown, contrasting effects were observed across the agricultural sectors. In the short-term, there were no visible impacts of the pandemic on labour demand, cereal stocks or marketing, except for cereals grown for fuel (Omnes, 2020). In contrast, produce sales in two specific agricultural sub-sectors decreased, i.e., vegetable production in the short-term (Lang, 2020) and vineyards in the medium-term. The two main issues with vegetable production included: (1) difficulty finding farm labour; (2) difficulty selling due to logistical perturbations.

Regarding labour, the government platform, set-up to connect farmers and people who became temporarily unemployed due to the crisis was mostly unused (Zapalski, 2020). Some farmers were consequently unable to harvest their crops due to labour shortages. The difficulties in selling products resulted in increased demand for direct selling platforms, although without (for now) systemic changes in cropping practices.

For the vineyard sector, the significant impact was a decrease in sales, which strongly depend on the type of wine and the distribution channel, i.e., their labels and thus on the type of buyers (pers. comm, head of a wine cooperative). For instance, fine wine like Champaign's and premium wines were most affected because their marketplaces were closed (i.e., restaurants, bars, hotels, conferences, celebrations), resulting in an 80% decrease in sales in March and April (Vitisphere, 2020) and a yearly decrease of 20-30% (larvf.com, 2020). Independent wine producers selling directly to clients or restaurants and hotels were negatively affected as the tourism sector ground to a halt during the lockdown and was slow to recover in the aftermath. Conversely, labels sold to mass retail outlets were less affected. There have been limited partial deferral from bars, hotels and restaurants markets to mass retail and wine shops with an advantage for Bag-In-Box. Exports were reduced by 12% in the first trimester of 2020 (Béteille, 2020). The decrease in sales led to bad financial performances for vine-growers and wine companies. In the medium-term, wine demand will also be strongly affected by the economic slowdown and the decrease in consumer incomes (Cardebat et al., 2020). The drastic reductions in demand led to increased wine stocks in all

wine regions (+6/7% stocks for the 2019/2020 campaign compared to 2018/2019). The increased wine stocks caused a problem at the cellar level as storage space was limited. Due to saturation in wine markets and a decrease in wine prices, some farmers responded by developing innovative distribution channels (platforms or private delivery).

To manage wine stocks, contrasting strategies were adopted by grape growers and wine sellers (Girard, 2020): while buyers aim to reduce their stocks, growers support high yield levels to maintain their production level and ensure economic sustainability (holding prices constant).

Although the crisis did not impact agronomic and winemaking practices *per se*, it led to either a voluntary decrease in grape yields or label changes. Merchants aimed at reducing wine stocks and thus promoted a reduction in wine production to stabilize the market and avoid price collapses. On the other hand, vine-growers and wine processors aimed at maximizing wine production at a given price. Merchants and growers of the various Bordeaux protected denominations of origin (PDO) aimed at reducing the 2020 wine production by 10% while actors of Cognac PDO decreased production objectives in 2020 by about 9.5%[1]. The head of a wine cooperative explained that at an individual level, the possibility of rapidly changing wine markets from PDO to geographical identification (GI) or non-GI enables increased wine yields (PDO wines yields are limited, e.g., around 40 hl/ha in Languedoc while wines protected by a geographical identification can produce up to 90 hl/ha, yet the latter have lower sale prices).

3.2 Short and medium-term effects of Covid-19 on the agricultural sector at the policy level

3.2.1. Policy responses in the Burkinabe case study

The agricultural sector did not receive much support from the government compared to the industrial and touristic sectors or formal enterprises located in urban areas (Kobiane et al., 2020). The general lack of initial support was because farm households were assumed to feed themselves using their farm products. Moreover, as family farms mostly operate without permanent employees and do not pay taxes or social contributions, they were not a national response priority. However, in May 2020, the government provided a 30 billion CFA francs fund to purchase agricultural and livestock inputs to support farmers during the 2020/21

[1] Source : De la vigne au vin - Le champagne a besoin d'aides - Covid-19, Politique, Viticulture, Économie et gestion (agri-mutuel.com)

agricultural season (Chambre Nationale d'Agriculture, 2020; FAO, 2020). Nevertheless, as late as November 2020, it was not clear whether the resources had been disbursed.

The food trade sector was supported from the beginning of the health crisis by the creation of a 5 billion CFA francs social fund for retail fruit and vegetable traders in the city and surveyed actors mentioned that travel passes were issued to transporters of fruits and vegetables and livestock exporters to Côte d'Ivoire, Ghana and Togo. Also, they mentioned that local authorities had organized sites selling fresh products along roads and outside closed markets so that retail traders could sell their products to city dwellers in compliance with social distancing measures.

