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Economic impact of Covid-19 on mango production and marketing in Ratnagiri district of Maharashtra state

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Abstract

The present study was undertaken in Ratnagiri district of Maharashtra state to study impact of COVID-19 pandemic on demand and supply of input and output with respect to mango. For this purpose, 60 mango growers were selected randomly from three tahsils viz. Dapoli, Chiplun and Lanja of Ratnagiri district. The per hectare cost of mango production was found to be higher during COVID-19 pandemic compared to before pandemic situation and this was due to high cost of inputs. The supply gap was found negative with respect to all the inputs before and during COVID-19 pandemic. However, this gap was high during COVID-19. The per hectare family labour utilized in mango production during COVID-19 pandemic was increased to 61.40 man days as against 34.22 man days before pandemic. The per hectare input utilization gap in mango production during COVID-19 was found to higher in SSP followed by sterameal. During pandemic due to lockdown market was closed. So, farmers used various methods to sell the produce. Distant marketing of mangoes and marketing through social media and phone calls these marketing channels were adopted for marketing of mango during the pandemic. The net change in income due to sell through these channels was estimated to Rs. 5975 and Rs. 6725 per quintal respectively. Major challenges of agriculture faced by the sample farmers during the COVID-19 pandemic were labour unavailability, delaying in harvesting, low price for cashew produce, high wage rate and loss due to delaying in harvesting. Other than these, problems faced by the farmers were input unavailability, marketing of horticultural produce, transportation availability during the lockdown, market closure, and unavailability of tools and implements during the lockdown and losses due to delaying in transportation.

Keywords: impact, supply gap, partial budgeting, labour utilization

Introduction

The outbreak of novel coronavirus disease, comprehensively named as COVID-19 has changed the world only in a few months which had led to unexpected consequences. The agricultural sector has faced significant hurdles because of amid concerns COVID-19 pandemic and lockdown. During the lockdown in India transportation has largely been halted, thereby reducing yields and compromising food security. During the peak of the spring harvest, produce could not reach the rural markets or "mandis", thus severely disrupting normal supply chains. The absence of agricultural and other migrant labour has also affected planting, harvest and post-harvest operations. Also, the pandemic has created challenges for procurement operations.

The effect of COVID-19 on agriculture/horticulture sector was severe. The harvesting of major fruit crops was completed and also, in some part, it affected the farmers due to non-availability of labours. Major fruit crops harvesting and marketing was affected. The Konkan region of Maharashtra state is known as fruit bowl of the state. The major impact of COVID-19 on horticultural crops production is observed in this region. So, Ratnagiri district was selected to study the economic aspects of this impact. This study on economic impact of COVID-19 on mango in Ratnagiri district of Maharashtra was carried out with following specified objectives,

1. To assess the impact of COVID-19 pandemic on demand for and supply of mango produce.
2. To study the impact of COVID-19 pandemic on demand for and supply of inputs with respect to mango produce.

Methodology

Konkan region is mainly known for production of major horticultural crops like mango, cashew, arecanut and coconut, etc. In view of this, Ratnagiri district was selected purposively for the present investigation.

The three tahsils namely Dapoli, Chiplun and Lanja from Ratnagiri district were selected for the study. Two villages from each tahsil were selected randomly. From each selected village 10 mango growers were selected randomly. Thus, the final sample consisted of 60 farmers. The data was collected by survey method through personal interviews from the selected farmers, with the help of pre-tested comprehensive schedule specially designed for the purpose. The data collected from farmers were analysed with simple statistical tools and presented to draw meaningful conclusions.

Analysis of data

The data collected from farmers were analysed with simple statistical and mathematical tools and presented to draw meaningful conclusions.

a) Tabular analysis

The data were processed for arriving at desired conclusion and it was arranged in suitable tables and cross tables. Simple statistical tools such as arithmetic mean, percentage and ratios were used.

b) Cost concepts used in analysis

Standard cost concept used in farm management studies viz. 'cost A', 'cost B', 'cost C' were used to work out cost of cultivation of mango.

