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INDUSTRY OUTLOOK

INDIAN RICE INDUSTRY: OUTLOOK AND CHALLENGES

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Industry Outlook

Rice is one of India's most important food crops, feeding the population of India, as well as a key generator of employment. The region under rice crop grew from 30.81 million hectares in 1950-51 to 43.86 million hectares in 2014-15, a nearly 142% increase. Rice production has increased significantly from 20.58 million tonnes in 1950-51 to 104.86 million tonnes in 2014-15, a nearly 5-fold increase. In 1950-51, the yield was 668 kg/ha, which increased to 2390 kg/ha in 2014-15 [1]. The majority of rice is produced during the Kharif season. Rice, which is a high-protein grain, comes in two varieties: basmati and non-basmati. In the global rice market, world production for 2020/21 rose 0.85 million tons to a record 504.0 million, with Indonesia, the Philippines, and Sri Lanka accounting for most of the increase. But the production forecasts for 2020/21 were lowered for Argentina, Guyana, and Nigeria.



Global and domestic and residual use is forecast at a record 504.2 million tons, up 2.2 million from the previous forecast, with China accounting for the bulk of the upward revision. China's Long grain rice accounts for roughly two-thirds of the country's rice production, with medium and short grain varieties accounting for the remaining one-third. China is also a major rice importer and exporter in the world. China imports massive volumes of milled rice, the majority of which comes from Southeast Asian neighbors.

Global Trend of Rice production:

The following Table (Table 1) represents the world's major rice producing countries.

Table-1: Country wise Rice production (milled production in million tonnes)

Country	2019-20	2020-21	Change over 2019-20
China	146.73	148.3	1.57
India	118.43	120	1.57
Indonesia	34	34.9	0.9
Vietnam	27.1	27.1	No major change
Thailand	17.66	18.66	1.0
Burma	12.7	12.9	0.2
Philippines	11.93	12	0.07
Japan	7.61	7.62	0.01
Pakistan	7.2	7.6	0.4
Brazil	7.6	7.48	-0.12
USA	5.88	7.23	1.35
Nigeria	5.04	5.04	No major change
Egypt	4.3	4	-0.3
South Korea	3.74	3.51	-0.23
European Union	1.98	1.98	—

Source- USDA report-India-Grain and Feed Update-February 2021. <https://www.fas.usda.gov/data/india-grain-and-feed-update-25>

With the exception of Brazil, South Korea and Egypt, the majority of countries show positive growth in rice production from 2019 to 2020. Vietnam and Nigeria saw broadly no change in production. Additionally, global rice production has increased, with China, India, Indonesia, Vietnam, and Thailand remaining the Major producers.

Global Rice Indices

Table-2: International Grains Council (IGC) and Oilseeds Index (GOI) and GOI sub-Indices

Item	January 2021 Average*	Month-on-Month(M-0-M) Per Cent Change (%)	Year-on-Year (Y-0-Y) Per Cent Change (%)
Rice	197	2.90%	18.40%

*Jan 2000=100, derived from daily export quotations
Source: market Monitor, AMIS; No. 85, February 2021

The main crop harvesting progressed well in several key Asian exporters. But average international rice prices have risen month on month (m-o-m), and trade has been hampered by a regional shortage of shipping containers. Strength in the local currency and worries about low water supply bolstered Thai quotes, while tight availability boosted Vietnamese values ahead of winter/spring crop harvesting. In India, prices grew as a result of heavy government paddy procurement and steady demand in the face of low export prices. Global rice trade is expected to reach 46.1 million tonnes, up 0.5 million from the previous estimate and up 3% from a year ago [3] .

Table-3: International Grain Council’s World Rice Projections (in million metric tonnes)

Years	Opening Stock	Production	Imports	Total supply	Total usage	Exports	Closing stocks
2018-19	164.878	498.2988	42.57974	663.1768	487.5618	42.57974	175.61
2019-20 (estimated)	175.61	497.3958	43.58955	673.0058	498.6343	43.58955	174.37
2020-21 (forecast)	174.37	503.6175	45.635	677.9875	502.2017	45.635	175.785

Source - Accessed from International Grains Council

Major rice exporters are India, Thailand, Vietnam, Pakistan, and the United States, while the major importers are Comoros, Philippines, China, Benin, and Iran.

Table-4: Major Exporting and Importing Countries (2019-2020)

