

**Review Article**

Indian Agriculture During the Pandemic: Impact and Resilience

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To cite this article:

Poondla Madhurya, Mekala Latha, Challa Sujani Rao, Sunkara Prathibha Sree. Indian Agriculture During the Pandemic: Impact and Resilience. *Advances in Applied Sciences*. Vol. 6, No. 2, 2021, pp. 14-18. doi: 10.11648/j.aas.20210602.12

Received: September 29, 2020; **Accepted:** November 3, 2020; **Published:** April 29, 2021

Abstract: The Indian agriculture and allied sector is not an exemption in facing the unprecedented conditions occurring due to the coronavirus pandemic. But the sector is resilient enough to have a setback and show its economic prominence. Agriculture and allied sector has shown a 3.1% GDP growth during the pandemic even though the sector involves manual outdoor operations on a daily basis. The food grain output was recorded as the highest ever (295.67MT) during 2019-20. Out of the highest contributing crops, rice has shown the highest increase in production (9.27 m tons) followed by pulses and Cotton, whereas the remaining crops has shown an average increase of 3.52 million tons. In spite of the perishability of the agriculture goods, harvest is being wasted at markets, Industrial godowns and on-crop wastage has also become a serious problem due to less marketable time, poor storage techniques and workforce. On the flip side, Due to the increase of unemployment in the country the malnutrition has become much concern due to lack of purchasing power of citizens. But the farmers in the country normally have less profit margin of over 10-12% of the cost of production. As South India is the most hard hit of diseases caused due to undernutrition, The Agribusiness and agri production, supply chain systems and allied sectors should allocate properly the increased production with necessary postharvest and processing measures and increase trade opportunities for increasing value added in order to achieve nutritional security and increase profit margin of farmers and thereby to fight the effect of pandemic on people.

Keywords: Perishability, Production, Malnutrition, GDP

1. Introduction

India consistently ranks second among most populous countries in the world [6]. Agriculture being the backbone of Indian economy is a source of employment to almost 60 percent of the country's population with its diversified interrelation with Forestry, Fishery, Animal husbandry, Dairy, Poultry and other. India is the second largest producer of agricultural products. India is the world's largest producer of milk, pulses and jute, and ranks as the second largest producer of rice, wheat, sugarcane, groundnut, vegetables, fruit and cotton. It is also one of the leading producers of spices, fish, poultry, livestock and plantation crops. Worth \$ 2.1 trillion, India is the world's third largest economy after the US and China [4]. Agriculture sector contributes about 17 percent towards Nations GDP [5]. The global pandemic caused by the

SARS CoV-2 virus is not an environmental disaster like floods or earthquakes but the level of impact it is creating is similar to those [2]. When the research is in an incapable position in failing to find an appropriate medicine to stop the disaster, we can at least lessen the aggravating impact of the disaster on the society by adopting proper managerial skills and putting them into practice. The pandemic has made its own fingerprints in almost all sectors leaving them unproductive with a sense of fear and uncertainty. Agriculture has become a complex cycling process of battles between farmers and the land. So far, the farmers in India tend not to leave their profession in spite of any calamity or crisis. But COVID -19 is exceptional in its risk on human life as it is also exceptional from other viruses in its rapid multiplying nature and genetic transformation ability. The agrifood production, supply chain and processing industries struggle in bringing food from field to fork. While

agriculture is the most deciding factor for Gross domestic product (GDP) of India, Time is the most critical deciding factor in agriculture. This article reviews the state of agricultural sector during the COVID-19 pandemic (upto August 2020) and focuses on the main troubles of the farmers and the reliable measures to be taken to improve production vs consumption and distribution pattern, measures to improve profit margin of farmers and to reduce postharvest losses.

2. Present Scenario

2.1. An Increasing Trend

The GVA to Agriculture has grown by 3.4% from April to June 2020 quarter compared to last year. The RBI estimate revealed that agriculture has recorded a real GVA growth of 4% this year. India has received healthy monsoon rainfall during July and August which are crucial for crop sowing. Subsequent high water availability augurs agriculture well this year which reflected an increase in the productivity of food

grains. In monetary terms, the sector has added 14,815 crore in the first three months of the fiscal while the overall GVA of the country has shown contraction of 22.8% in comparison to last year. Also the Agriculture has attracted huge private investments during July and August months. This might be due to the reverse migration of people to villages and the future uncertainty left in other sectors. This has created the willingness to invest back in agriculture,[14] Unlike the recent years scenarios of moving to other sectors.

Table 1. Composition of agriculture and allied sector and its contribution towards GDP.

