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Smallholder farmer aptitudes and perceptions about the impact of COVID-19 pandemic on agriculture in Morocco during the lockdown

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The worldwide health crisis due to the COVID-19 virus since its outbreak in China has caused a complete lockdown of all government services in Morocco, including schooling, travel, borders, and other services, and highlighted the importance of agriculture in the food safety of the country. A survey was created to better understand smallholder farmers' perceptions of the expected effects of COVID-19 on their farming practices and social well-being. Potential vulnerabilities and resilience in the targeted farming systems were given special consideration. This survey was conducted with smallholder farmers (n=211 respondents) in three agricultural regions of the country (between June 5 and June 20, 2020). Perceptions of the potential influence on farming systems, agricultural productivity, communities, economics, markets, labor, gendered division of labor, food security, and community wellbeing were among the variables studied. The COVID-19 impact on agriculture was obvious and felt by smallholder farmers, in addition to an unusual drought and hailstorm. The survey conducted highlighted a substantial impact of the pandemic on the social life of farmers, daily farming activities, basic agricultural production system activities, and operations as well as farm incomes. The pandemic has also revealed the precarious and vulnerable situation of smallholder farmers who lack health care and retirement benefits worthy of their contribution to the economy. The study also summarized all measures taken by authorities to slow down the impact of the pandemic on vulnerable persons including farmers and others categories. For resilient sustainable agriculture, the crisis highlights the need to continue supporting smallholder farmers by improving their living conditions and by considering their needs in the new agriculture plan 'Green Generation' from 2020 to 2030.

Keywords: COVID-19, Agricultural system, Morocco

INTRODUCTION

The SARS-CoV-2 virus disease, known as COVID-19 has proven to be both highly infectious and

highly virulent making this pandemic much more disruptive than those of the past (Shereen et al., 2020). Further, a growing body of studies indicates that COVID-19 has altered food systems (Savary et al., 2020; El Bilali et al., 2021b) with consequences on food security (Devereux et al., 2020; El Bilali et al., 2021a). Indeed, several measures were adopted to eradicate the virus spread (e.g., travel restrictions, lockdowns, market closing) that have negatively affected multiple economic sectors and disrupted international value chains and international trades (Bonaccorsi et al., 2020; Nicola et al., 2020). Consequently, the pandemic significantly declined food production alongside disturbed food chain stages (Devereux et al., 2020; Laborde et al., 2020; Pu and Zhong, 2020; Rahimi et al., 2021).

The COVID-19 epidemic created socio-economic shocks that impacted the global functioning of agricultural and food systems, as well as the food security situation of millions of people worldwide (Shereen et al., 2020; Stephens et al., 2020). Agriculture is one of the crucial sectors of human development and is strongly affiliated with food security (Lopez-Ridaura et al., 2019; Abdelhedi and Zouari, 2020). Agriculture is a very important economic sector in Morocco (Amiri et al., 2021). The agriculture sector (including livestock) accounts for approximately 15% of Morocco's GDP, 23% of its exports, and nearly 30% of its total employment. The industry is worth around MAD 30 billion (US$ 3 billion). Nearly 143,000 people work in agribusiness, which is made up of 2,050 industrial units (small and medium-sized companies). Agribusiness output is largely geared for the home market, with only 12% of overall industrial exports going to other countries. While the country's economic growth has overall become more resilient, agriculture remains climate-dependent and thus remains highly vulnerable. Primary crops in Morocco are cereals, which are planted in nearly 43% of all agricultural areas. Key agricultural exports comprise citrus fruit (especially oranges), vegetables (e.g., pepper, tomato, green bean), almonds, table olives and olive oil, dairy products, and, more recently, blueberries, cherries, and asparagus. Early season vegetables and specialty crops such as Argan have the highest value for export. High-quality agricultural products are frequently set to be exported to Europe. It generates about 19% of national gross domestic product (GDP), with significant seasonal variations (11 to 19%). This sector is the largest employer in the country and accounts for about 40% of the nation's workforce (MAPM, 2014). Except for cereals, sugar, coffee, and tea, Morocco produces enough food for local consumption. More than 40% of the cereals and flour consumed in Morocco is imported. Moroccan agriculture is also characterized by the duality of its operating structures; more than 70% of farmers have less than 5 ha and covering only a third of the agricultural surface area, while a limited numbers of farmers who farm extensive areas occupying a significant part of the cultivated area. However, the medium-sized farm category (5 to 20 ha) does exist as well.