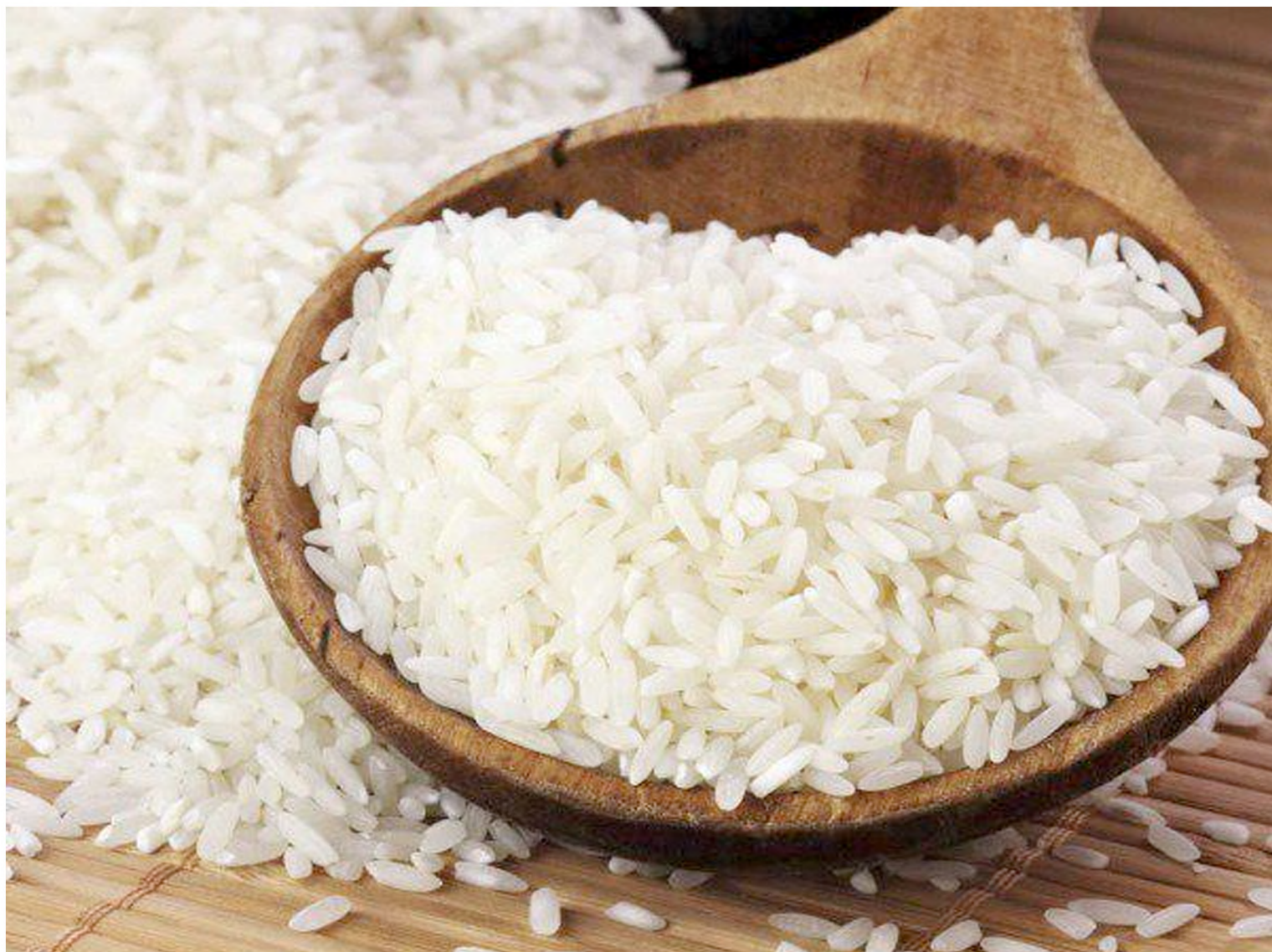
Importers (In lakh tonnes)		Exporters (In lakh tonnes)	
Comoros	522.85	India	98.19
Philippines	27.68	Thailand	75.80
China	24.89	Viet Nam	54.68
Benin	15.28	Pakistan	45.88
Iran, Islamic Republic of	14.23	United States of America	36.28
Saudi Arabia	14.03	China	27.47
Côte d'Ivoire	13.42	Myanmar	23.22
Iraq	12.56	Brazil	10.62
Ghana	10.87	Uruguay	9.01
Malaysia	9.69	Paraguay	7.38
South Africa	9.67	Italy	6.75
United States of America	9.62	Cambodia	5.55
Senegal	8.92	Korea, Democratic People's Republic of	5.13
Cameroon	8.90	Argentina	5.03
Brazil	7.51	Belgium	3.39

Source- Trade Map, HS-Code-1006 (Rice)

In the last few years, the Philippines has emerged as one of the top global importers of rice, almost on par with China. In comparison to the Philippine position, China's share of global rice imports has almost shrunk by half. In March 2019, the Philippines implemented the Rice Tariffication Act which led to a considerable increase in imports. This development also provided an opportunity to the Indian rice exporters to enhance rice exports to Philippines. While this helped lower inflation, the Philippines adjustment to rice liberalization remains a challenge. On September 11, 2019, the Philippines notified the World Trade Organization (WTO) of an investigation into the surge in imports, in reaction to the farmgate price dropping nearly 30 per cent and the resulting loss of income for farmers. The investigation will help determine whether a safeguard measure, which could potentially double the current duty, can be imposed.[4]

Domestic Outlook

Rice is the staple food of over 65 per cent of India's population and accounts for 40 per cent of the country's total food grain production. It plays an important role in Indian agriculture because it ensures the food and livelihood security of a significant portion of the rural population. India produced 116.42 million tonnes of rice in 2018-19, trailing behind only China in the world [5] .



The Economic Survey, 2020-2021 highlighted that major commodities of export, which recorded positive growth during January 2021 vis-à-vis January 2020 were: Other cereals (313.88%), Oil meals (253.06%), Iron ore (108.66%), Cereal preparations and miscellaneous processed item (43.62%), Jute mfg. Including floor covering (27.64%), Tobacco (26.18%), Rice (25.86%), Fruits and vegetables (24.00%), Carpet (23.69%), Handicrafts excl. Hand-made carpet (21.92%), Spices (20.35%), Ceramic products and glassware (19.01%), Engineering goods (18.69%) etc.[6] , As a whole, it is clear that the production of cereals, including rice, has improved.

Table-5: The domestic balance sheet in (MMT)

Years	2018-19	2019-20	2020-21*
Carry in	19.13	26.11	30.04
Production	116.48	118.43	119
total Availability	135.61	144.54	149.04
Consumption	99	104.54	104.04
Exports	10.5	10.44	12.00
Total Usage	109.5	114.5	116.04
Carry out	26.11	30.04	33
Average Monthly Consumption	8.29	8.57	8.6

* Estimated

Source: Compiled from www.agriwatch.com; <http://www.agriwatch.com/grains/rice/>

The domestic balance sheet in (MMT) is shown in the table above (Table-5) for the three years beginning in 2018-19. The table clearly brings out that India's exports, demand, and consumption are all on the rise. The favourable climate condition is one of the reasons for the increased production trend.

According to APEDA's (February 2021) latest estimates, total rice exports reached a high of 115.98 lakh tonnes in the first nine months of the current fiscal year, i.e., April to December 2020. In the first three quarters of this year, 64.30 lakh tonnes of rice were exported. Indian rice is being actively purchased by Asian and African buyers because Indian rice is still significantly less expensive than Thai rice, even after a minor price increase [7].

Table-6 India's Rice Production and Exports (in Million Tonnes) [2011-12 to 2019-20]

Year	Production	Exports
2019-20	100.35*	3.78 (April-August)
2018-19	116.42	12.00
2017-18	112.76	12.69
2016-17	109.70	10.75
2015-16	104.41	10.50
2014-15	105.48	11.97
2013-14	106.65	10.88
2012-13	105.23	10.13
2011-12	105.30	7.16

*First Advance Estimates for Kharif Crop only.

Source: Agriculture Ministry, APEDA.

Basmati Rice

"Basmati" is long grain aromatic rice grown for centuries in the specific geographical area, at the Himalayan foothills of Indian sub-continent. Basmati rice is characterized by extra-long slender grains that elongate at least twice of their original size with a typical soft and fluffy texture upon cooking, delicious taste, superior aroma and distinct flavour. In view of these and other attributes, Basmati rice is unique among other aromatic long grain rice varieties. Agro-climatic conditions of the specific geographical area as well as method of harvesting, processing and aging account for these distinctive features of Basmati rice. Owing to its unique characteristics, the "scented Pearl" lends a touch of class that can transform even the most ordinary meal into a gourmet's delight.