Sector	Agricultural GDP	National GDP
# Crops	60.2	9.27
Livestocks	26.1	4.03
Forestry and logging	8.1	1.24
Fisheries and Aquaculture	5.6	0.86
# Field crops	34.3	5.28
# Horticultural crops	25.9	3.99
Agriculture Sector	100	15.4

Table 2. Impact of Covid-19 on performance of Agriculture sector.

Crop	Production (million tonnes)	Production (million tonnes)	Increase
	2018-2019	2019-2020	
Sugarcane	349.78	353.85	+2.61
Rice	107.80	117.47	+9.27
Wheat	103.60	106.21	+2.16
Cereals	43.06	45.24	+2.76
Total oil seeds	31.52	34.19	2.67
Cotton	28.04	34.89	4.07
Pulses	20.26	23.02	6.85
Food grain	285.21	295.67	+10.46

(Anil et al 2020)

2.2. An Overview of Underlying Problems

Despite an increase in agricultural production and GDP, the farmers are still not getting a fair price [1, 11]. This is the case during the times of inflation also [11]. This is due to the poor trade facilitation. In the next Kharif harvest season during November to December we can expect an increase in the production of food grains where we should improve the trading and supply chain management otherwise the country worsens its post harvest losses again. Due to the lockdown the Kharif sowing time has been delayed in community spread regions and the crops in those regions suffer from inappropriate microclimates which can cause negative impact on seed germination and crop growth. During the first phase of lockdown, the rabi harvesting has been halted and there was a standing crop loss due to lack of performing harvesting operations in some parts of India. In fact, neither sowing time nor the shelf life period of crops can be altered or extendable for which agriculture is considered as a time sensitive business. Exacerbating the problem of perishability of agri goods or products, the marketable time is reduced to three fourth during the pandemic days. Some agro produce manufacturing and processing industries were temporarily shut down during the first phase of lockdown period. This has shown the blockage of perishable stock decreasing the return on equity (ROE) of

the agri industries over a small period. On the other side of the alarming COVID cases there is a hidden hunger like situation called malnutrition which is worsening due to joblessness. But it is not just the food security that we need at this time but the nutritional security should be maintained in order to make one resistant to fight the pandemic. India has a normal food wastage of 30% grains and 40% fruits and vegetables unlikely to that, prevalence of malnutrition among Indian children remains alarming.

The Food and Agriculture Organization (FAO) of the U.N. estimates that about 1.3 billion tons of food per year is lost after harvest and before reaching consumers. Put in perspective, a 50 percent decrease in losses would be equivalent to adding more than 550 million acres of agricultural land, which is greater than the total amount of arable land in the United States and Canada combined. Grain bio deterioration generally occurs off-farm during storage in market, milling stations and warehouses whereas the mechanical damage, spillage or scattering are the characteristic losses from harvest to processing. The need of the hour is to deploy necessary post harvest and food processing techniques to reduce the danger of food and nutritional insecurity in spite of the operational risks involved during the pandemic. The Bengal famine which was caused

due to improper allocation of the resources during 1942 has shown the importance of supply chain management in agriculture for attaining food security. The Supply chain management should be worked in a prior vigilance with marketing intelligence and proper organization of the stock in order to anticipate the losses. Some less shelf life crops like Banana, Tomatoes, Chillies and climatic fruits like Mango

hold good for exports to increase the value added. The disruption of supply chain in agriculture or failing to reach out maximum number of end consumers depict not only the poor sale of agricultural commodities but also a wastage of all the input services like human labour, extension services of agriculture and all the package of practices that farmer does in order to bring the crop from sowing stage to harvesting period.

