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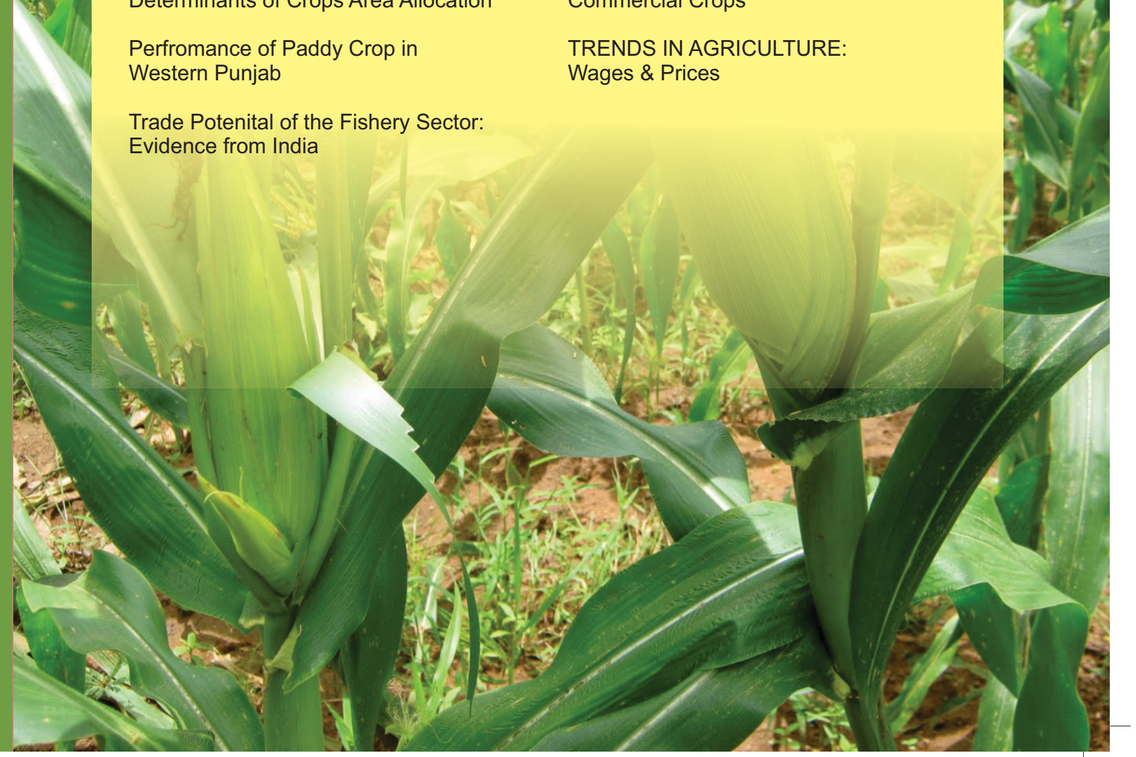
AGRICULTURAL SITUATION IN INDIA

NOVEMBER, 2016



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Agricultural Situation in India

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CONTENTS

The Journal is brought out by the Directorate of Economics and Statistics, Ministry of Agriculture & Farmers Welfare, it aims at presenting an integrated picture of the food and agricultural situation in india on month to month basis. The views expressed are not necessarily those of the Government of India.

Note to Contributors

Articles on the State of Indian Agriculture and allied sectors are accepted for publication in the Directorate of Economics & Statistics, Department of Agriculture, Cooperation & Farmers Welfare's monthly Journal "Agricultural Situation in India". The Journal intends to provide a forum for scholarly work and also to promote technical competence for research in agricultural and allied subjects. Good articles in Hard Copy as well as Soft Copy (agri.situation@gmail.com) in MS Word, not exceeding five thounsand words, may be sent in duplicate, typed in double space on one side of foolscap paper in Times New Roman font size 12, addressed to the Editor, Publication Division, Directorate of Economics and Statistics, M/o Agriculture & Farmers Welfare, C-1, Hutments Dalhousie Road, New Delhi-110 011 along with a declaration by the author(s) that the article has neither been published nor submitted for publication elsewhere. The author (s) should furnish their e-mail address, Phone No. and their permanent address only on the forwarding letter so as to maintain anonymity of the author while seeking comments of the referees on the suitability of the article for publication.