- i. Cost A: Cost A included wages on hired human labour, bullock labour, cost of plant protection, depreciation on implements and machinery including repairs, interest on working capital, land revenue and other cases etc.
- ii. Cost B: Cost B included cost A + interest on fixed capital and rental value of owned land.
- iii. Cost C: Cost C included Cost B + imputed value of family labour and supervision charges.

c) Impact analysis

i) Before and after method

The same group of farmers were used for comparing the changes that have occurred due to the intervention i.e. condition of farmers before intervention were compared to their condition after the intervention.

ii) Partial budgeting

This method is used when we have to calculate the economic impact of extra methods adopted for marketing of mango produce during the COVID-19 pandemic.

Profit/Loss = (Added returns – Added costs) + (Reduced costs – Reduced returns)

Terms Used in the study

a. Hired Labour

The cost of hired labour was calculated by considering the actual wages paid by the selected mango growers to the hired labour.

b. Family Labour

It was calculated on the basis of wages paid for hired labour.

c. Other inputs

For purchased inputs like manure, fertilizers, plant protection chemicals, etc., actual purchase price was taken whereas, for home produced inputs the opportunity cost was considered.

d. Interest on working capital

It was worked out at the rate of 6 per cent per annum on working capital.

e. Interest on fixed capital

It was worked out at the rate of 10 per cent per annum on fixed investment made on the farm for production of major horticultural crops.

f. Rental value of land

Rental value of owned land was worked out as one sixth of the gross return from horticultural business whereas, for leased in land, the actual rent paid was considered.

g. Depreciation of tools, implements and machinery

Generally, small hand tools, implement, and machinery were used for horticultural crop production. Therefore, considering the average life of these hand tools, implements, and machinery the depreciation was worked out by using following formula.

$$\text{Annual Depreciation} = \frac{\text{Original price-junk value (Rs.)}}{\text{Expected working life of assets (years)}}$$

h. Benefit-cost ratio (B-C ratio)

To judge the profitability of horticultural crop production B-C ratio was work out with the help of following formula.

$$\text{Benefit – cost ratio} = \frac{\text{Total returns (Rs.)}}{\text{Total cost (Rs.)}}$$

Results and Discussion

1. Per hectare labour utilization in Ratnagiri district for mango production.

Labour is an important input in production of horticultural produce as their production is labour intensive. The operation wise labour utilization in mango production is given Table 1. It is seen from the Table 1 that, in Ratnagiri district, per hectare human labour utilized for mango production before COVID-19 pandemic condition were estimated to 99.47 man-days, out of which 34.22 were family labour days and 65.25 were hired labour days. However, during COVID-19 pandemic, per hectare total 102.9 man-days of labours were estimated in mango. It includes 61.48 days of family labours and 41.42 man-days of hired labours. This indicate that the per hectare family labour utilization was increased from 34.22 to 61.48 man-days during COVID-19 pandemic.

Table 1: Per hectare labour utilization in Ratnagiri district for mango production, before and during COVID-19 pandemic. (Figures in days)

Sr. No.	Operations	Before COVID-19			During COVID-19		
		Family	Hired	Total	Family	Hired	Total
1	Fence repairing	2.18	3.96	6.14	3.6	2.38	5.98
2	Weeding/grass cutting	0.89	0.95	1.84	0.89	0.83	1.72
3	Manuring and Fertilizers Application	2.54	6.45	8.99	4.55	4.71	9.26
4	Cultar application	1.71	3.50	5.21	3.87	1.62	5.49
5	Plant protection	4.98	8.00	12.98	10.07	6.28	16.35
6	Harvesting	21.92	42.39	64.31	38.5	25.6	64.1
	Total	34.22	65.25	99.47	61.48	41.42	102.9

2. Per farm input quantity demanded by farmers and quantity supplied from the market

Per farm input demanded by farmers and quantity supplied from the market and the gap between input demanded and supplied is estimated and presented in Table 2.

It is observed from the Table 2 that, in the Ratnagiri district the farm inputs like FYM, chemical fertilizers *viz.* urea, SSP and MOP, the organic fertilizers like sterameal, fishmeal and plant protection chemicals were utilized during COVID-19 pandemic and non-pandemic condition. Considering the input demanded by the farmers in Ratnagiri district before covid, the supply from the market was not sufficient with respect to all inputs. It is seen that, the maximum (3.98%) supply gap was recorded in plant protection chemicals, which was followed by organic fertilizer sterameal (3.37%), chemical fertilizer MOP (1.87%), FYM (0.92%), other organic fertilizers (0.84%) and fishmeal (0.79%) during the period of

before COVID-19 pandemic.