This is why the US Patent Office in September 1997 judged the result, named basmati 867, sufficiently novel to grant it patent #5,663,484, entitled "Basmati Rice Lines and Grains", giving RiceTec exclusive rights to any basmati hybrid grown anywhere in the western hemisphere.

Areas of Cultivation:

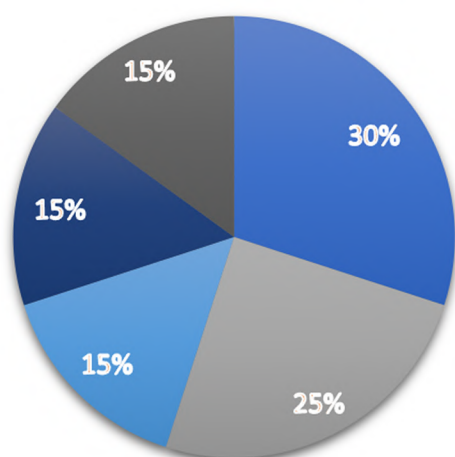


The areas of Basmati Rice production in India are spread over the states of J & K, Himanchal Pradesh, Punjab, Haryana, Delhi, Uttarakhand and western Uttar Pradesh.

Basmati Rice Exports

India is the leading exporter of the Basmati Rice to the global market. The country exported 44,54,656.70 MT of Basmati Rice to the world for the worth of Rs. 31,025.91 crores (or 4,330.68 US\$ Million.) during the year 2019-20. Major Export Destinations of Basmati Rice (2019-20) are Iran, Saudi Arab, Iraq, United Arab Emts, Kuwait.

CHART-A Top Five Export Destination of Indian Basmati Rice as on 2019-2020



- Nepal (242.6 Mill, USD)
- Benin (195.2 Mill, UDS)
- U Arab Emts (130.3 Mill, USD)
- Somalia (121.6 Mill, USD)
- Guinea (119.3 Mill, USD)

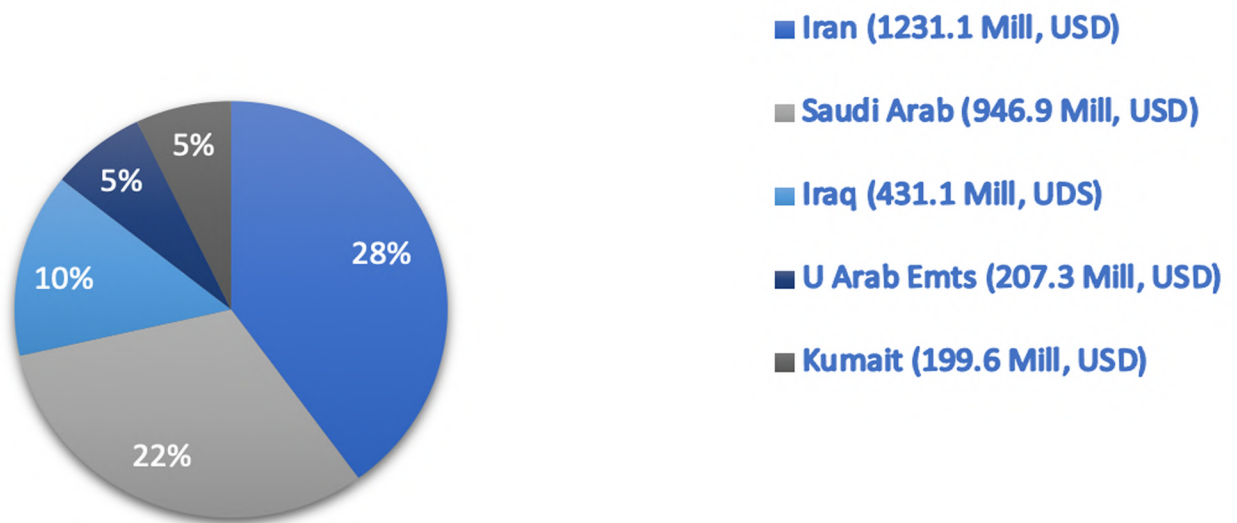
NON-BASMATI RICE

Any rice other than Basmati Rice is termed as Non- Basmati rice. In the world, it has been reported that there are 10000 varieties of rice. Out of these varieties, the maximum number is in India.

Exports:

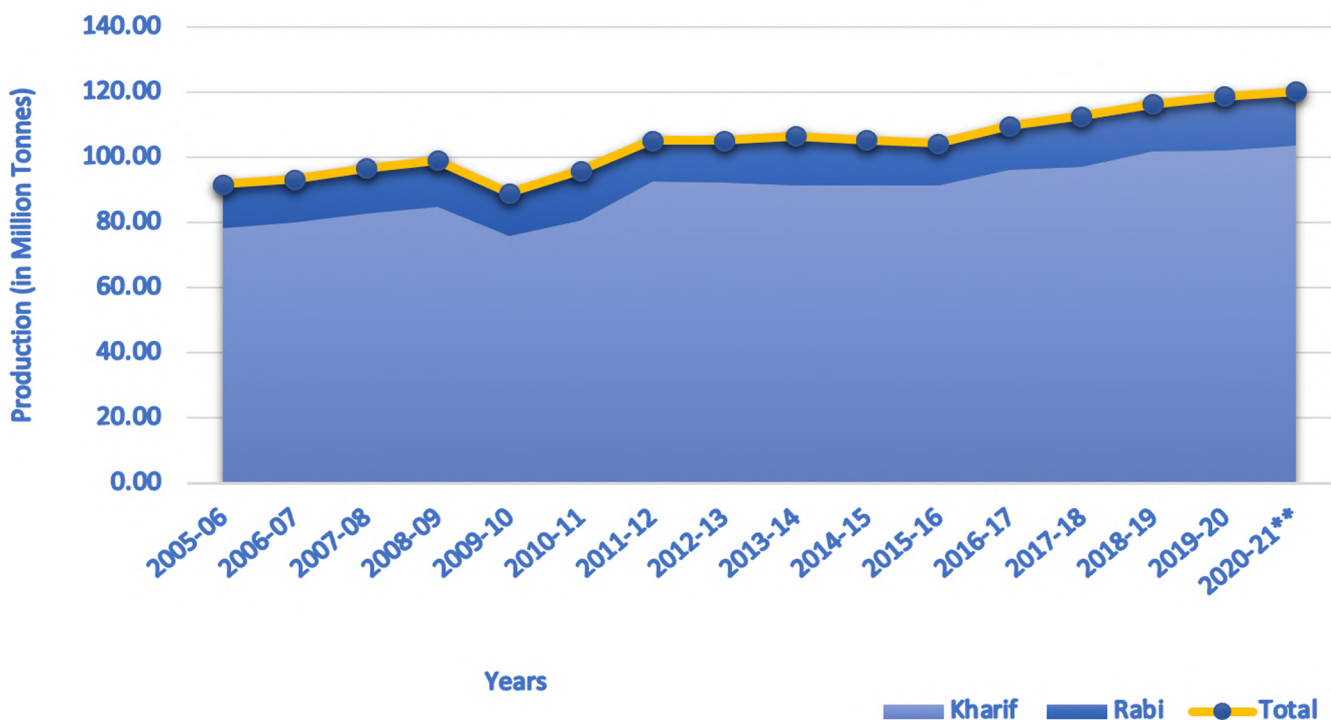
The country exported 50,40,707.75 MT of Non-Basmati Rice to the world for the worth of Rs. 14,364.64 crores/2,014.59 USD Millions during the year 2019-20. Major Export Destinations of Non-Basmati Rice (2019-20) are Nepal, Benin, U Arab Emts, Somalia, Guinea.

