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IMPACT OF COVID-19 PANDEMIC ON CULTIVATION OF MANGO

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ABSTRACT

COVID-19 pandemic affected human lives as well as economy worldwide. Mango production has been significantly affected by the COVID-19 pandemic, which has created difficulties for growers, markets, supply chains, and consumer behavior globally. The study was carried out to assess the impact of COVID-19 pandemic on cultivation of BARI Aam-3 by the growers of Porsha upazila under Naogaon district and Nachole upazila under Chapainawabganj district. Data were collected from 111 BARI Aam-3 growers. Descriptive statistics were used for data analyses. Majority of the respondents were middle aged, literate, belonged small household, had medium to large farm, medium annual income, had moderate knowledge on mango cultivation and some kind of off farm activities. Highest percentage of them had high training experience, medium extension contact, medium organizational membership, medium cosmopoliteness, low to medium innovativeness, medium farming experience, access to credit and available irrigation water. More than one-fourths (27.0%) of the respondents were very highly affected in getting market price. The highest portion of the respondents suggested about incentive, subsidies, inputs, laborer and marketing support and credit at reduced rate of interest.

Keywords: COVID-19, pandemic, market price, labor, BARI Aam-3

Introduction

COVID-19 pandemic emerged as a serious crisis across the globe. It is the most dangerous pandemic that impacted all sectors of the world. It is the first pandemic that spread all over the world. It was first reported in December 2019 in Wuhan, China (Mamun *et al*. 2020) and later spread throughout the world. It caused deaths of seven million people worldwide (Worldometer 2024). Economic loss was also a great impact of COVID-19 pandemic worldwide due to the restrictions and health regulations. Flight ban, lockdowns or curfew and social distancing was implemented worldwide to prevent COVID-19 infection (Mamun *et al*., 2020). The measures taken to control the pandemic greatly affected the major economic sectors all over the world including agriculture. The protocols and provisions to control the pandemic disrupted the market's supply chain, resulting in decreased production and distribution as well as a shortage of labor and inputs (Poudel *et al*. 2020). COVID-19 caused a global food crisis (Balkan 2020). There was decrease in the agricultural exports (Lin and Zhang 2020). The agri-food sector in the countries which depended on seasonal migrant workers experienced labor shortages due to an abrupt loss of mobility across borders and within countries. This, in turn, had an impact on global food costs and availability (FAO, 2020). There was delay in horticultural activities and food crop farming activities due to the ban on going out of the house during the pandemic in Indonesia resulting in decrease in farmers' income (Pulubuhu *et al*. 2020).

The mobility of migrant workers was severely restricted due to the lockdown to control COVID-19 pandemic. The labor shortage greatly affected the agriculture all over the world (Ramakumar 2020). Some major challenges of agriculture during COVID-19 in India were interruptions in the collection of harvests from the homesteads by private dealers, lack of laborers to collect the rabi crop, shutdowns in the retail farming markets and shortage of drivers for transportation (Arumugam and Kanagavalli

2020). The Bangladeshi agricultural sector has increased food security and income generation, and one important subsector that has benefited is the fruit business. Even with its significant GDP contribution, the industry is vulnerable to domestic shocks including insufficient rainfall, volatile market prices, labor laws, and governmental regulations, among other things.

The COVID-19 epidemic should not be undervalued as an external shock with a wide range of possible effects on the agricultural value chain (Onumah *et al*. 2024, Ogada *et al*. 2021). In some parts of India, the harvesting of major food crops was affected due to non-availability of labourers during COVID-19. The harvesting and marketing of major fruit crops was also affected (Singh *et al*. 2020). The epidemic has impacted the nation's whole food supply chain and created an economic catastrophe, which could further impede the advancement of population nutrition and health (Fahim *et al*. 2021). The lockdown in Bangladesh due to COVID-19 affected the food supply chain and raised the possibility of food insecurity. The lockdown limited vegetable producers' ability to sell their products and increase productivity by impeding their access to marketplaces. Vegetable growers suffered a significant loss due to reduction in yield prices (Alam and Khatun 2021). There were several adverse impacts of lockdown due to COVID-19 pandemic on rural economy in Bangladesh such as delayed harvest, difficulty in selling farm produce, labor and material input disruptions and cost increases (Malek *et al*. 2021). Information asymmetry and bargaining power are two factors that could make the COVID-19-related disruption of the food supply worse (Rusu *et al*. 2020). These elements highlight the necessity and timeliness of this study, as does the lack of some empirical research on the functioning of the mango business. There are several researches on impact of COVID-19 pandemic on agriculture in world (Aduhene and Osei-Assibey 2021, Afele *et al*. 2022) but there are limited researches regarding this issue in the context of Bangladesh. Therefore, this research was conducted to specifically assess the impact of COVID-19 pandemic on cultivation of a promising Bangladesh Agricultural Research Institute (BARI) released technology, BARI Aam-3.