It is revealed from the Table 2 that, during COVID-19 pandemic condition in the Ratnagiri district, the supply gap was found to be negative with respect to all the inputs. The maximum supply gap of input was recorded for the chemical fertilizers *viz.* SSP (26.55%), MOP (26.02%) and urea (21.84%). Apart from the chemical fertilizers supply gap, the next supply gap was recorded in FYM (18.21%), which was followed by fishmeal (15.09%), plant protection chemicals (13.01%), and sterameal (8.19%). However, it is indicated from the Table with respect to Ratnagiri district that, the supply gap in all the recorded inputs were observed in both pandemic and non-pandemic condition, but the supply gap of all inputs during the COVID-19 pandemic condition was comparatively much higher than the non-pandemic condition. It may be due to the mobilization restrictions, deficit in production and fear about the pandemic conditions.

Table 2: Per farm input quantity demanded by farmers and quantity supplied from market before and after COVID-19 pandemic in Ratnagiri district for mango production.

Sr. No.	Particulars	Before COVID-19		Gap (%)	During COVID-19		Gap (%)
		Demand	Supply		Demand	Supply	
1	FYM (q)	56.25	55.73	-0.92	58.3	47.68	-18.21
2	Chemical Fertilizers (q)						
	a) Urea	5.8	5.76	-0.69	6.09	4.76	-21.84
	b) SSP	5.36	5.26	-1.87	5.8	4.26	-26.55
	c) MOP	3.29	3.2	-2.74	3.92	2.90	-26.02
3	Organic Fertilizers (q)						
	a) Sterameal	5.34	5.16	-3.37	5.25	4.82	-8.19
	b) Fishmeal	6.35	6.30	-0.79	6.76	5.74	-15.09
	c) Others	7.15	7.09	-0.84	7.54	5.78	-23.34
4	Plant protection chemicals (lit.)	5.27	5.06	-3.98	5.69	4.95	-13.01

3. Per hectare input utilization in mango production in Ratnagiri district

The detail information about the per hectare physical input

utilization in mango production in Ratnagiri district, before and during the COVID-19 pandemic is given in Table 3.

Table 3: Per hectare input utilization in mango production in Ratnagiri district.

Sr. No.	Inputs	Before COVID-19	During COVID-19	Gap (%)
1	FYM (q)	19.09	18.46	-3.3
2	Chemical Fertilizers (q)			
a)	Urea	2.94	2.32	-21.08
b)	SSP	0.98	0.32	-67.34
c)	MOP	1.96	1.55	-20.91
3	Organic Fertilizers (q)			
a)	Sterameal	1.67	1.15	-31.73
b)	Fishmeal	2.47	2.14	-13.36
c)	Others	2.38	1.96	-17.65
4	Plant protection chemicals (l.)	2.38	1.92	-19.33

It is revealed from the Table 3 that, in case of mango production, the major input was observed to be FYM in both time of before COVID-19 pandemic and during COVID-19 pandemic conditions and it was recorded to 19.09 quintal and 18.46 quintal per hectare indicating negative gap of 3.3 per cent reduction in FYM utilization during COVID-19 pandemic circumstances as compare to before COVID-19 pandemic. However other than FYM, the per hectare maximum input utilization was noticed in urea (2.94 qtl. and 2.32 qtl.) in both the conditions of pandemic and non-pandemic situations, which was followed by plant protection chemicals (2.38 lit. and 1.92 lit.), fishmeal (2.47 qtl. and 2.14 qtl.), MOP (1.96 qtl. and 1.55 qtl.), sterameal (1.67 qtl. and 1.15 qtl.) and SSP (0.98 qtl. and 0.32 qtl.). The input utilization gap was observed to be more during COVID-19

pandemic condition in SSP (67.34%), which was followed by sterameal (31.73%), urea (21.08%), MOP (20.91%), plant protection chemicals (19.33%), other organic fertilizers (17.65%) and fishmeal (13.36%) in Ratnagiri district.

4. Per hectare cost of production of mango before and during Covid

Per hectare cost of production of mango, before and during COVID-19 pandemic is shown in Table 4. It is seen from Table that, before COVID-19 pandemic, per hectare cost-C was worked out to be Rs.1,52,352. Out of which cost-A was accounted to Rs.58,989 and cost-B was Rs.1,34,974. Input cost which included hired labours, manures, chemical fertilizers, organic fertilizers and plant protection chemicals was worked out to Rs. 54,015.