CHART- B Top Five Export Destination of Indian Non-Basmati Rice as on 2019-2020



Source: APEDA, https://agriexchange.apeda.gov.in/indexp/Product_description_32headChart.aspx?gcode=0602

CHART-1 Rice Production (in Million Tonnes)

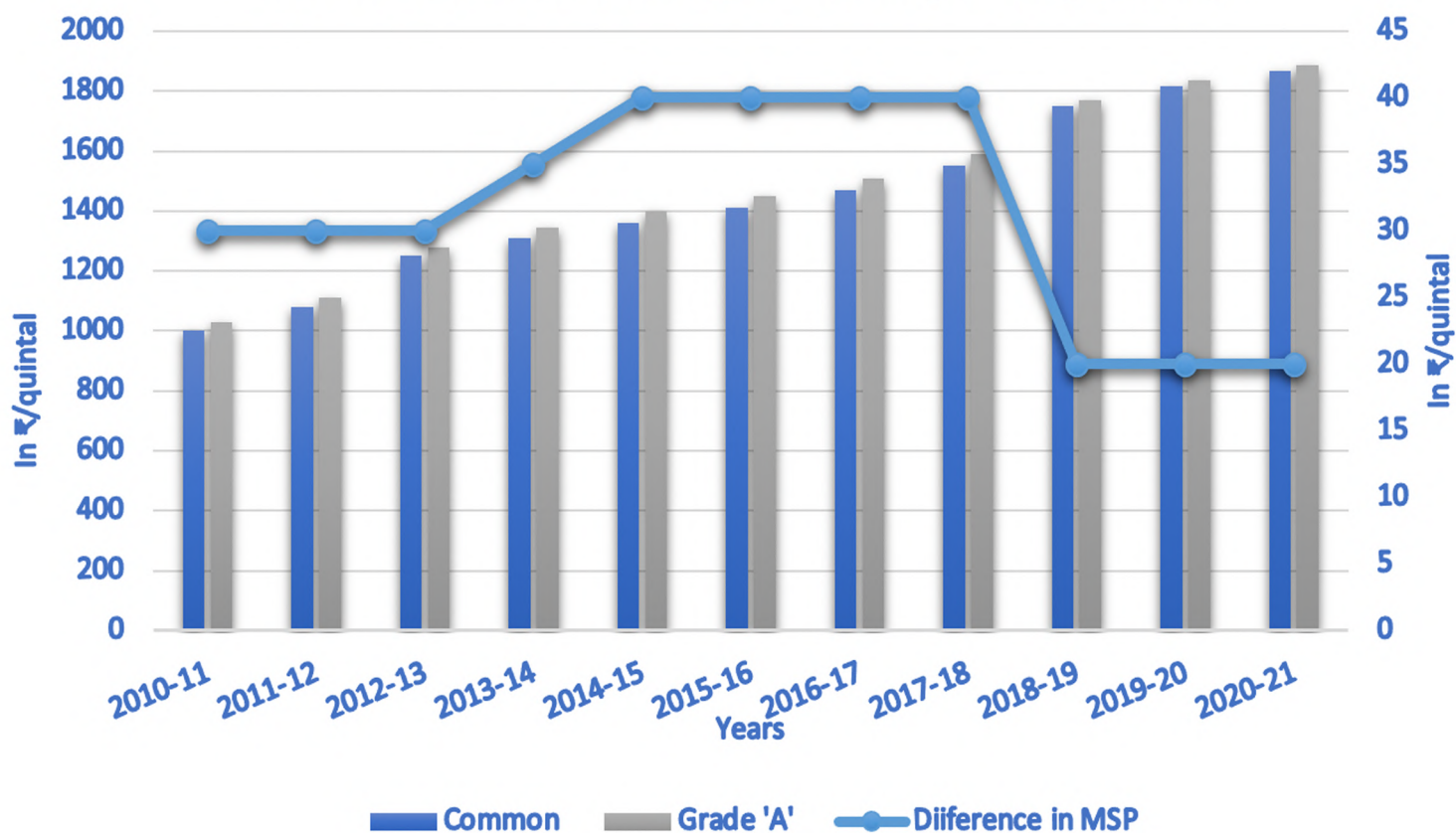


** Second Advance estimate (24-02-2021)

Source- Ministry of Agriculture and Farmers Welfare Department of Agriculture, Cooperation and Farmers Welfare

As per the second Advance Estimate (AE) of the Ministry of Agriculture and Farmers Welfare Department of Agriculture, Cooperation and Farmers Welfare, India's total rice production is estimated at 120.3 Million tonnes (2021). We can see from the above chart that the rice production increased significantly from the 2009-10 (89.09 million tonnes) to 2020-2021.

CHART-2 MSP-Paddy Trends (in ₹/quintal)



Source - Farmer's Portal <https://farmer.gov.in/mspstatements.aspx>

The above chart (Chart-2) brings out that while the MSP grew over time, the price gap between rice varieties narrowed significantly- from a high of 40/quintal (2015-2018) to a low of 20/quintal in recent years (2019-2021).