Methodology

The study was conducted in Porsha upazila under Naogaon district and Nachole upazila under Chapainawabganj district (Figure 1) (Rahman and Khatun 2018, DAE 2019a, DAE 2019b, DAE 2020a, DAE 2020b, DAE 2021).

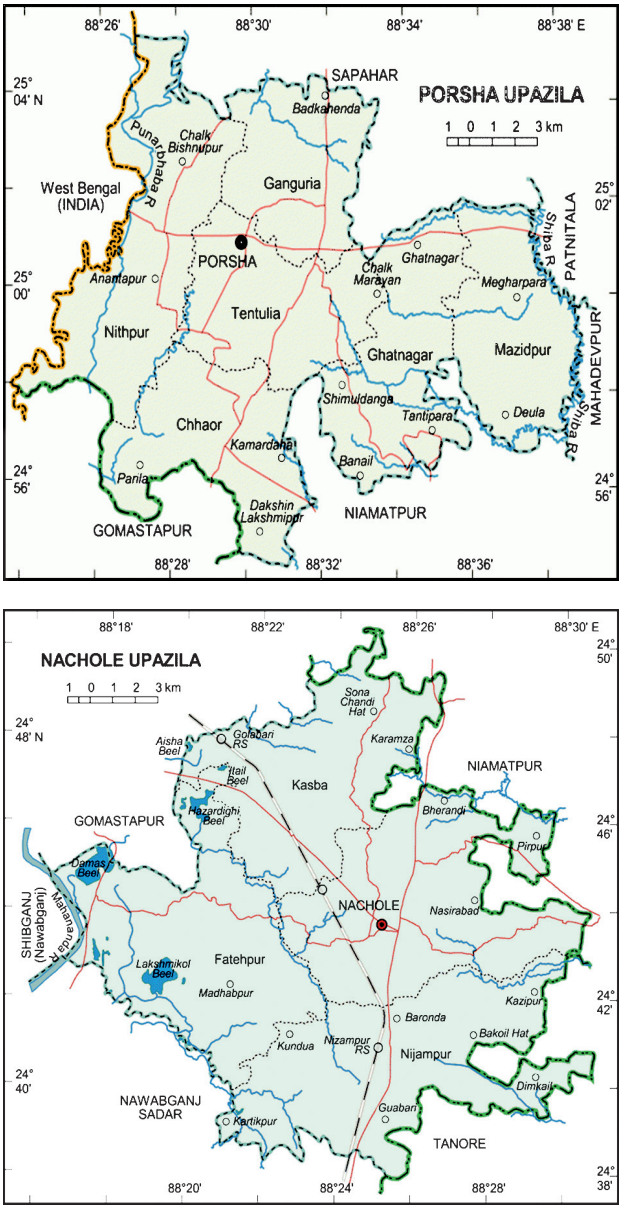


Figure 1. Map showing Porsha upazila under Naogaon district and Nachole upazila under Chapainawabganj district.