Unfortunately, drought renders arable land unproductive; especially the cereal-growing plains area, which is subject to considerable variation in annual precipitation. Drought occurs in Morocco once every three years, causing fluctuation in agricultural production. Consequently, the expansion of crop cultivation areas is hampered. Drought is the main concern for farmers in Morocco.

Before COVID-19, the growing season 2019-2020 recorded lower precipitation compared to a normal growing season with a discontinuity pattern, and cereal zones in non-irrigated areas (Bour) were abandoned for grazing. Therefore, this campaign was declared a drought year by the Ministry of Agriculture (Anonymous, 2020; FAO, 2020a). Although the country managed to meet domestic needs by relying on stocks, the small farmers felt the damage, and their limited development was worsened by the COVID-19 outbreak.

METHODOLOGY

The survey was conducted principally in three regions, Fes-Meknès (Sidi Slimane Moule Kifane, Hadj Kaddour, Ain Jemaa, M'haya, Nzalat Beni Amar, Ain Karma Oued Rommane, Taouanate), Rabat-Salé-Kénitra (Kenitra, Sidi-Kacem) and Beni Mellal-Khenifra (Dar Ouled Zidouh) as shown in Figure 1. These regions are known for extensive agricultural production of many crops including

cereals (wheat and barley) and vegetables (tomato, potato…). The data was collected by students in the Department of Plant Protection (École Nationale d'Agriculture de Meknès) from smallholder farmers (n = 211) in 3 regions covering all agroecological zones. Farmer identification and selection were based on their digital availability (cellphone, WhatsApp app), and physical presence. The survey (Table 1) was sent as a link via different platforms (E-mail, WhatsApp, and Google document) to the interviewers to respond, while some were interviewed by phone calls. Arabic and French versions of the survey were available according to each person's preference. Additionally, face-to-face interviews were arranged in strict COVID-19 regulations. Arabic and French surveys were thoroughly analyzed and further translated to English to meet paper-writing conditions. Descriptive analytics were used to analyze the collected data. The respondent percentages for each aspect of the survey were calculated and plotted in Microsoft Excel software.

RESULTS AND DISCUSSION

COVID-19 measures, timeline, and description of the health impact on the region

In December 2019 in the Chinese city of Wuhan, a new human coronavirus known as COVID-19 broke out. Early studies conducted proved that human-to-human contact can transmit the virus unless effective control measures are implemented. Many studies have been conducted to corroborate and estimate the impact of the COVID-19 pandemic on agriculture (Kerr, 2020), food security (Jha et al., 2021; Rahimi et al., 2021), grains, and oilseeds sector (Rahimi et al., 2021), agrarian trade (Barichello, 2020), fruit and vegetable requests (Richards and Rickard, 2020), dairy and flesh sectors (Rahimi et al., 2021), food security in the Near East and North Africa (FAO, 2020a), agriculture, food security and animal sectors (Stephens et al., 2020), consumer food demand responses (Richards and Rickard, 2020). There's still a considerable exploration gap in studies examining the impact of COVID-19 on food security. Consequently, we try through this paper to answer the following question what was the impact of the COVID-19 pandemic on agriculture in Morocco during the lockdown?

In the efforts to contain the spread of the disease, nations worldwide have embarked on total lockdown. In Morocco, a complete lockdown took place on March 13th and lasted three months, all schools at all levels were closed, transport between provinces was limited, and travels in/out of the country were suspended. The wearing of medical masks in public spaces and the workplace was mandatory as of April 7th. The price of masks was fixed at an affordable and daily production of 5 million mask units was assured by local textile units. Teleworking was reinforced when doable and, in some instances, major food markets were closed. To compel people to stay home, a state of emergency was declared and failure to comply was sentenced to 1 to 3 months imprisonment, as well as fines ranging from 61 to 131 $. A worldwide health crisis has now become a worldwide recession given the impact on all fields of human endeavor.