India's Largest Rice Producing States

Presently the highest rice producing states in India are Punjab, Andhra Pradesh, Uttar Pradesh, West Bengal, Tamil Nadu, Bihar, Chhattisgarh and Orissa; together they hold almost 72 per cent of the total area of rice production and contribute almost 75 per cent of the total rice in the country. West Bengal has been considered as the largest producer of rice in the country. The region has nearly half of its arable land under rice cultivation, which comes to about 5 million hectares of rice growing area. In the financial year 2016, this state produced over 14.8 million tonnes of rice, thus remaining as the highest rice- producing state in the country.

Government Initiatives

The government is taking prompt steps to ensure rice exports while taking all COVID19-related safety precautions. This has largely led to the sharp increase in rice exports, particularly during a period when the global COVID19 pandemic has disrupted supply chains for many commodities.

First export consignment of 'Red rice' from Assam to the USA flagged off [8].

It will significantly improve India's rice export prospects, as this rice variety, known as 'Bao-dhaan', is cultivated in Assam's Brahmaputra valley and is an important part of Assamese food. This Red rice is being sourced by leading rice exporter-LT Foods.

The shipment of non-Basmati rice increased dramatically between April and January of 2020-21. During April-January 2021, non-basmati rice exports totalled ₹ 26,058 crore (3506 US\$ million), compared to ₹ 11,543 crore (1627 US\$ million) in April-January 2020. Non-Basmati exports rose by 125 per cent in Rupee terms and 115 per cent in Dollar terms.

Government Procurement (hereafter GP) for the year 2020-21 increased[9] . Because of forecasted record harvests, reasonably poor open-market rates, and increased government purchasing to allay protests against the three new farm laws, the GP of rice through the minimum support price (MSP) scheme is significantly ahead of 2019-20. As a result, rice procurement through 22 January 2021 was expected to be 38.75 MMT (million metric tonnes), a substantial 22 per cent improvement over the same timeframe last year. Also, after ending the COVID-19 relief programs in November 2020, common rice prices continued to remain weak due to sufficient supplies on record Kharif rice harvests and weakened domestic demand.

The table (Table-7) and chart (Chart-3) shows the government procurement of Rice by states (MMT) in India.

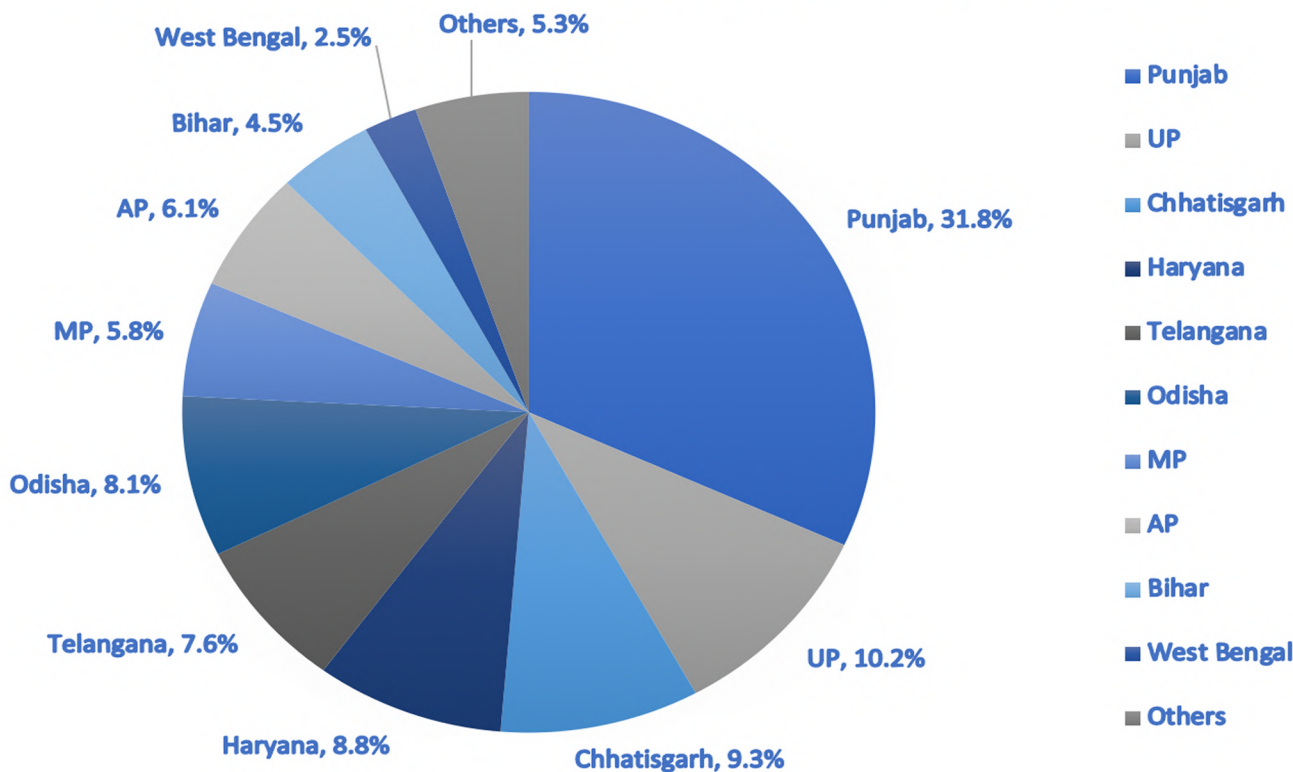
Table-7: State wise Rice Procurement

State	2018-19	2019-20	2019-20	2020-21
Period	October-September		October 1-January 22	
Punjab	11.33	10.88	10.87	13.59
Andhra Pradesh	4.81	5.53	1.75	1.74
Telangana	5.19	7.45	3	3.16
Chhattisgarh	3.97	5.22	3.53	3.98
Odisha	4.45	4.8	2.08	2.51
Haryana	3.94	4.31	4.31	3.76
Uttar Pradesh	3.23	3.79	3.32	4.14
West Bengal	1.98	1.84	0	0.44
Madhya Pradesh	1.4	1.74	1.54	2.5
Tamil Nadu	1.29	2.2	0.06	0.44
Others	2.81	4.23	1.2	2.5
Total	44.4	52	31.68	38.75

Source: Government of India, Food Corporation of India.

The chart (chart-3) given below diagrammatically shows the procurement of rice in various government schemes.