Table 4: Per hectare cost of production of mango before and during Covid

Sr. No.	Particulars	Before COVID-19	During COVID-19
1	Hired labour	22,838	17,604
2	Manures	13,363	18,460
3	Fertilizers		
a)	Urea	2,058	1,624
b)	SSP	882	256
c)	MOP	3,920	3,100
4	Organic fertilizers		
a)	Sterameal	4676	3220
b)	Fishmeal	2470	2140
c)	Others	1904	784
5	Plant Protection	1904	1536
	Input Cost	54,015	48,724
6	Depreciation on implements and machineries	1633	1633
7	Land revenue and other cesses	100	100
8	Interest on working capital (@ 6% for 12 months)	3240.9	2923.44
	Cost-A	58,989	53,380
9	Rental value of land (1/6th of gross return-land revenue)	38,575	44,125
10	Interest on fixed capital	15910	15910
11	Amortization value	21,500	21,500
	Cost-B	1,34,974	1,34,915
12	Family labour	11977	26129
13	Supervision Charges (10% of input cost)	5401.5	4872.4
	Cost-C	1,52,352	1,65,917
14	Marketing Cost	3512	8320
15	Total Cost	1,55,864	1,74,237
16	Yield (qtl.)	57.12	53.47
17	Value of produce	2,32,050	2,65,350
18	B:C ratio	1.52	1.60

The estimated total returns obtained from a hectare was accounted to be Rs.2,32,050 and benefit cost ratio was 1.52 before COVID-19 pandemic condition, indicated mango production was profitable venture before COVID-19 pandemic. During COVID-19 pandemic condition, in mango production per hectare cost-C was worked out to be Rs.1,65,917. Out of which cost-A was accounted to Rs.53,380 and cost-B was Rs.1,34,915. The input costs for the maintenance of orchard were estimated and it was found to be Rs.48,724. The per hectare total returns obtained from the mango orchard during COVID-19 pandemic was estimated it was accounted to Rs.2,65,350. The benefit cost ratio was worked out and observed to be increased to 1.60 for mango during the pandemic over the non-pandemic condition.

It is concluding from the Table 4 that the cost on all the input utilization during COVID-19 pandemic was declined except manures and family labour as compared to before covid condition. The family labour costs during COVID-19 period was estimated to Rs. 26129/- per hectare against it was Rs. 11977/- per hectare. However total per hectare production cost of mango during COVID-19 pandemic condition was observed to be higher (Rs. 174237/-) than non-pandemic condition and this was attributed to more use of imputed cost of family labour and higher rental value of land.

5. Methods adopted by sample farmers to sell mango produce during the COVID-19 pandemic

Marketing of any surplus horticultural produce is equally important as that of the production of the commodity. During the pandemic, government-imposed lockdown in the country to restrict spread of the virus. Market was closed. So, farmers used various methods to sell the surplus mango produce. The detail information about methods of sell is given in Table 5.

It is observed from Table 5 that, in Ratnagiri district, 71.70 per cent of sample respondents preferred to sell their surplus

mango produce through wholesaler and commission agents, followed by sell through social media and phone calls by 58.49 per cent farmers. Least number of farmers that is 20.75 per cent sold their produce to processing industry.

Table 5: Methods adopted by sample farmers to sell the mango during the pandemic.

Sr. No.	Methods	Percentage of farmers
a)	Wholesaler and commission agents	71.70
b)	Direct sale in local market	39.62
c)	Direct sale in distance market through own vehicle	28.30
d)	Social media and phone calls	58.49
e)	Processing industry	20.75

6. Economic impact of methods adopted for marketing of mango during COVID-19 pandemic

Partial budgeting technique was used to capture the economic impact of the extra methods, distant marketing of mangoes and marketing through social media and phone calls are adopted for marketing of mango during the pandemic. There are four components in partial budgeting. First, the added costs due to these methods over the sell through wholesalers and commission agents are considered. This includes the all increased expenses for transportation and packaging of mangoes. The second component is the reduced returns due to adoption of these methods. These first two components were listed on the debit side of the partial budget. The third component is reduced costs due to adoption of these methods which includes elimination of charges wholesalers and commission agents which were charged when mangoes were sold through wholesalers and commission agents. The fourth component is added to the returns side or the credit side of the partial budget. The final step in partial budget is the summary indicated by the difference between the credit and the debit.