Since the declaration of the first COVID-19 case on March 3rd, the cumulative number of cases has reached 94504 confirmed cases on September 20, 2020, with 74930 recovered and 1714 deaths. Challenges were intensified by weak infrastructure and poor health systems. Faced with the pandemic, the government has undertaken different measures designed to strengthen the country's health infrastructure. At the beginning of the pandemic, the government had only three operational screening centers, but with an increasing number of cases, University Hospitals and health establishments were allowed to perform the screening as well to ensure full territorial coverage. Therefore, the number of intensive care beds was increased to 3000 for a population of 36 million, and military hospital units were constructed (OECD, 2020). Furthermore, the country created a special fund to manage the pandemic with an approximate value of US$ 3 billion from the State's budget and donations. This budget was established to improve the healthcare system and acquire necessary medical facilities, as well as to maintain the prospective health consequences of the pandemic and minimize its socio-economic impact (OECD, 2020).

COVID-19 had a noticeable impact on Moroccan learning environments, as schools transitioned to online education to ensure stability in learning and teaching. Public tv and radio, for example, were also broadcasting educational programming. There is a risk that the nationwide school closure will broaden the learning gap between students from low socio-economic backgrounds and/or rural areas and those from more privileged backgrounds due to a lack of access to technological resources.

Immediate effects of COVID-19 control measures on agricultural systems and their drivers in the region

Impact on the Agricultural system and smallholder farming

The COVID-19 pandemic has resulted in a global economic downturn, caused disruptions to the global food supply chains, and raised concerns about food security. Structural constraints and vulnerabilities of food and agriculture systems make for an already challenging situation (FAO, 2020b). The rapid emergence of COVID-19 has indirectly strained global food systems and the livelihoods of farmers globally due to the disruption of chains from farm to plate (Jha et al., 2021). The immediate impacts which determine the resilience of the food system can be analyzed through the lens of food security, food production, and supply chains for inputs and outputs (Stephens et al., 2020). The agricultural sector started in the year 2020 under the threat of drought and the loss of 85,000 jobs compared to 2019. Agriculture accounts for 33% of the national workforce and contributes to 13% of GDP. The impact of the drought is directly affecting the production of cereals and other agricultural products, threatening employment in rural areas, the vast majority of which is informal. The crisis will mainly affect exporters who will see their products fade - images of destroyed fishery products illustrate this situation.

In this context, the availability of foodstuffs in domestic markets constitutes a major challenge for the government to overcome the crisis (Rahimi et al., 2021). The issue is even more vital and complex for countries that import to satisfy their needs, as is the case for most countries in the Near East and North Africa regions (FAO, 2020a). As a result, many countries in the region have already resorted to standard sets of assessments for natural calamities or economic crashes to reduce food insecurity challenges (FAO, 2020c). Morocco has taken various measures to mitigate the financial consequences of the COVID-19 crisis, as heat and drought stress have impeded cereal production. Furthermore, the Ministry of Agriculture has adopted an anti-drought plan with the financial support of 1.57 million $ to safeguard livestock, and spring crops and supply the local markets with cereals, pulses, fruits, and vegetables. A set of monitoring and control tools were set to ensure a comfortable stock of food supplies and to avoid the rise in the price of consumer goods as the pandemic crisis overlapped with the holy month of Ramadan (Anonymous, 2020).

Because food is the lifeblood of any nation, it is now critical to investigate the virus’s impact on the food supply chain, particularly on smallholder farmers. This category of farmers owning less than 5 ha is expected to be hit harder at all levels. Therefore, the effect of COVID-19 on the functioning of family farms during the three months of lockdown was evaluated in terms of availability of the labor and agrochemical supply, farming, and cultural practices, harvesting operations, produce storage, and distribution, as well as all possible interactions with local markets. In this report, a survey was conducted on 211 smallholder farmers (35-82 years old) in three different regions in Morocco (Fes-Meknès, Rabat-Salé-Kénitra, and Beni Mellal-Khenifra). The real impact of this pandemic virus on small farmers’ income as most of them are not covered by employment Insurance (EI). Although the magnitude of the impact cannot be assessed fully at the moment, special attention was given to how to cushion its effects on the most vulnerable and bottom-down of the pyramid in society. Our results indicated that the COVID-19 pandemic substantially affected the daily farming activities of smallholder farmers (74.4 %), their mode of life (74.9 %), and their access to their farm properties (56.9 %) and to food supply as well (46.0 %) (Figure 2). Regardless of the region, farmers have admitted that their social lifestyle has been drastically changed because of the pandemic, which ended schooling, domestic markets, and coffee shops for almost three months. This situation

pushed most of them to stay at home and in addition, to contribute to the education of their children and household activities. Unfortunately, more confrontations between the two genders have been noticed.