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Disclaimer: Views expressed in the articles and studies are of the authors only and may not necessarily represent those of Government of India.

STATISTICAL TABLES

Abbreviations used

N.A.	—	Not Available.
N.Q.	—	Not Quoted.
N.T.	—	No Transactions.
N.S.	—	No Supply/No Stock.
R.	—	Revised.
M.C.	—	Market Closed.
N.R.	—	Not Reported.
Neg.	—	Negligible.
Kg.	—	Kilogram.
Q.	—	Quintal.
(P)	—	Provisional.

Plus (+) indicates surplus or increase.

Minus (–) indicates deficit or decrease.

We are pleased to inform that our monthly journal *Agricultural Situation in India* has been accredited by the National Academy of Agricultural Sciences (NAAS) and it has been given a score of 2.76 out of 6. The score is effective from January, 2016 onwards. The score may be seen in the following website: www.naasindia.org

Soft copy of the journal may be seen in PDF at the following URL : eands.dacnet.nic.in/publication.htm

Farm Sector News

Union Agriculture & Farmers Welfare Minister Launched e-NAM Mobile App

Union Minister of Agriculture & Farmers Welfare, Shri Radha Mohan Singh, on 6th October, 2016 announced successful completion of e-NAM first phase and launched e-NAM Mobile App in New Delhi. The Minister of State for Agriculture & Farmers Welfare, Shri Parshottam Rupala was also present on the occasion.

Speaking on the occasion, Shri Radha Mohan Singh announced that most of the implementation issues faced in pilot phase had been addressed and e-NAM platform is connected to 250 markets across 10 States as of now (Andhra Pradesh (12), Chhattisgarh (05), Gujarat (40), Haryana (36), Himachal Pradesh (07), Jharkhand (08), Madhya Pradesh (20), Rajasthan (11), Telangana (44), Uttar Pradesh (67). Union Minister informed that so far, Detailed Project Reports (DPRs) for integrating 399 mandis with e-NAM have been received from 14 states and all of them have been approved.

Shri Singh said that the active involvement of all stakeholders, particularly mandi and marketing board officials made the NAM programme a success. He was sure that e-NAM would significantly contribute towards enhancing the farmer's income. He informed that so far, 1, 53,992.7 MT of agriculture produce worth Rs. 421 crore has been transacted on e-NAM platform and 1,60,229 farmers, 46,688 traders and 25,970 commission agents had been registered on the e-NAM platform.

He also added that quality parameters for 69 agricultural and horticultural commodities including cereals, pulses, oil seeds, spices, fruits and vegetables have been notified for trading on e-NAM platform. States have been asked to set up the quality assaying facilities to ensure quality assessment of the farmer's produce in a scientific and professional manner.

Also it was informed that provision of online payment of the sale proceeds to the farmers is made available in the e-NAM portal and States are requested to encourage direct transfer of sales proceeds to the farmer's bank account. A total number of 585 markets are targeted to be integrated in first phase with e-NAM by March 2018, out of which 400 markets will be integrated by March 2017.

Importance of Organic Farming has Increased Manifolds While keeping in view the Immediate Menace of Climate Change: Shri Radha Mohan Singh

The importance of organic farming has increased manifolds while keeping in view the immediate menace of climate change. That is why; the Government of India had launched Paramparagat Krishi Vikas Yojna (PKVY) and Organic Value Added Development (OVCDNER) schemes under National Sustained Agriculture Mission to promote organic farming in the country.

This was stated by Shri Radha Mohan Singh, Union Agriculture and Farmers Welfare Minister in a workshop organized on organic farming at Vigyan Bhawan, New Delhi on 7th October, 2016. Speaking on this occasion, Shri Radha Mohan Singh briefed the participants about Pandit Deen Dayal Upadhyay Unnat Krihsi Siksha Yojna.

Union Agriculture and Farmers Welfare Minister added that Paramparagat Krishi VikasYojna (PKVY) is the first extensive scheme which has been initiated in the form of Centre Sponsored Programme (CSP). The implementation of this scheme is carried out by the State Governments based on the cluster for every 20 hectare land. Under clusters the farmers are granted financial assistance for maximum one hectare land and Government of India has earmarked Rs. 50,000 for every hectare land during the period of transformation of three year ceiling. The objective in this regard has been chalked out for 10,000 of clusters while covering area of 2 lakh hectare land.