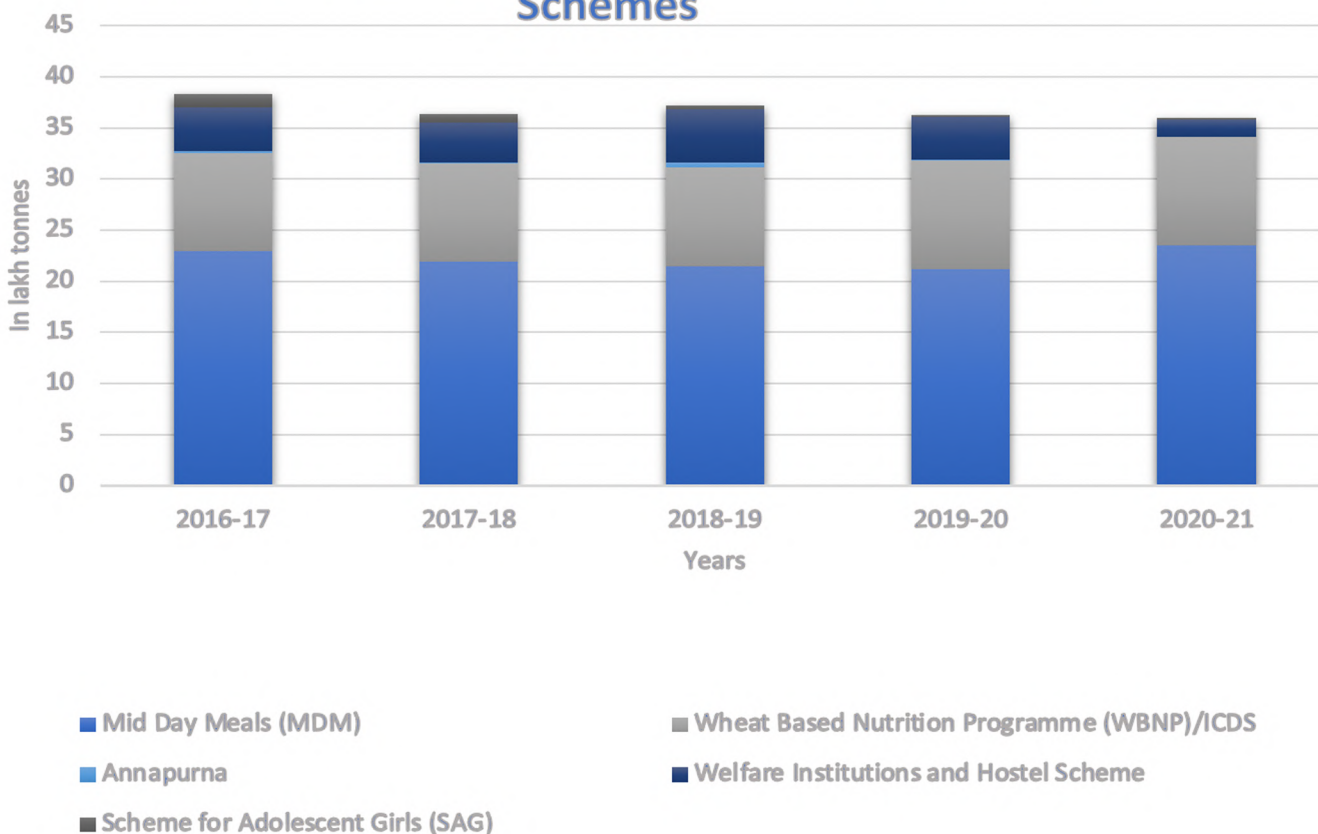
CHART-3 Major Paddy Procuring states in KMS 2020-21



KMS referred as Kharif market year.
 Source: Government of India, Food Corporation of India

We can see from the multi-bar chart above that the government rice procurement increased significantly over time. Positive growth is seen in mid-day meals and wheat-based nutrition programmes, but the reverse is seen in Welfare Institutions and Hostel Schemes.

CHART-4 Procurement of Rice in various Government Schemes



Source: Ministry of Consumer Affairs, Food and Public Distribution, Govt. of India.

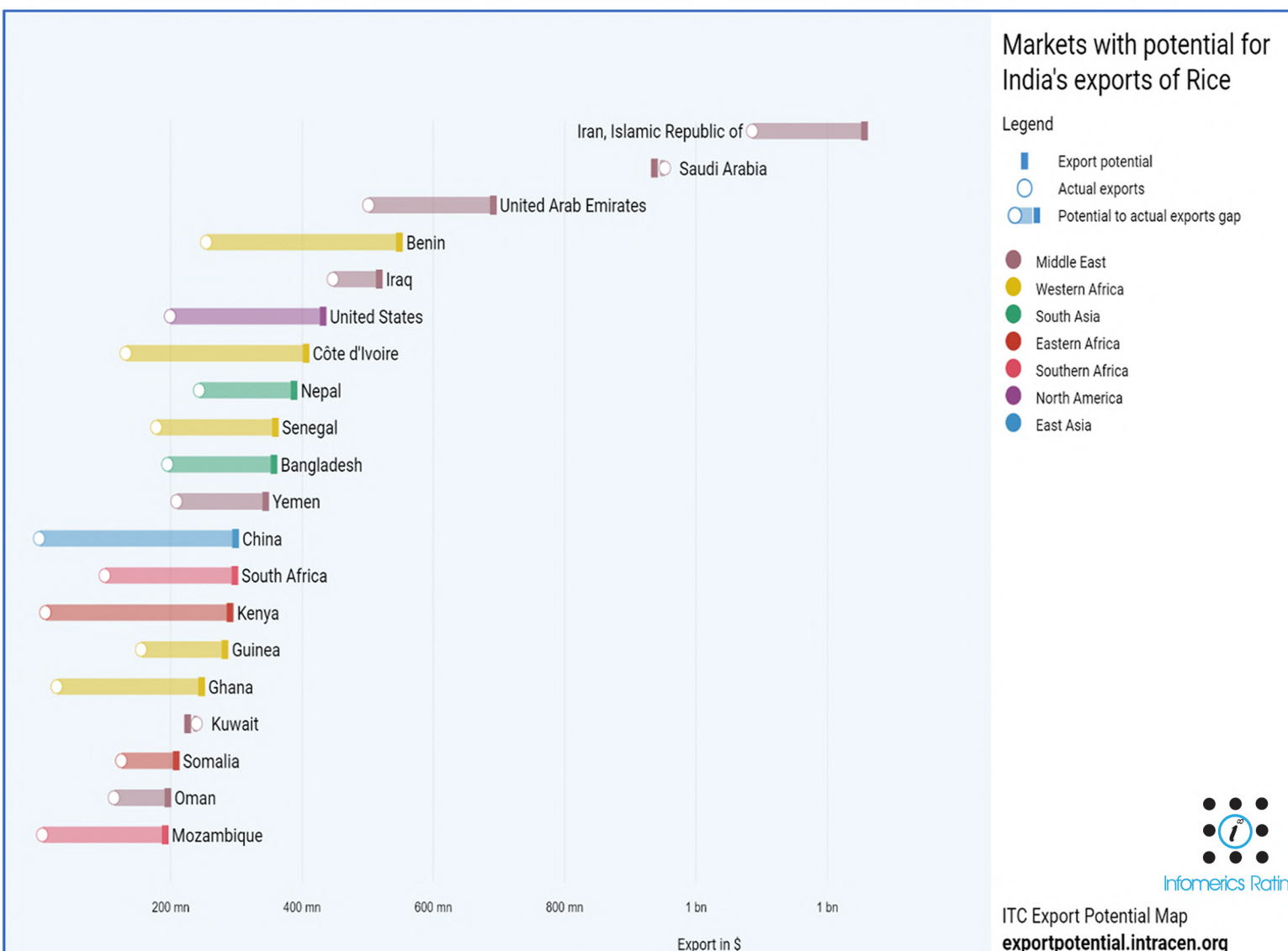
The negative growth in hostel scheme and welfare institution stems from the pandemic COVID-19 situation. In the ongoing Kharif Marketing Season (KMS) 2020-21, Government continues to procure Kharif 2020-21 crops at MSP from farmers as per existing MSP Schemes, as was done in earlier seasons.