The basic agricultural production activities and operations of smallholder's farms like agricultural machinery, agrochemicals inputs, agricultural workers, irrigation supplies, harvesting, livestock management, and milk collection and selling were interrupted during the pandemic (Figure 3). The availability of labor workers and the harvesting operations were most affected as declared by 55.0 % and 44.1% of respondents respectively, whereas respondents who proved the COVID-19 effect on other activities varied from 10.4 to 29.4 %. Furthermore, farmers who didn't encounter any constraints to purchase agrochemical products on credits as they did not have available resources due to the lockdown. A similar study carried out on about 30 smallholder watermelon farmers (25-35 years old) in the oases of the Drâa valley showed that the constraints of mobility and legal procedures to access the valley imposed by the local authorities following the pandemic, few buyers were able and willing to go to the closest local marker (Zagora) (Bossenbroek and Ftouhi, 2020). In addition, faced with a large supply and low demand, the selling prices of watermelons on the market had dropped drastically and in many production sites, the watermelons had not even been harvested. As a result, the lesser quality watermelons, which were often intended for local markets, rot on the spot or were given to livestock (Bossenbroek and Ftouhi, 2020). Hence, young farmers ended up with a lot of damage and most debts to pay back to input suppliers (fertilizers, seeds, and pesticides). The same authors reported that the impact of the pandemic is amplified by a year of drought due to the lack of precipitation. They pointed out that in certain oases like Fezouata district, the pandemic has mainly affected the marketing of dates, a product that plays a central role in the oasis economy. These were stored to be sold at a significant price during the month of Ramadan. Unfortunately, the administrative procedures imposed limited the transport of the goods and the closing of the domestic markets (Souks) has reduced the demand.

Nevertheless, the impact of the pandemic on livestock management and milk collection and selling was minimal; 70.6 and 89.6 % of respondents admitted no observable effect of the lockdown situation on livestock management and its related activities respectively. However, farmers noticed a rise in prices related to animal feeding and other inputs, mainly due to the closing of local domestic markets and restrictions on local movements.

There is no doubt that such access decreases in production factors can conveniently impede the animal sales and profit of livestock producers, particularly small-scale meat and dairy producers. Indeed, our survey highlighted a significant impact of this pandemic on the total income of small farms; 72.5% of farmers questioned demonstrated a reduction in their income and they explained it by a remarkable reduction in agricultural activities due to the lockdown (Figure 4). In addition, 50.2 % of the farmers interviewed found difficulties to sell their farm products as domestic markets were closed to avoid contamination, Vegetable farmers were the most impacted as their products have limited shelf life. Surprisingly, there was an oversupply of vegetable and fruit products, as the production was not significantly impacted (13%) (Figure 5), but the demand was unexpectedly very low, thereby this caused the bankruptcy of certain farmers like those producing watermelon in the Drâa region where the product was used to feed the livestock. Conversely, a recent survey on other categories of Moroccan farmers operating in export has demonstrated that for a large majority of the farmers surveyed, this crisis was not negative since their activity was not impacted or was positively impacted (Agrimaroc, 2020). Interestingly, 66.9 % of the farmers surveyed did not notice the effect of COVID-19 or saw an increase in demand. In addition, another trend should be underlined a small part of the farmers surveyed seems to be orienting their future toward a more resilient local market given the protectionism that the European countries imposed. This survey indicated that 16.95% of farmers wanted to withdraw from the local market. This category of farmers who opt for export was affected by a hailstorm which destroyed their production, about 910 ha were damaged (Figure 6).

This report underscored that only 33 % of farmers questioned having the medical assistance plan

RAMED had benefited from financial aid from the COVID-19 special fund. This indicated that 67% of smallholder farmers suffered from the interruption of activity resulting from confinement measures. Overall, this is interesting and evidenced a real impact of the COVID-19 pandemic on small farms and it will have an additional positive impact on the development and identification of risks related to COVID-19 in terms of resilience and food safety of small farmers.