Shri Radha Mohan Singh further added that the Ministry of Agriculture and Farmers Welfare has launched a scheme as Central Regional Scheme - Organic Value Added Mode Development Mission for North-Eastern regions for implementation in Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim as well as Tripura during 2015-16 to 2017-18 while keeping in view the potentiality of farming in North-Eastern region. This scheme aims to develop authentic organic products in value added mode so that the consumers might be linked with consumers and from input, seed certification to unification, processing, marketing as well as grant formation initiative. Assistance might be extended for the entire value added development. He said that the scheme has been approved with Rs. 400 crore for a span of three years.

Source: www.pib.nic.in

Union Minister briefed that Agriculture and Farmers Welfare Ministry has launched a new scheme named as Pandit DeenDayal Upadhyay Unnat Krihsi ShikshaYojna to fish out the talent of Indian youths and all over development of rural India. This scheme is being implemented by Agriculture Education Division related to Indian Council of Agricultural Research Council (ICAR). Shri Singh further briefed that under this course of action the trainers will be selected on village level so as to establish training centre, to impart knowledge about natural/organic/sustainable farming/rural economy. Various training programmes will be conducted in different regions in these centers. Almost 100 training centers will be set up throughout the country for the participation of teachers in various activities for the Advanced India Campaign conducted by Agriculture Research Council/ Human Resource Development Ministry under this scheme alongwith.

India is among the Top Egg Producer Countries in the World and the Production of Eggs in the Country is about 83 billion- Shri Radha Mohan Singh

Union Minister for Agriculture and Farmers Welfare, Shri Radha Mohan Singh had said that the availability of egg is 63 per person per year in the country, while as per National Nutrition Institute this should be about 180 eggs per person. Agriculture Minister said this in a function organized by DADF on World Egg Day at Pusa in New Delhi on 14th October, 2016. The poultry farmers and various stakeholders had participated in this function.

Agriculture Minister said that India is among the top egg producer countries in the world and the production of eggs in the country is about 83 billion. He said that in order to increase egg production by three times many steps have been taken so that health of the children improves and poultry farmers get benefits. He said that Government of India was promoting poultry farming through National Livestock Mission. Financial assistance was being given to the BPL families for poultry farming. Poultry farming was being promoted under the component of entrepreneurship development and employment generation.

Shri Singh said on this occasion that awareness should be created among the people about the nutrition values of eggs and doctors, nutrition specialists, academicians, women and child institutes, egg processing industries and related policy makers can play a vital role in this regard. Agriculture Minister said that one out of four children up to five years was suffering from malnutrition. Egg can help a lot in combating the malnutrition. Shri Singh said that high nutrition contents were available in eggs as well as it was a very good source of protein, Vitamin A, Vitamin B6, B12, Amino acid and Folate, Iron, Phosphorus & Selenium. He said that the recent research shows that it was helpful in reducing blindness. The Minister said that National Egg Coordination Committee, Compound Livestock Feed Manufacturers Association of India, Animal Health Companies, Poultry Federation of India and Poultry Association played a vital role in this programme.

The Agriculture Minister had inspected- Pusa 16, the new improved variety of arhar at the Indian Agriculture Research Council-Indian Agriculture Research Institute, New Delhi. This variety of arhar takes a period of 120 days to get ready for harvesting compared to its other varieties which takes about 165-180 days. This variety gets ready at once and is suitable for machine harvesting. After harvesting of this variety, crops like mustard, potatoes, wheat, etc can be sowed easily in the fields. Its production is 20 quintals per hectare and has 23.5% protein content in it.

Initiatives by Government would bring Prosperity to Farmers: Shri Radha Mohan Singh

The government is committed for the prosperity and welfare of farmers, for this purpose a number of initiatives have been taken during last two and half year. Within four years objective of "Water to every field" would be achieved. Improved irrigation facilities with long term irrigation fund and better management initiated by this government would help to achieve the target. Addressing regional Editors Conference in Chandigarh, Union Agriculture and Farmers Welfare Minister Sh. Radha Mohan Singh said that to ensure better prices for the produce of farmers government was working in connecting all agriculture mandis with a national platform and by next year, all the 585 mandis would be connected to a common single market where farmers could be able to sell their produce for better price. He said that direct benefits transfer to farmers under various scheme would also be made possible in near future.