The cotton sector has been negatively affected by a decline in prices on the international market. Prices dropped from 60-72 cents/lb between October 2019 and March 2020 to 48–54 cents/lb in April (-23%) then 54-58 cents/lb in May and June (LesEchosInvestir, 2020). This decrease was linked to the near-shutdown of textile factories in Asia from January until June. The shortfall for the country's leading cotton company, Sofitex, was estimated at 7 billion CFA francs (Trésor Direction Générale, 2020). Since then, the price of cotton has ranged between 60 and 65 cents/lb.

In response to this anticipated decline, the government introduced 15.4 billion CFA francs subsidies aimed at facilitating the purchase of cotton inputs (mineral fertilizers, insecticides, herbicides) and a special subsidy of about 12 billion CFA francs to support the purchase price of cotton offered to producers at the end of the 2020/21 season (Commodafrica, 2020).

3.2.2. Policy responses in the Colombian case study

In Colombia, the government was quick to support the agricultural sector. In particular, during the lockdown that started in late March, farmers and workers in the agro-industry were given passes to facilitate their movement and continuation of production and trading activities. In late March, the government launched a 1.5 billion-Peso credit scheme, "Colombia Agro Produce," to mainly support farmers' input purchase (Finagro, 2020). A preferential interest rate was offered to smallholder farmers (3.5%) compared to medium- and large-scale producers (4.5%) through this scheme. The resources availed by the government were initially intended for all farmers, irrespective of the size of their farm. However, the Ministry of Agriculture's statistics showed that, in the initial stages of the crisis, the aid

money was used by agribusiness and medium-sized farmers and not by smallholders (Finagro, 2020). Thought it is important to note that smallholders already benefit little from credit even during normal circumstances. By May, a mere 20% of the available "Colombia Agro Produce" funding had been requested. Surveyed farmers reported that they had not received support from technical staff or information from banks on how to access government support. The comptroller general (a Colombian independent government institution that acts as the highest form of fiscal control in the country) raised awareness on this, leading to the subsequent exclusion of large-scale farmers from the scheme (Forbes, 2020). The government also abolished customs duty on maize, sorghum, and soybean seeds to decrease farmers' cost and compensate for the increase in prices of imported agricultural inputs (Gruère and Brooks, 2020).

The two main policy actions, namely the decrease in customs duty and Colombia Agro Produce scheme, highlight that the likely beneficiaries would have been large-scale farmers as they are the primary users of external inputs.

3.2.3. Policy responses in the French case study

The public policy response to face the health crisis included two types of instruments. The first one included various direct financial support to farms and companies. This support was open to all sectors and included: contributions deferral or waivers[2], state-guaranteed loans and 100% financial coverage of the partial activity allowance[3] (less used because production was not affected). The second type were economic instruments aimed at alleviating the market from large stocks of products such as wines. These economic instruments included a subsidy for the wine sector to distillate wine into pure alcohol and a subsidy to incentivize private storage to remove wine from the market and reduce storage cost for winemakers between €7 and 9/hl for six or eight-month storage periods (FranceAgriMer, 2020). In our study site, subsidies enacted to promote wine selling. The national and regional governments created a support fund for small businesses, potentially allowing farmers to receive €1,500 from the state and €5,000 from the region[4]. However, conditions set to qualify for receiving these

[2] Waivers are conditioned upon a loss of revenue of more than 80% ; https://www.economie.gouv.fr/covid19-soutien-entreprises/mesures-soutien-secteurs-restauration-tourisme-culture-sport [accessed 5 August 2020]

[3] This aimed to limit the long-term cost for state and companies of reducing their labour force and rehiring people after the crisis.

[4] The aid of 1,500 euros is intended for companies that suffered a loss of more than 50% of turnover between March 2019 and March 2020. The aid of 2000-5000€ is intended for companies with at least one employee, or a declared spouse-collaborator. It is only for companies encountering great difficulties, their available assets not allowing them to settle their debts within 30 days or their fixed charges. They are eligible only if they have

subsidies were not met by all farmers, leading to potential inequalities amongst them. However, these conditions do not exclude any agricultural practices, and there is no mention of the need to decrease mineral fertilizers or pesticide use, as was the case before Covid-19, under the "Ecophyto" national plan that aimed to reduce pesticide use.

3.3 Effects of Covid-19 adaptation measures on GHG emissions

3.3.1 GHG emissions in the Burkinabe case study

The measures taken by the state to facilitate the acquisition of imported inputs (mineral fertilizer, soybeans for livestock) made it possible to maintain their use in 2020. According to surveyed farmers, there was no significant change in the amounts of inputs used at the farm level. Likewise, no significant change in agricultural practices was mentioned. Most smallholder agricultural fields in Burkina Faso are characterized by low fertile soils that depend on short-term nutrient supply through mineral and organic fertilizers to support crop production (Diarisso et al., 2016). The "organic" farms remain largely secretive and uncertified. In the short-term, actors in the agricultural sector have tried to continue producing as before, but this health crisis has raised awareness among the citizenry and decision-makers on the need to limit the country's dependence on imported agricultural inputs and products (i.e., rice, milk and oil) (Kobiane and al., 2020).