Paddy procurement for Kharif 2020-21 is continuing smoothly in the procuring States & UTs of Punjab, Haryana, Uttar Pradesh, Telangana, Uttarakhand, Tamil Nadu, Chandigarh, Jammu & Kashmir, Kerala, Gujarat, Andhra Pradesh, Chhattisgarh, Odisha, Madhya Pradesh, Maharashtra, Bihar, Jharkhand, Assam, Karnataka, West Bengal and Tripura with purchase of over 638.57 LMTs of paddy up to 12.02.2021. This is an increase of 16.25 per cent against the last year corresponding purchase of 549.30 LMT. Out of the total purchase of 638.57 LMT, Punjab alone has contributed 202.82 LMT which is 31.76 per cent of total procurement [10].

Indian untapped market for Rice (HS code - 1006) and Rice Export Potential

Rice exports and imports can be analysed by using Trade Map under HS Code- 1006. The Chart (Chart 5) represents the Indian Rice Export potentials. "Export potentials" imply the untapped markets for Indian exports. Let us take an example, suppose country X is a rice exporting country. Country-Y is a rice importing country, which imports rice from many countries including Country-X. The amount of Export by Country-X is lower than the amount of rice Country-Y is importing hence there is a scope for Country -X to export more to Country -Y that is what we called as untapped market. Rice exports and imports can be analysed using Trade Map under HS Code 1006, and the Chart (Chart-5) below depicts Indian exports and export potentials. Export potentials are untapped markets for Indian exports. Take, for example, the case of country X, which exports rice. Country-Y is a rice importer that imports rice from several countries, including Country-X. Since the amount of rice exported by Country-X is less than the amount of rice imported by Country-Y, there is potential for Country-X to export more to Country-Y, which we refer to as an untapped market.

Chart-5: India's Rice Export Potential



The oval shape reflects current exports, while the bold rectangular part represents the total amount of imports that a nation is importing. Hence, the difference between the two is known as the export potential to actual exports.

Iran, the Islamic Republic of, Saudi Arabia, and the United Arab Emirates are the markets with the most potential for Indian rice exports. China has the highest absolute difference between potential and real exports in terms of value, leaving room for \$287.5 million in additional exports.

Industry Risk

It is estimated that approximately 400,000 tonnes of non-basmati rice and 100,000 tonnes of basmati rice were caught in the supply chain in March and April 2020, as a consequence of lockdown impact. India mainly exports non-basmati rice to Bangladesh, Nepal, Benin and Senegal, and premium basmati rice to Iran, Saudi Arabia and Iraq whereas, Cambodia, Vietnam and Myanmar curbed their rice exports, and as a result demand for Indian rice surged, but traders were reluctant in signing new contracts.

The non-basmati rice exports declined after the government withdrew 5 per cent incentives from April 1, 2019. In order to help farmers, the government has increased minimum support price (MSP) for the last several years, but this has made Indian rice uncompetitive for exports.

In addition, some importing countries, such as Bangladesh, have begun to cultivate rice on their own, resulting in a reduction in overall annual imports. One potential explanation is that the MSP for India's non-basmati rice exports has been steadily growing. Export demand for non-basmati rice mostly is affected due to the increase in the Minimum support price (MSP) of paddy which made the Indian non - basmati rice expensive in the world market. On the supply side, rice production remains highly dependent on the vagaries of the monsoon and faces agricultural risks, such as, outbreak of diseases, which could lead to variance from the projected production levels impacting supply and hence prices, and damages caused by poor storage facilities.



With 1.87 million tonnes of non-basmati rice imported from India in 2017-18, Bangladesh became the largest importer. But farmers in Bangladesh increased their sowing area the following year, resulting in higher production from local sources and a proportionate decrease in non-basmati rice imports. Consequently, India's non-basmati rice exports to Bangladesh fell by 70 per cent in FY 2018-19, to just 480,567 tonnes. With continued favourable agro climatic condition this year as well, United States Department of Agriculture (USDA) reported Bangladesh's rice output to rise further 35.3 million tonnes this year as compared to 34.9 million tonnes and 32.6 million tonnes in 2018-19 and 2017-18 respectively [11] .

India merchants almost halt exports to Iran as its rupee reserves fall: The current issue that will trigger difficulty in exporting rice to Iran is a shortage of Iranian currency with the two lenders, IDBI and UCO, because depleting currency reserves generates confusion on the payment front, and Indian exporters are now concerned about future payments [12] .