Shri. Radha Mohan Singh said that the government was working for financial empowerment of the farmers through various ways. The credit flow to the agriculture sector had been increased to 9.0 lakh crore and to reduce the pressure of loan on farmers, Rs. 15,000 crore had been allocated for interest subvention. Shri Singh said the centre was already providing 5% interest subsidy to the banks out of 9% being charged by them for agriculture loan. Union Minister appealed to the state governments to provide remaining 4% from their exchequer so that farmers can get agriculture loan at 0%.

Reiterating that government is committed to ensure two fold increase in the income of farmers, the Minister said that besides increase in MSP, other scheme had been taken up to raise the income of the farmers. The Minister added that Agro-forestry was being encouraged and some new programmes like "Medh Par Ped" had been initiated and extension and capacity building support was being provided to farmers for additional income.

The Union Minister announced that by next year about 14 crore farmers would get Soil Health Card and a significant numbers of farmers will get the insurance cover. Shri Singh said that the premium under Prime Minister Fasal Bima Scheme had been reduced significantly with full coverage of the loss. The Minister said that under Soil Health Card scheme, Rs 368.30 crore had been allocated this year compared to Rs. 142 crore last year. Shri Singh added that an allocation of Rs 5500 crore in the year 2016-17 budget has been made under Pradhan Mantri Fasal BimaYojana which was Rs 3,185 crore in the previous budget. This is an increase of about 73% in this scheme. Subsequently, Rs 500 crore allocated by Finance Minister and there is further demand for Rs 10,583 crore.

Central Government to open Krishi Vigyan Kendra (KVK) in all the Districts of the Country

The Central Government has announced opening of at least one Krishi Vigyan Kendra in all districts of the country. This would provide advanced Agriculture technical assistance to the farmers near their farms itself. Besides this, Central Agriculture and farmers welfare minister Shri. Radha Mohan Singh also announced the opening of Apiary Development Centers in ten states. Shri Singh called upon the farmers to use the residual husk after paddy farming to make organic fertilizer, in paper making and Card-board Industry and as animal feed. This would prevent the adverse effect of husk burning on the environment. Shri Singh directed that all the KVK and district Agriculture officers should apprise farmers to make appropriate use of husk. Shri Radha Mohan Singh Said that Hon'ble Prime Minister Shri Narendra Modi's Mission to increase the number of trees in the country by planting saplings on farm boundaries under National Forestry Plan should be implemented.

Shri Radha Mohan Singh highlighted all these things in New Delhi on 20th October, 2016 while interacting via video conference with all the KrishiVigyan Kendra experts, District level officers associated with agriculture Development and progressive farmers of 12 states. It was the first occasion when the Union Agriculture and farmers welfare minister addressed the officers of KrishiVigyan Kendra and District Agriculture officers, through video conference.

He appealed to the youth to associate themselves with Agriculture schemes based Start-ups and instructed the KVK and Agriculture officers to help the youth in connecting with the Start-ups, so that more job opportunities may be created. Shri Singh also urged all to provide constructive assistance to the Swatch Bharat Mission. The Union Minister directed all the Krishi .Vigyan Kendra Experts and district level officers associated with Agriculture development to participate in the cleanliness campaign in at least 5 villages so that more awareness on cleanliness may be created in the society.

NITI Aayog and Ministry of Agriculture & Farmers Welfare hold Consultations on Agriculture Reforms.