A fundamental observed change was a reduction in the area under cotton production by 22 000 hectares, during the 2020/2021 crop season, compared to 2019/2020 crop season (PR-PICA, 2020). This difference was caused by a drop in the cotton's purchase prices following the pandemic. This reduction in cotton area corresponded to a significant drop in fertilizer use and a decrease in cotton exports (Table 3). Consequently, we estimated the reduction in fertilizer use and cotton exports to have resulted in an absolute GHG emission reduction of 29,194 tonnes of CO_2 eq. Moreover, where the land that was previously under cotton, was put under crops that do not receive (i.e., legumes) or receive (sorghum and maize) lower amount of fertilizer compared to cotton, land-based GHG emissions would have been low. Additionally, reduced intra-country and international trade of other agricultural products (i.e.,

been refused a 'reasonable' cash loan by their bank. Source: https://chambres-agriculture.fr/exploitation-agricole/gerer-son-entreprise-agricole/coronavirus/ [accessed 10 September 2020]

fruits, vegetables and livestock) probably resulted in short-term decreases in transport-related GHG emissions.

3.4 GHG emissions in the Colombian case study

The measures taken to decrease the custom duty for agricultural inputs helped maintain input use at pre-Covid levels. For on-farm productive activities, no significant changes were mentioned by farmers or found in the available statistics. Nevertheless, we estimated that the general decrease in coffee exports (Table 3), linked to a reduction in international trade, corresponds to a decrease in transport-related GHG emissions of 4,862 tonnes of CO_2 eq.
While we did not observe a change in fertilizer use, the observed increase in the demand for organic products may, in the medium to long-term, translate to a decrease in soil-based GHG emissions than those associated with mineral fertilizer-based crop production systems (Chirinda et al., 2010).

3.5 CO_2 emissions in the French case study

For on-farm activities, neither the short-term actions mentioned by farmers nor the economic measures led to radical changes in agricultural production systems. The decrease in wine exports (Table 3) led to a decrease in transport emissions of 14 t of CO_2 eq. The mentioned changes in wine labelling strategies may have led to higher production levels in 2020, and more GHG for their harvest, transportation and transformation (information from personal communication with the head of a wine cooperative). No quantification of GHG emissions associated with the wine labelling changes was done with the available limited data

4 Conclusions

Our observations and results suggest that the measures implemented following the Covid-19 crisis at the farm or policy level did not lead to a drastic change in current agricultural or farming systems. At both farm and policy level, actors of the various agricultural value chains attempted to maintain existing practices. Our initial observations showed short-term changes in the supply and demand of agricultural products. Despite the lack of proactive measures to link climate change and Covid-19 crisis (no environmental conditionality to access to the various subsidies), we estimated a net decrease of CO_2 emissions linked to a decrease in crop exports in the three countries.

While detailed assessments of the evolution of practices, labels, exports, and product-specific demands (organic, local, fresh), will be published in the 2021 statistics, from this initial evaluation, it appears the Covid-19 crisis could have been a missed opportunity to make fundamental and long-term changes and accelerate the transition to more sustainable and resilient agricultural systems. The absence of environmental conditionality raises questions on the capacity to address long-term issues such as climate change. Nevertheless, the Covid-19 crisis has increased awareness of increased interdependence and global linkages. Action demands from informed citizens that may lead decision-makers to include long-term environmental thinking in future policy responses.

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Figure caption

Figure 1: Localization of the study sites

Table captions

Table 1: Main characteristics of the study sites

Table 2: Sources of the collected data

Table 3: Input data used for the simulated scenarios

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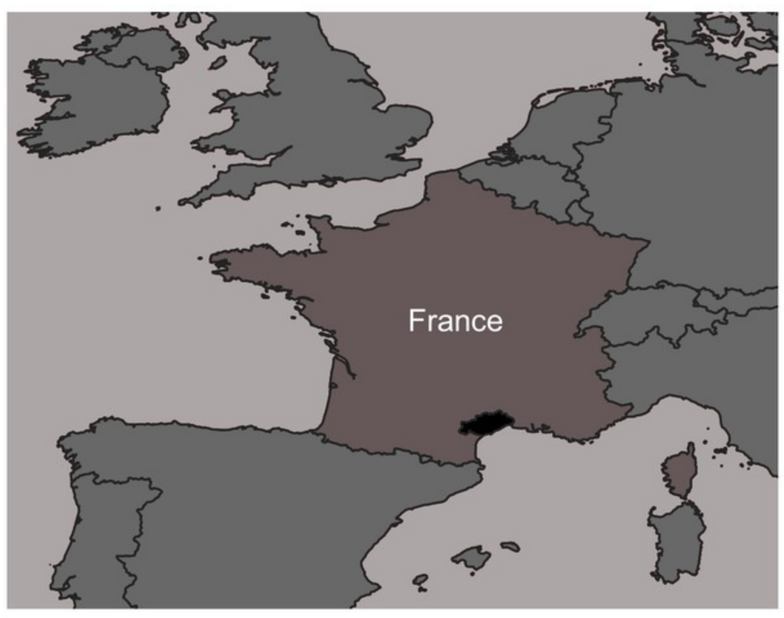
France
Burkina Faso
Colombia