Paddy cultivation a threat to sustainable agriculture: Rice cultivation is a major source of GHG emissions (e.g., methane and nitrite oxide) and a significant sequester of carbon dioxide from the atmosphere, making it a significant threat to sustainable agriculture. Furthermore, methane (or CH₄) an emission from flooded paddy fields, as well as the burning of rice residues, including husks and straws, contributes to GHG emissions [13] .

The industry also faces high working capital requirement, inventory carrying costs and interest costs. Being a seasonal crop, huge stocks of paddy have to be procured and stored for a long period. There are regulatory risk/concerns for non-basmati rice too; non-basmati rice is procured by government under the PDS at levy prices (sum total of MSP and milling cost). Rice mills have to first supply a fixed proportion of custom-milled rice as per respective state government's requirement to the Food Corporation of India before entering the open market. This impacts the profitability of rice mills.

India is likely to see a decline in non-basmati rice as demand from West African countries remain weak. Iran, the biggest buyer of India's basmati rice has started own production [14] . Competition from other countries like Pakistan, Vietnam, Thailand is also increasing [15] .

However, a major challenge is that as rice exporters, both basmati and non-basmati, are facing difficulties over rising transportation cost due to diesel price hike and a subdued demand in the gulf region due to second wave of coronavirus hitting the region. Rising transportation costs have posed challenges to carry rice from Haryana to Mundra and Kandla ports.

Road ahead

During the forecast period, the rice market is expected to rise at a CAGR of 1.2 percent (2021-2026). In comparison to other sectors, rice commercialization has not been substantially impacted by COVID-19 because of steady growth in demand.

Despite the global lockdown, India's rice crop is expected to be the largest in the last five years, and demand for rice continues to grow. The initial 21-day lockdown in March and April 2020, however, disrupted rice exports. Surplus rice held by the Food Corporation of India (FCI) is expected to be converted to ethanol for use in making alcohol-based hand sanitizers and blending for the Ethanol Blended Petrol (EBP) scheme.

Many rice exporters are keen to a part of the paddy procurement process at minimum support price (MSP) in the forthcoming rabi harvest season in Telangana, mainly with the demand to smoothen out international and domestic price differential.

Given the winds of change blowing across countries and the heightened consciousness of the concerns of sustainable development in general and climate change and reduced water availability because of plummeting water table levels (with about 4,000 litres of water going into production and processing per kilogram of rice) in particular, India's rice producers need to modify their production strategies and management practices to sustain production and increase yield over the long haul. This aspect assumes particular significance in view of the United Nations' Food and Agriculture Organization's (FAO's) disconcerting estimate that the world population will grow by two billion people by 2050 and food demand will increase by 60 per cent.

This steep rise in population will naturally have attendant implications for greater water requirement across the board, including for crop production, drinking water, and industrial use. This thesis can be substantiated by important work done by Dr. Prasanta Kalita, Professor, Department of Agricultural and Biological Engineering, University of Illinois. Professor Kalita has, on the basis of comprehensive modelling exercise, demonstrated "the crop growth stage is shrinking.

The time for total maturity from the day you plant to the day you harvest is getting shorter. The crops are maturing faster, and as a result, you don't get the full potential of the yield". Implementing strategies also need to be tweaked to prevent post-harvest crop losses. The FAO estimates about 30 per cent of crop loss or wastage post-harvest. Consequently, efforts to reduce these losses can enhance crop availability and food security. Holistically, an apposite approach to achieve a 60 per cent increase in rice production while minimizing additional irrigation needs requires a judicious mix of conservation strategies and a 30 per cent per cent reduction in post-harvest loss. This is a difficult task but certainly doable.

Given the large untapped market for rice, there is a compelling need for ease in business procedures that will aid in smooth exports from India to other countries, as these untapped markets provide a welcome opportunity. As exports and production in several countries have taken a hit in the wake of the Covid-19 pandemic, India is well placed to tap newer markets with appropriate policies. But this opportunity needs to be effectively leveraged by coordinated and concerted action by all stake-holders with a sense of urgency. There is also a need for proper technological advancement and R&D, which will help to ensure the agricultural market's long-term viability.

ENDNOTES

1. See the Status paper of NFSM, <https://nfsm.gov.in/StatusPaper/Rice2016.pdf>
2. See February Report of USDA.
3. See USDA report. <https://apps.fas.usda.gov/psdonline/circulars/grain-rice.pdf>
4. See report by Observer Research Foundation (Issue 433,2021). https://www.orfonline.org/wp-content/uploads/2021/01/ORF_IssueBrief_433_Climate-Smart-Agriculture-.pdf
5. See PIB, dated 15-02-2021.
[https://pib.gov.in/PressReleaseIframePage.aspx?PRID=1698184#:~:text=8.84per%20cent.-,The%20commodities%2Fcommodity%20groups%20which%20have%20recorded%20positive%20growth%20during,\(44.88%25\)%2C%20Jute%20mfg.](https://pib.gov.in/PressReleaseIframePage.aspx?PRID=1698184#:~:text=8.84per%20cent.-,The%20commodities%2Fcommodity%20groups%20which%20have%20recorded%20positive%20growth%20during,(44.88%25)%2C%20Jute%20mfg.)
6. See the Paddy outlook, Agricultural Market Intelligence Centre, PJTSAU.
7. "How India's rice production can adapt to climate change challenges"(12 March 2021)
<https://www.newfoodmagazine.com/news/141229/rice-farming-techniques/>
8. PIB dated 04-03-2021, <https://www.pib.gov.in/PressReleaseDetail.aspx?PRID=1702513>
9. Last accessed through PIB dated 15-02-2021 and USDA (22 February 2021)
10. Last Accessed through PIB, Dated 13 Feb 2021.
11. See Business Standard/ 29-07-2019, "India's non-basmati rice export falls after govt withdraws tax incentive."/https://www.business-standard.com/article/economy-policy/india-s-non-basmati-rice-export-falls-after-govt-withdraws-tax-incentive-119072901168_1.html
12. See Mint/04-03-2021, "India merchants almost halt exports to Iran as its rupee reserves fall",
<https://www.livemint.com/news/world/india-merchants-almost-halt-exports-to-iran-as-its-rupee-reserves-fall-officials-11614860621423.html>
13. For more details see the report by observer research foundation, Issue 433, 2021.
14. See <https://economictimes.indiatimes.com/news/economy/agriculture/indias-august-rice-exports-drop-29-on-weak-african-demand-govt/articleshow/71520823.cms>
15. See <https://timesofindia.indiatimes.com/business/india-business/india-needs-new-markets-for-rice-exports-says-industry/articleshow/70993699.cms>

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