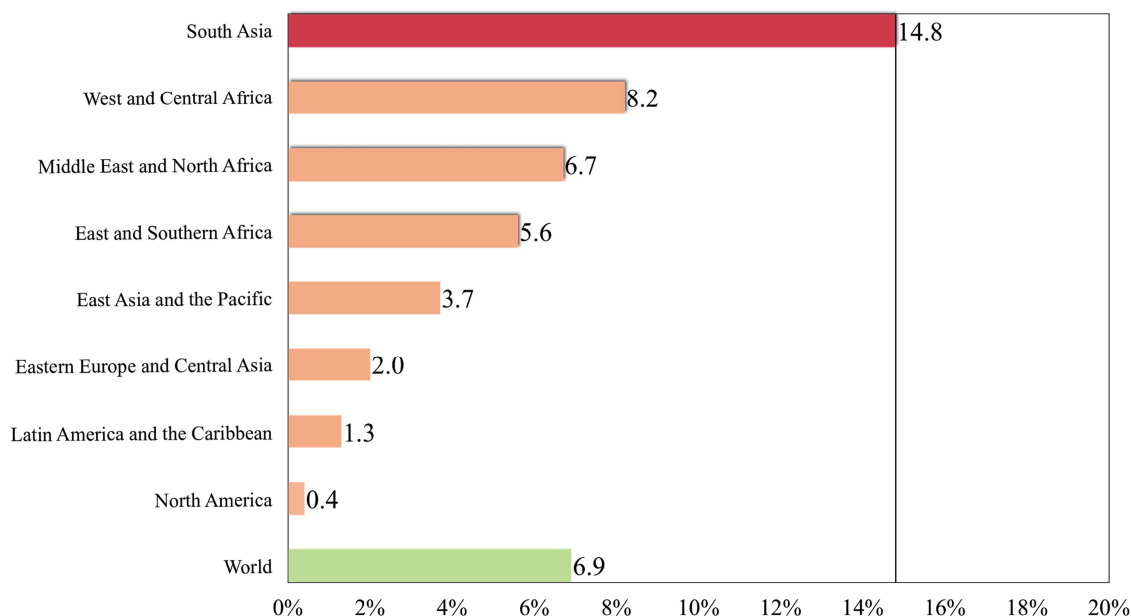


Figure 1. Percentage of children under 5 who are wasted (%), by region (2019 World data UNICEF).

3. A Guide for Further Improvement

Anti Globalization movements and techniques should be encouraged to reduce imports and dependence on foreign sources of supply. The remote areas within the country should be provided with proper allocation of resources utilizing the rail and flight services unused due to decreased mobility of citizens. By following this will show improvement in trade and GDP in the long run. Almost more than 80% of Indian farmers are small and marginal [3] without affording the techno driven farming operations. Having known that automation is needed for Indian agriculture,[9] In an incentive to increase the purchasing power of the farmers during the economic crisis, offering agriculture credit loans for tractors and other high cost mechanized equipment by director general of trade and development and agro service centers operating services for less cost if free service of agricultural machinery provided from government can have a betterment in farming. Farmers can be advised to grow short duration crops during COVID-19 as the cases number is alarming one should ensure that the farmers safety and exposure should be given paramount importance in the present situation of reduced workforce and increased reluctance of daily workers for performing outdoor activities. The virtual employment facilities should be increased, IT has a great role in improving the extension services in Agriculture. Proper awareness should be provided both at marketplace and in self and family management to the farmers during the pandemic. Online FTC

programs should be conducted frequently. A training need can be described as a "What attitudes, knowledge and skills do the functionaries need in order to do their job effectively" (Donald, 1983). Improvement in Training improves one's performance and results in better expected performance of the job in agriculture [12]. Creating virtual training meetings to agricultural Officers and thereby to farmers and creating Apps and reaching out the farming community and guiding them should be given supreme importance in this time to revive from obsolescence. The human resource of India is so high that we can utilize it by creating relevant possible employment opportunities either by providing legal rights to the already existing schemes [15] of agriculture like as under MGNREGA or by encouraging entrepreneurship within the budget for getting rid of the temporary economic recession of the country. As food, shelter, clothing are the basic needs of humans, The simple changes made on the trade of these will give a big impact in the long run for transforming India from a passive marketing country unto a hub of manufacturers. The khadi and village industries board should not only focus on improving employment facilities to the rural people but also to improve the economic objective of producing and selling goods for profit in order to improve the Gross value added (GVA) due to these industries. This can be done by encouraging the traditional Indian clothing by drawing the attention of the clients and encouraging the handicrafts by providing the startup and restart credits which will not only increase employment but also reduce the foreign dependence for

clothing of foreign brands which will surely have an uplift of Cotton growing farmers and the Indian textile industries. Also the ministry of Agriculture should bear some of the operational costs of agri produce manufacturing units like Oil mills, textile mills, Cold storage, Sugar factories, Rice mills, etc for giving salaries to employees and for their working capital, because these are the industries which mechanise the agriculture. The Small industries development organization

(SSIB) and (MSMES) should increase the maximum limit of the credit to artisans and hand made product sellers during the present difficult times besides providing restart credits to entrepreneurs. However the repo rate also plays a role in the unemployment rate in the country. Agro Industries development corporation's of all states must take relevant coordinated plans of actions to reap intangible benefits to the farming sector during the economic crisis.