Colombia


France


Burkina Faso

Table 1

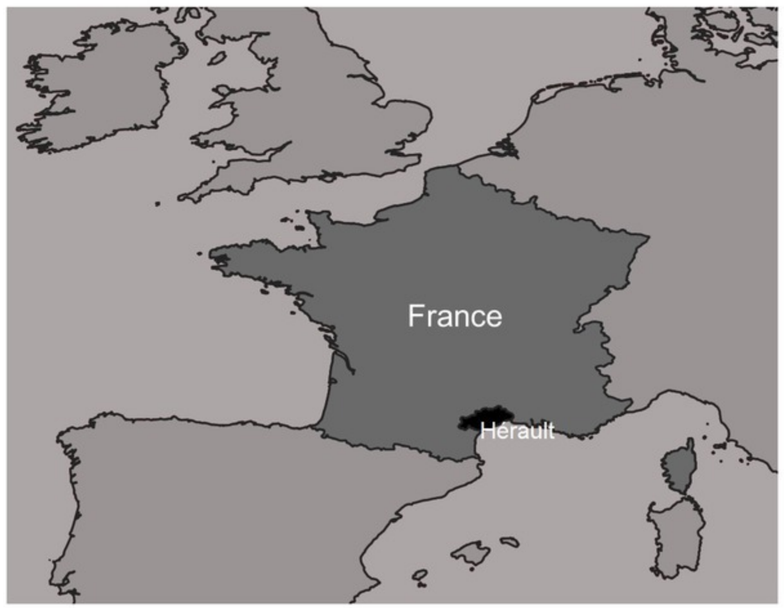
	Burkina Faso	**Colombia**	**France**
Province	Hauts Bassins Region	Cauca	Herault NUTS-3
Main cash crops	Cotton	Coffee	Vine
First lockdown period	21 March to 4 May	21 March to 31 August	17 March to 11 May

Table 2

		Burkina Faso	Colombia	France
Farmers	Surveys Main /other value chains	15/24	20/5	4/0
	Questions asked	1. Did the covid-19 pandemic impact your farming activities? 2. If, yes what were these impacts?		
	Other sources	1 peer-reviewed article 2 public institutions reports	1 press release 2 NGO release	5 press releases 2 NGO release
Actors from the value chains	Number of surveyed Main /other value chains	7/35	0	4/0
	Questions asked	1. Did the covid-19 pandemic impact your agriculture-related activities? 2. If, yes what were these impacts?	0	What was the impact of covid-19 on selling? (level, type, price, timing)
	Other sources	2 Press releases 3 Public institution releases	1 press release 2 government release 1 peer-reviewed article	1 press release 2 government releases

Table 3

	Burkina Faso	**Colombia**	**France**
Scenario	Decrease of the cotton areas of 22 000 ha with resulted in a 9,240 t reduction of cotton fibre production compared to the same period in 2019	Decrease of 55 500 t of coffee exported from January to November 2020 compared to the same period in 2019	Decrease of 2133 HL of wine exported from February to November 2020 compared to the same period in 2019
Average quantity fertilizer rate for the main cash crop	150 kg/ha NPK (14-18-16) 50 kg/ha urea 46%	-	-
Yield for the main cash crop	420 kg/ha	-	-
Estimated distance to the main ports of importation	1,000 km from Burkina to Tema port in Ghana and then 22,698 km from this port to the port of Shanghai, China	256 km from Cauca to Buenaventura port 4,332 km from Buenaventura port to New-York (leading coffee export destination)	170 km from Herault to Marseille port 3,500 km, corresponding to France's average distance to three main ports in Europe, the US, and China.



[There were no major changes in agricultural practices
Policy measures aimed at mainaining input use
Decrease in Coffee exports led to a decrease of 4,862 t CO2 eq emissions emissions]

[There were no major changes in agricultural practice but changes in market strategies for vine growers
Policy measures aimed at alleviating the markets from large stocks
Decrease in wine exports led to a decrease of 14 t CO2 eq emissions emissions]

[There were no major changes in agricultural practices
Policy measures aimed at mainaining input use
Decrease in Coton areas of 22 00 ha led to a decrease in the use of fertilizers and of exports and to a decrease of 29,194 t CO2 eq emissions]