NITI Aayog and Ministry of Agriculture and Farmers Welfare jointly conducted a one day national consultation with States and UTs on Reforms in Agriculture on 21st October, 2016. The three important areas of reform, namely, (i) agricultural marketing reforms (ii) laws related to felling, transportation and processing of farm forestry produce and (iii) land leasing for agricultural purposes were discussed in the meeting. The meeting was attended by Principal Secretaries in-charge of Agriculture marketing, Forest and Revenue Departments of the States. The Vice chairman, NITI Aayog while inaugurating the consultation stressed that reform would be the key for enhancing agricultural prosperity and should be the part of vision for 15 years being prepared by NITI Aayog. Prof. Ramesh Chand, Member (Agriculture) made a presentation on Agriculture Reforms. It was also highlighted that while reforms happened in other sectors of economy post 1990-91 liberalization, the agriculture witnessed patchy and half done reforms. The Secretary, Department of Agriculture, Cooperation & Farmers Welfare mentioned that the reform process started in 2000 which faced a slow down after the initial years. He emphasized on the need to promote emergence of alternative channels and encourage investment in development of marketing and cold chain infrastructures. DAC has been advocating States to provide complete freedom to the farmers to sell their fruits and vegetables to the buyer of their choice in the notified market area with the additional option to sell the produce in the main yard, wherever they get better prices. Although 14 States have initiated reforms in varied models, States need to adopt the model which is more beneficial for them.

Department of Animal Husbandry, Dairying and Fisheries has made all out Efforts to Prevent H5N8 Virus

On 17th October, 2016, the National Institute for High Security Animal Diseases (NIHSAD), Bhopal informed that samples of wild birds died in National Zoological Park (NZP), New Delhi received by them have tested positive for H5 Avian influenza virus. These samples were earlier tested positive for Influenza A virus at Northern Regional Disease Diagnostic Laboratory (NRDDL), Jalandhar. Immediately, the advisory was issued to the Director, Animal Husbandry, Delhi Administration and the Director, NZP and were requested to send the report to the Department.

The NZP on 18-10-2016 informed that the mortality was among the wild birds and not the captive birds. The mortality started on 14-10-2016. Between 14 to 17th October, there was mortality of nine birds: 5 Rosy pelican, 3 ducks and one Painted Stork.

The Department of Animal Husbandry, Dairying and Fisheries has requested NIHSAD, Bhopal and the

NRDDL to investigate the outbreak thoroughly to determine the source of infection, so that the zoo authorities across the country can implement suitable strategy to prevent the ingress of the disease to captive birds. The same is under progress.

The Director, AH, Delhi visited zoo on 18-10-2016 and deputed his team for carrying out action/ surveillance at the zoo.

On 19.10.2016, Joint Commissioner (LH) and Assistant Commissioner from the Department of Animal Husbandry, Dairying and Fisheries visited the NZP had a discussion with Director, NZP and also participated in the meeting along with the officials of NCDC, Dr. Ram Manohar Lohia Hospital, Delhi Department of Health etc. The Department issued the necessary guidelines to the state government and the zoo authorities on control and containment of the infection. The Ministry of Environment, Forests and Climate Change was requested to issue advisories to all the wildlife/ bird sanctuaries in the country to be on alert and take necessary actions for prevention of the disease.

Till now, no human infections with H5N8 has been established anywhere in the world. However, necessary precautions are to be undertaken while handling sick/ dead birds and contaminated material during control and containment operations.

The Centre has also established a control room in DADF. The Control Room can be reached at these telephone numbers: 011-23384190 and 09448324121. Joint Commissioner, Dr. Munialappa has been named as the Nodal Officer and would be available for advice and help round the clock.

The National High Security lab for animal diseases - NIHSAD - the world body OIE recognised facility for disease diagnosis in South Asia and the Four Regional Laboratories, and the Central lab at IVRI have been instructed to give all assistance to the State Governments and get sample tested in an emergency response manner. In fact all 45 samples obtained from Delhi government at the Bhopal lab have been tested within the stipulated 72 hour time frame as per Bio-security level -4 requirements and 13 cases have tested positive for H5N8. Similarly test results have been given for other cases in Kerala, Punjab and MP. As per available reports from other states, the disease incidence is in control. The Animal Husbandry, Dairy and Fisheries Department of the States issued guidelines for maintaining cleanliness in the zoological parks housing wild birds, water bodies as well as meat / poultry market areas where meat is sold. Necessary precautions for human beings coming in the contact with poultry have also been reinforced although as per WHO observations, the transmission of H5N8 virus is very low. Also there would be no trade impact of the incidence as per global OIE criteria.