The population of the study was the growers who cultivated BARI Aam-3 for at least five years. The sampling population was 472 and 117 in Porsha and Nachole upazila,

respectively. Of these total 589 growers, 111 growers were selected as sample respondents (Hoque and Miah 2001, Loki *et al*. 2019) using proportionate random sampling technique. Data were collected during January to April, 2021. Fifteen selected characteristics of the respondent were the independent variables of the study. Age of the respondent was measured in terms of years. Level of education was measured in terms of years of schooling. Family size was measured by counting the total number of family members of the respondent comprising the head of the household, his wife, children, parents and other dependents who jointly lived and ate together. Farm size was measured in terms of hectares. Annual income was measured in terms of thousand BDT. Training experience was measured in terms of number of days. Extension contact was measured in terms of scores. Farming experience was measured in terms of years. Access to credit, off-farm activities and availability of irrigation water were measured in ordinal scale where if the respondent had access to credit, it was coded as one (1) and if he/she had no access to credit, it was coded as zero (0). Similarly, if the respondent had off farm activities, it was coded as one (1) and if he/she had no off-farm activities, it was coded as zero (0). In case of availability of irrigation water, if the respondent had available irrigation water, it was coded as one (1) and if he/she did not have available irrigation water, it was coded as zero (0). Organizational membership, cosmopoliteness, innovativeness and knowledge on cultivation of mango were measured in terms of scores. Data were coded, compiled, tabulated and analyzed according to the objectives of the study using SPSS v20. Descriptive statistical measures like number and percentage distribution, range, rank order, mean etc. were used.

Results and Discussion

The information presented in Table 1 show that about half (49.5%) of the BARI Aam-3 respondents were middle aged. Ninety-one percent of them were literate and the highest percentage (43.2%) of them belonged to higher secondary education level. Majority of the respondents (45.0%) had small family. More than ninety percent (91.9%) of the respondents had medium to large farm. The average annual income of the respondents was BDT766.6 thousand which was much higher than the national average (BDT137.8 thousand) (BBS 2021). Most of the respondents (80.2%) belonged to medium to low annual income category. More than one-fourths (36.0%) of the respondents had high training experience. The large majority of them (77.4%) received agricultural training. The highest portion of the respondents (70.3%) had medium extension contact. Most of them (65.8%) had medium farming experience. Most of the respondents (97.3%) had access to credit. More than half (55.0%) of them had some kind of off farm activities. Most of the respondents (89.2%) had available irrigation water. Majority of them (42.3%) had medium organizational membership. Majority of the respondents (75.7%) had medium cosmopoliteness. Most of the respondents (78.4%) had low to medium innovativeness. Majority of them (68.5%) had moderate knowledge on mango cultivation.

More than one-fourths (27.0%) of the BARI Aam-3 respondents were very highly affected in getting market price and more than one-fifths (21.6%) of them were moderately affected in marketing BARI Aam-3 (Table 2) due to COVID-19 pandemic. It was also found that 12.6 percent of them were moderately affected in getting transport and 4.5 percent of them were moderately affected in getting labor due to COVID-19 pandemic. It might be due to the reason that because of lockdown caused by COVID-19 pandemic growers were highly affected in the market price of BARI Aam-3. Their marketing activities, transport availability and labor availability were also affected to some extent. Gatto and Islam (2021) revealed that the agricultural production was reduced after COVID-19 hit in Bangladesh. There was significant reduction in the harvests of different crops. It was also observed in their study that to compensate for the reduction in male family labor, households hired slightly more male and female labor. There was reduction in the consumption of the important and nutritious food items, such as fruits. It was also found that different stages of crop production were affected by the lockdown and other government measures. It was also revealed that the government agricultural support programs were limited to specific areas during the lockdown but could improve productivity in those areas. The price of the perishable goods reduced to a great extent because of lack of buyers and traders in local markets, or rumors about food safety