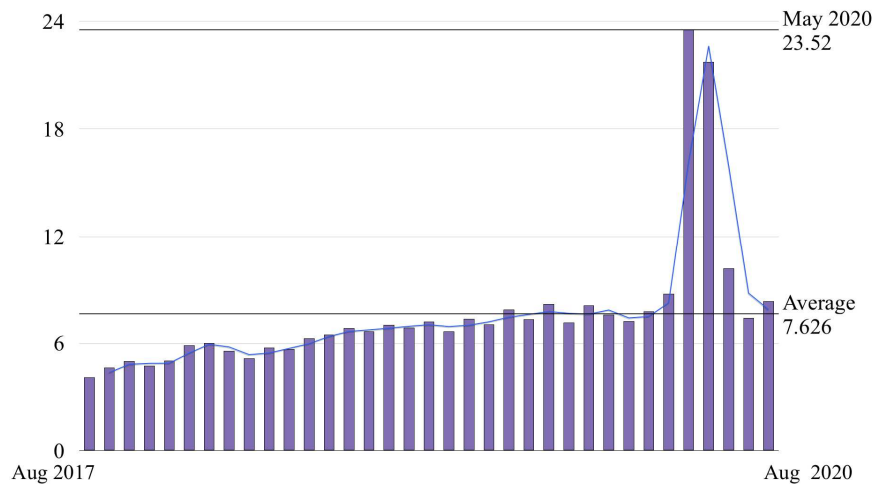


Figure 2. Unemployment rate (%) in India, by month (2017 Augusto to 2020 August CMIE data).

Research should be given paramount importance for agriculture to flourish. Finding new minerals that can be used as a source of nutrients and also utilization of wastewater for extractable nutrients for the improving of soil productivity is an important angle to improve the efficient usage of the resources. Usage of Bio fertilizers, Bio pesticides, Integrated farming bio systems, Integrated pest and nutrient management will have sustained benefits than chemical farming while maintaining soil health. Digital soil health cards are to be provided for farmers to help them in making the fertilizers application decisions. The online decision support tools which are based on principles of site specific nutrient management should be utilized by small and middle farmers more vigorously to take on spot soil tests due to less access to manual tests [8]. The art of kitchen gardening is a nice approach but it couldn't be possible in cities however they can adopt roof farming and vertical farming approaches which are strong assets to ensure nutritional security with less mortality risk during the pandemic [7]. Home composting with kitchen waste is a sustainable sense of action to adopt. Green houses and polyhouse is another area of concern as they safeguards the crop from temperature aberrations and from the present heavy rains which might be due to slight decrease in pollution amid lockdown. Polyhouses also provide as an isolated conditions to farmers, preventing air borne infection, better feasibility to sanitation before entry into the work environment, proper vision on crop's micro environment with individual care and governance is possible. Low cost small and medium polyhouses can be developed at home or for a colony purpose. Proper retail packaging and sanitation should be given supreme importance as it can lessen the probability of

risk on life. Using improved storage technologies for packaging make higher profits, It is evident from a survey that the maize stored in hermetic bags received almost 11 percent higher prices than that stored in jute bags [10]. Open marketing without a roof or shelter should be avoided which may cause post harvest loss and less trade time during the bad weather conditions. Also drones can be a great need if the pandemic cases surge. Drones will ensure precision farming practices by proper supplying of fertilisers to crops in large scale farming systems by site specific management to manage field variability while producing high profits and yield stability with less environmental impact due to accuracy and efficiency in fertilizer use. These can be remotely controlled, they can play a role in food production and distribution as well during the disaster period. The food production should diversify the crops selections and the intake of protein diet through pulses and millets be improved instead of high focus on rice and wheat consumption. The bio fortification of cereals for improving iron content [13] in food supplements can lessen nutritional insecurity and undernutrition in children by protecting from stunting and wasting and will have a good impact to make people physically resistant from the disease. Government giving iron rich foods at a subsidiary price for children and lactating women can reduce severity of hunger related problems.

4. Conclusion

The unemployment, production loss, and undernutrition related problems in India are still to be answered to their extent. The government should spotlight on improving the

Agricultural credit projects provide crop insurance, virtual training to farmers, online extension facilities, e-agri marketing platforms, guidance on market intelligence to new agro entrepreneurs during the pandemic, supply free agri inputs for increasing tangible benefits to farmers for encouraging farming, and encourage foreign investments in India. The research has to be given importance for new innovations in quality food production in a sustainable way and scientific methods of food processing in order to get a relief from the worrying situation of nutritional insecurity. There should be a much focus on Organisational, Commercial, Managerial, Financial, Social and economic aspects of farmers and the cash mobilization in agricultural sectors should be taken into consideration in order to maintain the agricultural production distribution and consumption cycles of the country in an organized way.

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