Thrust on Increasing Productivity of Oilseeds and Pulses to meet the Nation's Requirement: Shri Radha Mohan Singh

The Union Agriculture and Farmers' Welfare Minister Shri Radha Mohan Singh on 25th October, 2016 outlined the thrust of the Agriculture Ministry for increasing the productivity of oilseeds and pulses to achieve self-sufficiency. Addressing the Members of the Consultative Committee attached to the Ministry of Agriculture this morning, Shri Radha Mohan Singh said that Indian Council of Agricultural Research and the Ministry of Agriculture and Farmers' Welfare would jointly work on a two-pronged approach of productivity enhancement and increasing production through area expansion for meeting the shortage of pulses.

As regards oilseeds, the Minister said that the Indian Council of Agricultural Research (ICAR) was having research programmes for nine annual oilseeds crops at four commodity based research institutes. The Minister pointed out that there has been a technological breakthrough in oilseeds and a number of climate resilient high yielding varieties/hybrids of oilseeds has been notified for cultivation and increasing the productivity. He was confident that by adopting the already available technologies yield of nine oilseeds crops could be increased.

Shri Radha Mohan Singh informed the Members that India has a number of oil yielding species of plant origin which include the nine annuals, two perennials (oil palm and coconut) and some minor oil bearing species of forest and tree origin.

Among the nine annual oilseed crops, groundnut, rapeseed-mustard, soybean, sunflower, sesame, Niger and safflower are used for edible purpose and castor and linseed are the non-edible vegetable oil.

Soyabean contributes largest (36%) to the total oilseed production followed by groundnut, rapeseed-mustard, castor, sesame, sunflower, linseed, safflower and Niger. India is the largest producer of castor and dominates in global castor oil trade. The growth rate of edible oil consumption has increased at 4.3% while the annual oilseeds' production increased at about 2.2%, thus necessitating the import of edible oils. The country has to import more than 50% of edible oil. Last year edible oils to the tune of Rs 69,717 crores were imported to meet the domestic demand.

To meet the annual consumption of vegetable oil in the country by 2020 and 2025 (which is expected to reach 16.43 kg. and 16.98 kg per capita), it has been estimated that oilseed production to the tune of 86.84 and 93.32 Mts would be required by 2020 and 2025, respectively.

The Minister said that in order to make our country self-sufficient in vegetable oil, the productivity

enhancement programme for oilseeds might also require institutional and policy support in a campaign mode besides technological support from ICAR.

As regards pulses, the Minister said that ICAR is engaged in development of high yielding varieties/hybrids and associated crop production and protection technologies of various pulse crops through coordination with Indian Institute of Pulse Research, Kanpur and participation of the State Agricultural Universities, State Departments of Agriculture and other Institutes. Technological breakthrough in pulses in terms of notification of high yielding and pest/disease tolerant crop varieties/hybrids has been achieved.

KVKs set up throughout the Country Play very Important Role to Enhance the Income of the Farmers and Promote Agriculture: Shri Radha Mohan Singh

The Union Minister of Agriculture and Farmers Welfare, Shri Radha Mohan Singh said that the Krishi Vigyan Kendra (KVK) set up throughout the country play very important role to enhance the income of the farmers and promote agriculture. The Union Minister of Agriculture and Farmers Welfare appealed KVKs and state level agriculture officials that they should work with the farmers in very much closed affinity. They were called for to extend their contribution to the farmers for enhancing their income. Shri Radha Mohan Singh added that Ministry of Agriculture and Farmers Welfare is going to initiate integrated farming on 100 KVKs very shortly. The farmers living in the district after having observed them can adopt to increase their income.

Shri Singh suggested to the farmers to farm fish in paddy field, as this would provide them economic benefit. The Central Agriculture and farmers' welfare minister stressed improvement of indigenous breeds in Animal husbandry and vaccination of domestic animals especially against foot and mouth disease.

During the video conference, Shri Radha Mohan Singh reiterated the resolve to modernize agriculture. Shri Singh said that farming would be modernized through use of drone and smart phones. The Central Minister declared that Skill development work was being initiated at 100 KVKs and pulses and oilseeds hubs are being established at same number of KVKs.