Impact on Agro-industry

The impact of COVID-19 on the agro-industry was considerable as food processing was hampered more by a problem of supply of inputs and semi-finished products. In addition, the 2,000 agro-industrial units present in Morocco have been faced with a problem of supply of ingredients and additives - mostly imported - used by almost all sectors in the manufacturing processing (UED, 2020). These include preservatives, emulsifiers, fats, and other texturizing gelatins, stabilizers, sweeteners, thickeners, vitamins, enzymes, acids, and other natural or synthetic antioxidants intended for various manufacturers, including producers of olive oils, fruit juices, beer, wine, dairy products, and confectionery. Moreover, the value chain of Morocco Food & Beverage Manufacturers was certainly disrupted due to the fall in safety stocks, naturally low, of certain semi-finished products, such as the concentrated fruit at the base of production of industrial juices, imported mainly from the European Union (UED, 2020).

Regarding the effect of COVID-19 on the fishery industry, the Moroccan Federation of Industries Products Processing and Enhancement of Fisheries (FENIP) has noticed a significant impact of the pandemic on the processing of seafood because the confinement affected the availability of labor and disrupted the logistics and supply chains of raw materials, especially boxes metallic for food canning. However, this impact was less at the beginning of the pandemic (in March) due to the biological rest, but more relevant in subsequent months (UED, 2020). It should be noted that this sector is very important for the Moroccan economy; it offers around 660.000 direct and indirect jobs, supports some 3 million people, and exports more than 85% of its production.

Furthermore, Female labor force participation in Morocco stands at 21.3% and is mainly in the agricultural and industrial sectors. Moreover, around 17% of women in non-agricultural employment work informally and will therefore be particularly vulnerable to the lockdown measures. It should also be noted that the fisheries industries and farms operating for export have continued their activities during the lockdown, which resulted in several outbreaks of the disease being detected.

Speculation about longer-term impacts on agricultural systems and their drivers in the region using SDG lens

The health crisis from which the whole world is suffering presently has economic consequences and the African continent is not to be excluded, given the continent’s interdependence with the rest of the world (Ndouma et al., 2020). The Moroccan economy was not the exception and suffered disastrous economic and social repercussions (Bribich, 2020; Haddad, 2020). As a result, the number of poor and non-poor vulnerable to poverty is surprisingly doubled; nearly 10 million Moroccans including those working in agriculture may become poor or at risk of impoverishment (Bribich, 2020). Moroccan agriculture is made of contrasts which reflect the diversity of the agro-ecological and socio-economic conditions of the country. In a recent study, it was shown that the agricultural and food systems of Morocco face sustainability problems whose nature differ from one area to another and from one agrarian system to another (FAO, 2017). Therefore, the longer-term impacts of COVID-19 on agricultural systems will be more likely affected by the same factors. The survey was carried out in the agricultural plain areas, and the impact of the health crisis on the sustainability of agriculture in this area was judged on a scale of 1 to 4 (1: very bad; 2: rather bad; rather good and very good) and the surveyed farmers spoke out on the major Sustainable Development Goals (SDGs) that are recognized for principles SDG1 (efficiency in the use of resources), SDG2 (conservation of natural resources), SDG3 (improving living conditions) and

SDG4 (Resilience) as previously described (FAO, 2017). According to the same study, agriculture in the plains before the health crisis was judged as fairly good by farmers with an efficiency of 2.8, a capacity to improve the living conditions of rural populations of 2.9, and a balance sheet on the conservation aspect of natural resources and resilience more mixed (2.6). Their results were mainly explained by a major transformation in the sector as a result of the implementation of the Green Morocco Plan (PMV), which has lasted 12 years since its launch in 2008 and sets up a large portfolio of actions aimed at strengthening the role of agriculture in the social and economic development of the country with the main objective of developing competitive agriculture intended for export in the era of globalization. However, it is important to mention that these investments mainly concerned the large farms to help them optimize their production. Conversely, small farms have received less aid from the state during this plan when compared to large farms, which made them very susceptible to risks such as that of COVID-19 presently. Therefore, the impact of this pandemic on such farmers was very obvious during this study as mentioned above, and the scores obtained for 4 SDGs principals were very affected by this health crisis, except SDG2, for which an increase was observed due to a drop of using natural resources imposed by the lockdown. Furthermore, the score of the other three principal SDGs (efficiency, improvement of living conditions, and resilience) was remarkably dropped to 2 during this growing season due essentially to the drought and climate change. In fact, many farmers in the Meknès region have lost their production at the end of the season due to hailstorms; about 9100 ha of horticulture crops have been lost (Figure 6). Interestingly, 100% of those surveyed admitted that drought and climate change were the main factors affecting the sustainability of their agriculture, and the pandemic has only revealed the truthful reality. Hence, the current question for Moroccan agriculture: what development model will the country opt for after COVID-19? Is the country still going to continue the support of competitive agriculture based on large farms for export or reorienting agriculture towards the production of basic food supplies to guarantee food security by relying on the production of small farms that often supply local markets?