Table 6: Partial budgeting of extra methods adopted during the pandemic for marketing of per quintal mango produce in south Konkan region. (Figures in Rs.)

Sr. No.	Debit	Distant marketing	Social media and phone calls	Credit	Distant marketing	Social media and phone calls
1	Added Cost			Reduced cost		
a)	Transport cost	688	406	Commission charges	788	788
b)	Packaging cost	375	313	-	-	-
2	Reduced return	-	-	Added returns	6250	6656
	Total	1063	719	Total	7038	7444

Net change in income due to sell through distant marketing was Rs. 5975 and through social media and phone calls was Rs. 6725 during the pandemic

Distant marketing and marketing through social media and phone calls was extra two methods adopted by the farmers during the pandemic than the previous year. Debit and credit side of the partial budgeting presented in Table 6 reveals that the total additional cost of distant marketing was observed to be Rs. 1063 per quintal. However, the reduced costs and added returns due to distant marketing of mango were Rs. 7038 per quintal. Similarly, added costs due to marketing through social media and phone calls were estimated to be Rs. 719 per quintal and reduced costs and added returns were Rs. 7444 per quintal.

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be Rs. 1063 per quintal. However, the reduced costs and added returns due to distant marketing of mango were Rs. 7038 per quintal. Similarly, added costs due to marketing through social media and phone calls were estimated to be Rs. 719 per quintal and reduced costs and added returns were Rs. 7444 per quintal.

Thus, net change in income due to sell through distant marketing and through social media and phone calls rather than sell through wholesalers and commission agents was estimated to Rs. 5975 and Rs. 6725 per quintal respectively.

7. Challenges faced by respondents during COVID-19 pandemic

The information regarding the challenges faced by respondent farmers in mango crop production during COVID-19 pandemic is displayed in Table 7.

Table 7: Challenges faced by respondents during COVID-19 pandemic.

Sr. No.	Challenges	Number of respondents (percentage to the total respondents)
1	Labour Unavailability	91.66
2	Transportation unavailability during lockdown	35.00
3	High wage rate	83.33
4	Low price for produce	75.00
5	Input Unavailability	70.00
6	Delaying in harvesting	90.00
7	Loss due to delaying in harvesting	81.66
8	Loss due to delaying in transportation	21.66
9	Unavailability of tools and implements during lockdown	23.33
10	Market closure	38.33

It is observed from Table 7 that, in study area, the major problems experienced by the sample farmers were labour unavailability (91.66%), delaying in harvesting (90.0%), low price for produce (75.0%), high wage rate (83.33%) and loss due to delaying in harvesting (81.66%). Other than these problems faced by the farmers, input unavailability (70.0%), transportation unavailability during the lockdown (35.0%), market closure (38.33%), unavailability of tools and implements during the lockdown (23.33%) and losses due to delaying in transportation (21.66%).

Conclusions

1. The returns from mango orchard was comparatively higher during COVID-19 pandemic even though yield level were found to be lower. This was due to higher price realization during COVID-19 pandemic.
2. In COVID-19 pandemic condition, supply of inputs was decreased. Because of sudden lockdown, limited transportation, shutdowns of manufacturers and market closure.
3. In labour utilization, it is seen that during the COVID-19 pandemic condition, supply of hired labours was decreased.
4. Input utilization in major horticultural crops was affected

during the pandemic period as supply of inputs was limited it created maximum gap in the usage of various inputs.

5. Partial budgeting of extra methods adopted for marketing of mango during the pandemic showed Rs. 5975 per quintal net change in income due to distant marketing and Rs. 6725 per quintal net change in income because selling through social media and phone calls.
6. Major challenges faced by the sample farmers in mango production and marketing during the pandemic were labour unavailability, delaying in harvesting, low price for cashew produce, high wage rate and loss due to delaying in harvesting. Other than these, problems faced by the farmers were input unavailability, transportation availability during the lockdown, market closure, and unavailability of tools and implements during the lockdown and losses due to delaying in transportation.

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