

Impact of COVID-19 on Indian Agriculture and Some Mitigation Strategies

Dr. S. N. Jha,

Indian agriculture is robust and contributed so much that no was afraid of at least for food crisis during this more than month lockdown and various restrictions imposed throughout world due to rapid spread of COVID-19, rather India was confident enough to have so much storage of food for feeding whole India for more than one and half years, even if there is no production of food during these period. Thanks to all agricultural scientists and engineers, storage and distribution agencies, and other stakeholders engaged in Indian Food and Agriculture System. The COVID-19 pandemic has forced us to think and reorient our food system so that country remains always with full stomach. There is an old proverb that खाली पेट होइह न राम गोपाला (means empty stomach does not allow even chanting of The God's name). We are one of the most populous countries and thus require our food systems so robust and renewable that even if any other pandemic or any other biological attack in terms of viral/microbial diseases in our agriculture and animal production systems comes in future, impact on economy in general and food system in particular should be minimal. This article therefore discusses how this pandemic may affect our agriculture and food system in near future and some mitigation strategies to make country's Food and Agriculture least affected due to any such pandemic in future.

Current Scenario and Immediate Effect

Indian Agriculture and Food system is unique. Here some states are considered to be consuming states while others supplying. These consuming states if you see mostly are suppliers of labour force to those producing states not only for Food and Agriculture System but also for labour intensive industries. The supply of labour powers normally is called labourers' migration from less economic activity states to high economic activity states. While accurate data is hard to obtain, Union Labour Ministry statistics put the number of migrant labourers in India at about 41 million. The Census 2011 had put the number of internal migrants within the country at 139 million. However, this number also includes women who migrate due to marriage or with their migrant husbands. Uttar Pradesh, Bihar, Madhya Pradesh, Chhattisgarh, Jharkhand, Rajasthan, West Bengal, Odisha and the North East contribute nearly all the labourers who need to move between states. The exodus of lakhs of labourers from worksites and many times their bare-feet or bicycle march to home states will perhaps remain the most gripping and enduring reminder of the COVID-19 effect. According to one estimate nearly six million migrant workers were seen crossing state borders—often multiple states—during the second fortnight of March itself. This impatience march of labourers towards their home states is mainly because of fear in mind of about 80% that they will run out of food before the end of the lockdown. In addition over 92% of them had already lost one to three weeks of work, which probably caused financial insecurity too, besides family anxiety. Many of them even thinking, if will die without food and funds, let die in our home and thus reach there by hook or crook. Things were however managed well by the administration and all government and nongovernment agencies. But it is and will be

very difficult to make them follow the lockdown guidelines, even simple social distancing norm, to decelerate the spread of COVID-19 and any other such pandemic in future.

Though the overall supply situation and prices of essential food items does not appear to be too worrisome, but in longer period adverse effects in **five cases** may be seen. Majority of operations requires labourers and they have either returned their home or want to return due to insecurity even post-COVID-19, which **firstly** affected, harvesting, collection and marketing of food grains, fruits and vegetables at the farm level. **Secondly**, fall in the farm prices of a range of commodities in agriculture. Tomato growers in Maharashtra were reportedly receiving not even Rs 2 per kg. Grape growers were reportedly facing an aggregate loss of Rs 1000 crore due to the crisis, as demand has fallen. Wheat prices in Madhya Pradesh have had reportedly fallen from Rs 2200/Q to about Rs 1600/Q by March 25th 2020. For many crops, these prices are also below the MSPs announced. In Punjab, vegetables that were sold at Rs 15/kg were reportedly being sold at just Rs 1/kg. In Delhi's mandis, the price of broiler chicken has fallen from Rs 55/kg in January 2020 to Rs 24/kg in March 2020. In Tamil Nadu, egg prices have had reportedly fallen from Rs 4/egg to Rs 1.95/egg over the same period. If these lockdown proceeds or happens in instalments, these prices may to rise, just as in the Western economies, driven by panic buying and supply bottlenecks. Despite such price rises, the farmers are unlikely to be the beneficiaries; most benefits are expected to flow to wholesale and retail traders as well as other middlemen. In addition there is also a chance of glutting of some agri-produce when lockdown is lifted fully. There may be little heat of maintenance of agri-equipment, water bodies and transportation system.

Third, the return of many migrant workers back home has meant that harvest operations are not taking place smoothly, and many farmers are being forced to leave the crop in the field itself or delayed harvesting of over-ripened crop. In such cases, the losses will be maximum for farmers. While mechanical harvesters in some states could be used, lockdown regulations disrupted their free movements from one place to another, besides shortage of drivers/operators for these harvesters were rampant. As machine repair shops were closed and mechanics were not available, spare parts were not easily available for repairs, leading to many machines being left unused. In the rice mills of Kerala too, reports indicate a shortage of migrant workers, which had led to these mills not procuring sufficient paddy from the farmers. So farmers had either not harvested at all, or had harvested but left the product near the fields. Labour shortages were also being experienced in most milk processing plants, cold storages and warehouses. **Fourthly**, supply chains were disrupted across the country for a range of commodities and causes huge post-harvest losses even at supplier's level.