Table 1. Characteristic profile of the BARI Aam-3 respondents

Characteristics (Measurement unit)	Possible and observed range	Respondents (n = 111)		Mean
		Categories	%	
Age (Year)	Unknown (24-73)	Young (up to 35)	34.2	40.7
		Middle aged (36-50)	49.5	
		Old (above 50)	16.3	
Level of education (Years of schooling)	Unknown (0-18)	Illiterate (0)	1.0	10.2
		Can sign only (0.5)	8.1	
		Primary (1-5)	10.8	
		Secondary (6-10)	36.9	
		Higher secondary (>10)	43.2	
Family size (Number)	Unknown (2-12)	Small (up to 4)	45.0	5.2
		Medium (5-6)	37.0	
		Large (above 6)	18.0	
Farm size (Hectare)	Unknown (0.3-32.8)	Small (0.21-1.00)	8.1	4.7
		Medium (1.01-3.00)	38.7	
		Large (above 3.00)	53.2	
Annual income (‘000’ BDT)	Unknown (79-4500)	Low (up to 353)	37.0	766.6
		Medium (354-1180)	43.2	
		High (above 1180)	19.8	
Training experience (Number of days)	Unknown (0-276)	No training (0)	22.6	18.0
		Low (1-5)	29.7	
		Medium (6-10)	11.7	
		High (above 10)	36.0	
Extension contact (Score)	0 to 72 (10-55)	Low (up to 28)	18.0	38.9
		Medium (29-50)	70.3	
		High (above 50)	11.7	
Farming experience (Years)	Unknown (5-60)	Low (up to 9)	16.2	20.8
		Medium (10-32)	65.8	
		High (above 33)	18.0	
Access to credit	-	No	2.7	1.0
		Yes	97.3	
Off farm activities	-	No	45.0	0.6
		Yes	55.0	
Availability of irrigation water	-	No	10.8	0.9
		Yes	89.2	
Organizational membership (Score)	Unknown (0-213)	Low (up to 7)	37.8	22.4
		Medium (8-38)	42.3	
		High (above 38)	19.9	
Cosmopoliteness (Score)	0 to 15 (1-15)	Low (up to 8)	18.9	10.6
		Medium (9-14)	75.7	
		High (above 14)	5.4	
Innovativeness (Score)	0 to 21 (0-15)	Low (up to 3)	50.5	4.6
		Medium (4-6)	27.9	
		High (above 6)	21.6	
Knowledge on mango cultivation (Score)	0 to 30 (16-30)	Low (up to 22)	18.0	25.2
		Moderate (23-28)	68.5	
		High (above 28)	13.5	

Table 2. Impact of COVID-19 pandemic on BARI Aam-3 cultivation

Item	Extent of impact				
	*VHA (%)	HA (%)	MA (%)	PA (%)	NAAA (%)
Production	0.0	0.9	0.0	0.0	99.1
Harvest	0.9	2.7	0.9	0.0	95.5
Market price	27.0	9.0	23.4	4.5	36.0
Marketing	19.8	9.0	21.6	0.9	48.6
Transport	10.8	6.3	12.6	2.7	67.6
Labor	3.6	2.7	4.5	1.8	87.4
Pesticide availability	0.9	0.9	0.9	0.0	97.3
Credit availability	0.9	0.0	0.0	0.0	99.1

*VHA=Very highly affected, HA= Highly affected, MA=Moderately affected, PA=Poorly affected, NAAA= Not affected at all.

concerns. According to Adav *et al*. (2022), the supply gap was discovered to be negative for every input both prior to and after the COVID-19 pandemic. However, during COVID-19, this disparity was quite large. Joshi *et al*. (2019) also reported negative impact in the postharvest supply chain, transportation, retail marketing and trade of fruits and vegetables. Sornsena *et al*. (2021) revealed that the mango export farmers could not sell their mangoes and the harvesting of mango was delayed also in Khon Kaen, Thailand due to COVID-19. Talukder *et al*. (2021) reported that the agri-food systems were disrupted at the farm, value chain and market levels in Bangladesh due to COVID-19 pandemic. Lockdown caused loss of income throughout the country. Farmers could not sell their products after harvest in many cases. In their study, Onumah *et al*. (2024) noted that the COVID-19 pandemic and its related effects, which vitally disrupted access to inputs, access to current market information, disruption of the informal market previously used by the producers and distributors, coupled with some exogenous factors like unfavorable climatic conditions for the fruits, post-harvest losses, incidence of pests and diseases, limited labor, and transportation, among others, could be the reason for the declining profit obtained by mango producers and distributors. Rahman *et al*. (2021) also reported that the lockdown due to the COVID-19 pandemic caused restrictions on access to agricultural products, materials, markets and advisory services in Bangladesh and farming activities were greatly affected by those. The price of fruits was also reduced.