Although agriculture remains poorly paid, this health crisis has shown how vital it is for the economy (Srairi, 2020). With a lockdown for more than three months, the population has learned the important contribution of the hard work of smallholder farmers and that without their work, there would simply be no food supply for all. This has raised awareness of the often-overlooked roles of agriculture, starting with the regular supply of food products to local markets, the maintenance of territories, and the creation of jobs for millions of workers, etc. Furthermore, our survey showed that 66.8 % of respondents did not receive financial aid from the government during the lockdown despite their needs. Therefore, there is work to be done to improve the living conditions of smallholder farmers at different levels to ensure the sustainability and profitability of their farms. In addition, to help farmers located in non-irrigated areas (Bour) areas from poverty, it is recommended to develop an agricultural system that is less susceptible to climate change and less dependent on water (Sraïri, 2020). Hence, the pandemic also revealed an overproduction of fruit and vegetables in certain regions with less demand in local markets, thereby the need of rethinking the long-term strategy of agriculture, particularly in the event of a similar crisis where all borders are closed. This situation resurfaces the importance of commercialization and transformation of agricultural products, often forgotten in all the development strategies of Moroccan agriculture and during the Green Morocco Plan (PMV).

Undoubtedly, the COVID-19 pandemic emphasized the fair value of agriculture in the country’s economy. Citizens have learned to appreciate the importance of agricultural activities and to pay tribute to the hard work of small farmers who feed local markets. The sustainability of agricultural production during the pandemic, despite health and economic uncertainties, thereby ensured the stability of the market supply of food products. Surprisingly, the pandemic underscored through this study the precarious and unacceptable situation of these smallholder farmers, who until now do not benefit from health care and retirement regime worthy of their contribution to society. This report showed that a few of them (33% of respondents) have the “RAMED” card which allows them to access basic health care and benefit from state aid in the event of a crisis such as COVID-19. Therefore, improving the living attributes of the rural population would become a priority in any

development program, in particular the new Green Generation (GG) plan from 2020 to 2030 (Forbes-France., 2020; Lahrache, 2020). This plan should take into account the FAO's recommendations for the sustainability and resilience of Moroccan Agrifood systems through the sustainable development paradigm (FAO, 2017), which are emerged during our survey, in particular: i) improving the efficiency of resource use, whether its natural resources, energy or labor; conserving, protecting and improving natural resources through direct actions; protecting rural livelihoods and improving equity and social well-being; strengthening the resilience of humanity, communities, and ecosystems, especially to climate change and the volatility of markets and; ensuring responsible and efficient governance, extremely important for the natural and human system's sustainability.

CONCLUSION

The COVID-19 pandemic is causing a significant impact on economic activity, shifting economies away from familiar equilibriums. The level of disequilibrium across economies is unprecedented, making future adjustment paths difficult to predict. Global supply chains in the food and agriculture businesses have struggled to keep up, first with panic buying, then with forced changes in food consumption patterns as a significant proportion of food is consumed away from home, and, finally, with drastic revenue declines. The COVID-19 pandemic revealed the crucial contributions of agriculture to the daily life of citizens, such as the supply of food, the maintenance of territories, the creation of millions of jobs, etc. These functions were maintained thanks to the measures taken by the authorities for the continuity of agricultural activities during the containment, which was not possible for sectors such as tourism or events. The pandemic did, however, expose the structural weaknesses of Morocco's agricultural sector, as citizens became aware of the huge quantities of imported food products. The Kingdom is reaping the fruit of strategic choices made for decades, which began with the visionary policy of dams in the early years of Independence and was strengthened in 2008 by the Green Morocco Plan (GMP), which brought agriculture into the era of modernization and massive private and public investment. The study concluded that the COVID-19 pandemic widespread has ensued several negative effects, which have directly and indirectly threatened food security. First, the COVID-19 pandemic severely affected the Moroccan agricultural sector, which contributes significantly to GDP, due to the suspension of agricultural activities, restriction of trade in agricultural commodities, and agricultural labor.

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