Fifth, Kharif showing particularly paddy transplantation may also be adversely affected in coming season, because of these labour-home-returns. As I have personally observed during 2009-10, when a vast portion of labourers returned Bihar and did not come back to Punjab and how difficult was paddy transplantation during that period. Because of frequent such fears in the mind of labourers they may not return to their previous employers and thus agriculture production system in food supplying states may get adversely affected, while

labour supplying states may have surplus manpower due to less economic activities. Policy makers have to think ways and means to solve these imbalances for both immediate and longer term as follows:

Mitigation Strategies

As our Honourable Prime Minister has said on the eve-of Panchayati Raj day interaction that COVID-19 situation has taught us to be self-reliant. For becoming country self-reliant each and every one district and panchayat has to be self-reliant. Mismatch of economic activities of different states and different district within states have to be addressed. For labourer surplus states we have to create agricultural/rural raw material based industries so that no farmers or their dependents have only agricultural activities, they must have some alternative source of perennial income too. Each family must have at least one or two members some salary/business based job, while states having labourer shortage may go towards fully mechanized precision Agriculture, precision Post-harvest operations and on-line marketing systems without boundary (Precision management system). For example the labour deficit state should immediately shift to Direct Seeding Rice instead of transplanting for which machinery are used here and there successfully. In any case, Indian Agriculture to secure future needs now major emphasis on Research, Development and Investment in Agricultural Engineering.

In labour surplus states we can make a containment zone of increased economic activities by establishing Agro-processing Centres (APC) based on locally available raw materials. For example APC for grain includes rice; wheat; pulse and oilseed processing, APC for selected spice processing, APC for fruits and vegetables processing. These APC may further be divided into primary and secondary processing and their combinations. Based on our experiences and APC models available, one agro-processing centres having investment of say 30-40 lakh can give direct employment of 6-10 persons locally with net profit of up to Rs. one lakh per month. For such establishments we need to decentralize the storage godowns at say panchayat level (which will also help in reducing grain movements, say **grain miles** during such pandemic and may work like a grain bank when need be), food quality and safety testing laboratories, a market yard for surplus and finished processed products selling locally and in open market through different digital platforms implemented by Government. In fact the present APMC should be abolished for whole country. In addition farm machinery and post-harvest equipment custom hiring centres, equipment repair and service centre etc may come its own in these areas and thus economic activities may get intensified. In such pandemic situation or otherwise each harvest before packaging should be treated with ultraviolet or infrared rays to ensure zero load of any virus and microbes. If one such APC is established in each village, labour movement may get considerably reduced. In fact no one want to leave their birth place, if he or she gets his/ or her requirement fulfilled locally. We have to generate work for majority of them as an additional source of income.

In labour shortage states we need to give emphasis on full mechanization of field preparation to sowing/transplantation, weeding, fertigation, harvesting, threshing, processing, and online

marketing, say using electronic national agricultural marketing, popularly known as e-NAM.. Efforts have to be made to develop robots not only for these operations for food grains but also for fruits and vegetables. A policy decision has to be taken and horticulture train developed long back in collaboration of ICAR, NHB and CONCOR needs to be introduced. Internet-of-thing (IoT), machine vision system, deep machine learning, sensor based maturity, harvesting and ripening stage determination of crops with big data analytics and decision making system need to be established for Indian Agriculture.

World population now need to be ready to face situation like COVID-19 or such worse situation or even more on our Agriculture and Food system in future too. A contingency plan for such situation, if any in future be in place. The nation which will be able to fill the stomach of their population without coming out from their homes for long period will only be the winner. For such situation we have to start working on developing engineered food (manufacturing food in factory without cultivation) designing robot for not only giving milk but also for delivery of food and for working as maid in needy houses; if not so, **at least low volume** (so that easier and quicker in transportation and distribution) **high nutrition having high amount of good quality protein, minerals, vitamins and other immune strengthening instant food products must be to be developed** for feeding masses in such situations in future. A broader Interdisciplinary platform/centre comprising scientists of Agricultural Engineering, Electronics, Computer, Robotics and Automation should quickly be formed to achieve this long term goal and for making such pandemic ineffective in future.

(The writer is ADG (Process Engineering) in ICAR. The content in this article is his personal views and the ICAR is not responsible for the same).