To cope with the challenges of COVID-19, the highest portion (70.0%) of the respondents suggested that the government may rehabilitate the affected growers through incentive, subsidies, inputs, laborer and marketing support and credit at reduced rate of interest (Table 3). It might be due to the fact that the affected growers needed rehabilitation through incentive, subsidy and agricultural credit support. Through a variety of initiatives, such as incentives, subsidies, laborer help, input support, marketing support, and loan facilities with lower interest rates, government can play a vital role in aiding and rehabilitating harmed farms. Haq *et al*. (2017) reported that the mango growers could increase their ownership of owned capital if credit would be provided to them at low interest in Muzaffargarh, Pakistan. The loan schemes with easy conditions and at low processing cost was necessary to start in their area. Financial incentives and subsidies provide direct assistance to growers, helping them recover from losses. Improving agricultural output and cutting production costs require input support. Growers may sustain or even boost their yields even in hard times when inputs like machinery, seeds, fertilizer, and pesticides are made more inexpensive for them.

Two-fifths (40.0%) of the respondent suggested about transport facilities like covered van/ truck for labor and carrying mango by road in lockdown. The mobility

Table 3. Rank order of the suggestions to cope with the challenges of COVID-19 pandemic in BARI Aam-3 cultivation

Suggestions	Respondents (%)	Rank
The government may rehabilitate the affected growers through incentive, subsidies, inputs, laborer and marketing support and credit at reduced rate of interest	70.0	1st
Transport facilities like covered van/ truck for labor and carrying mango by road in lockdown	40.0	2nd
The market of mango and other perishable products may be kept open in compliance with health regulations and maintaining social distance in lockdown	30.0	3rd
Large mango purchasers may go to the mango cultivating districts so that growers can market mangoes locally and reasonable market price can be ensured in the pandemic condition	20.0	4th
Carrier of mango can maintain sanitation, hygiene and social distance from packaging point to distribution point in case of online marketing to avoid infection	20.0	4th
Modern multipurpose cold storage facilities and processing of mango are required for mango storage	10.0	5th
Export of mango to foreign countries with government initiative can be increased	10.0	5th
The concerned authority may schedule the selling date of mango	10.0	5th
Reasonable market price can be ensured	10.0	5th

constraints imposed during lockdowns can be overcome if government or concerned authority provides or facilitates transportation for growers, laborers, traders and related persons, enabling them to perform harvesting, post-harvest handling and marketing activities. The availability of transportation infrastructure guarantees the timely harvesting of mangoes followed by marketing, so averting delays that may lead to spoiling or deterioration of fruit quality. Jhajhria *et al*. (2020) recommended that transportation logistics are important for movement of farm produce which can be arranged by farmers' groups or traders during lockdown due to COVID-19.

About one-thirds (30.0%) respondents' major suggestion was the market of mango and other perishable products may be kept open in compliance with health regulations and maintaining social distance in lockdown. This promotes public health and safety, preserves market access, lowers post-harvest losses, guarantees customer access to fresh produce, strengthens supply chain resilience, and has a favorable effect on mango agriculture. The successful execution of this recommendation and its advantages for growers and consumers alike depend on efficient government support and cooperation. Rahman *et al*. (2021) also reported that any distortions in the supply chain during harvest needs to be avoided in the COVID-19. Jhajhria *et al*. (2020) recommended that a compact marketing channel can be evolved for perishable crops like fruits and vegetables during COVID-19 lockdown and the products may be delivered directly in the terminal markets or to the bulk buyers.

Conclusion

COVID-19 pandemic affected the world economy and agriculture greatly. Due to the COVID-19 pandemic, more than one-fourths (27.0%) of the BARI Aam-3 respondents were very highly affected in getting the market price, and more than one-fifths (21.6%) of them were moderately affected in marketing BARI Aam-3. Their transport and labor availability were also affected. The majority of the respondents suggested that the government may assist the affected growers through their rehabilitation by offering incentives, subsidies, inputs, laborer and marketing support, and loans with lower interest rates. COVID-19 pandemic presented considerable obstacles for the mango industry, but this pandemic provided some lessons to the growers to survive in the future catastrophe like COVID-19 pandemic.

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