On this juncture the Minister of Agriculture and Farmers Welfare appealed the farmers to adopt fisheries so as to double their income. Shri reiterated the state and district level fisheries officers that they should take necessary steps to celebrate the World Fishery Day on 21st November and give support to the farmers in every walk of their agricultural need. The Union Minister further added that on 5th December the World Soil Health Day is celebrated. Therefore, the states are required to prepare themselves for the celebration. The Minister said that the farmers should get the Soil Health Card made and in this respect they should negotiate with the nearby agriculture officers..

Shri Arun Jaitley and Shri Radha Mohan Singh made the Field Visit of New Variety of Pulses, PUSA Arhar-16

Shri Arun Jaitley, Union Minister of Finance and Corporate Affairs and Union Agriculture & Farmers Welfare Minister Shri Radha Mohan Singh on 31st October, 2016 made the field visits of new variety of pulses, PUSA Arhar-16. Shri Radha Mohan Singh gave details information about the new variety to the Shri Arun Jaitley. Union Finance and Corporate Affairs Minister congratulated the Scientists of ICAR in developing the PUSA Arhar -16 and expressed hope that country will soon become self-sufficient in pulses.

Shri Radha Mohan Singh on the occasion said that PUSA Arhar-16 is an extra early maturing, semi-dwarf, determinate, high yielding variety and would be available to farmers from next Kharif season. The Minister informed that while the traditional varieties take 170 days to mature this new variety take less time to mature i.e, 120 days only.

Shri Arun Jaitley and Shri Radha Mohan Singh later paid tributes to Sardar Vallabhbhai Patel on his birth anniversary (EktaDiwas) and remembered his works specially his role in Unifying the Nation.

General Survey of Agriculture

Trends in Foodgrain Prices

During the month of September, 2016 the All India Index Number of Wholesale Price (2004-05=100) of foodgrains decreased by 1.28 percent from 282.3 in August, 2016 to 278.7 in September, 2016.

The Wholesale Price Index (WPI) Number of cereals increased by 0.28 percent from 249.1 to 249.8 and WPI of pulses decreased by 5.45 percent from 438.9 to 415.0 during the same period.

The Wholesale Price Index Number of wheat increased by 0.74 percent from 230.2 to 231.9 while that of rice increased by 0.24 percent from 248.5 to 249.1 during the same period.

Weather, Rainfall and Reservoir Situation during October, 2016

Rainfall Situation

Cumulative Post-Monsoon Season rainfall for the country as a whole during the period 01st October to 26th October, 2016 has been 31% lower than the Long Period Average (LPA). rainfall in the four broad geographical divisions of the country during the above period has been higher than LPA by 19% in Central India but lower than LPA by 65% in South Peninsula, 49% in northwest India and 23% in East & northeast India.

Out of total 36 meteorological Sub-divisions, 17 sub-divisions received excess/normal rainfall and 19 Sub-divisions received deficient/scanty rainfall. Out of 633 districts for which rainfall data are available, 146 (23%) districts received excess rainfall, 98 (15%) districts received normal rainfall, 145 (23%) districts received deficient rainfall, 213 (34%) received scanty rainfall and 31 (5%) received no rainfall.

Water Storage in Major Reservoirs

Central Water Commission monitors 91 major reservoirs in the country which have total live capacity of 157.80 Billion Cubic Metre (BCM) at Full Reservoir Level (FRL). Current live storage in these reservoirs (as on 27th October, 2016) is 115.46 BCM as against 89.06 BCM on 27.10.2015 (last year) and 116.33 BCM of normal storage (average storage of last 10 years). Current year's storage is higher than the last year's storage by 30% but lower than normal storage by 1%.

1. Economic Growth

- As per the estimates of Gross Domestic Product (GDP) for the first quarter (April-June) 2016-17, released by the Central Statistics Office (CSO), the growth rate of GDP in Q1 of 2016-17 was 7.1 per cent as copared to the growth of 7.5 per cent in Q1 of 2015-16 and 7.9 per cent in Q4 of 2015-16.
- The growth in gross value added (GVA) at constant (2011-12) basic prices in Q1 of 2016-17 was 7-3 per cent, as compared to the growth rate of 7.2 per cent in Q1 of 2015-16. At the sectoral level, agriculture, industry and services sectors grew at the rate of 1.8 per cent, 6.0 per cent and 9.6 per cent respectively in Q1 of 2016-17 (Table 2).
- In May 2016, CSO had estimated the growth rate of Gross Domestic Product (GDP) at constant (2011-12) prices for the year 2015-16 is estimated at 7.6 per cent as compared to the growth of 7.2 per cent in 2014-15 (Table 1).
- The share of total final consumption in GDP at current prices in 2015-16 is estimated at 70.1 per cent as compared to 68.5 per cent in 2014-15. The fixed investment rate (ratio of gross fixed capital formation to GDP) declined from 30.8 per cent in 2014-15 to 29.3 per cent in 2015-16.
- The saving rate (ratio of gross saving to GDP) for the years 2014-15 and 2013-14 was 33.0 per cent as compared to 33.8 per cent in 2012-13. The investment rate (gross capital formation to GDP) in 2014-15 was 34-2 per cent, as compared to 34.7 per cent and 38.6 per cent respectively in 2013-14 and 2012-13.

2. Agriculture and Food Management

- **Rainfall:** The country received 797.8 mm of rainfall during the South-West monsoon season (1st June-20th September, 2016) which was 5 per cent below normal. Out of the total 36 meteorological sub-divisions, 3 sub-divisions received excess season rainfall, 25 sub-divisions received normal season rainfall and the remaining 8 sub-divisions received deficient/scanty/no season rainfall.
- **All India production of foodgrains:** As per the 1st Advance Estimates of production of major Kharif crops for 2016-17, the production of kharif food-

grains is estimated to be 135.0 million tonnes for the kharif season as compared to 124.0 million tonnes for the kharif season of 2015-16 (Table 3).

- **Procurement:** Procurement of rice as on 9th September 2016 was 34.2 million tonnes during Kharif Marketing Season 2015-16 (KMS is under progress) whereas procurement of wheat as on 30th June 2016 was 22.9 million tonnes during Rabi Marketing Season 2016-17 (Table 4).
- **Off-take:** Off-take of rice during the month of April 2016 was 24.2 lakh tonnes. This comprises 22.8 lakh tonnes under TPDS/NFSA (offtake against the allocation for the month of May, 2016) and 1.5 lakh tonnes under other schemes. In respect of wheat, the total off-take was 21.15 lakh tonnes comprising 19.4 lakh tonnes under TPDS/NFSA (off-take against the allocation for the month of May 2016) and 1.8 lakh tonnes under other schemes. Cumulative off-take of foodgrains during 2016-17 (till April 2016) is 8.5 million tonnes (Table 5).
- **Stocks:** As on September 1, 2016 stocks of foodgrains (rice and wheat) held by FCI were 42.9 million tonnes, as compared to 51.8 million tonnes as on September 1,2015 (Table 6).

TABLE

TABLE 1: GROWTH OF GVA AT BASIC PRICES BY ECONOMIC ACTIVITY (AT 2011-12 PRICES) (IN PER CENT)

Sector	Growth			Share in GVA		
	2013-14	2014-15 (1st RE)	2015-16 (PE)	2013-14	2014-15 (1st RE)	2015-16 (PE)
Agriculture, forestry & fishing	4.2	-0.2	1.2	17.5	16.3	15.4
Industry	5.0	5.9	7.4	31.6	31.2	31.3
Mining & quarrying	3.0	10.8	7.4	2.9	3.0	3.1
Manufacturing	5.6	5.5	9.3	17.4	17.1	17.5
Electricity, gas water supply & other utility services	4.7	8.0	6.6	2.2	2.2	2.2
Construction	4.6	4.4	3.9	9.0	8.8	8.5
Services	7.8	10.3	8.9	51.0	52.5	53.4
Trade, hotels, transport, communication and broadcasting services	7.8	9.8	9.0	18.4	18.9	19.2
Financial, real estate & professional Services	10.1	10.6	10.3	20.3	21.0	21.6
Public administration, defence and other Services	4.5	10.7	6.6	12.3	12.7	12.6
GVA at basic prices	6.3	7.1	7.2	100.0	100.0	100.0
GDP at market prices	6.6	7.2	7.6	—	—	—

Source: Central Statistics Office (CSO). 1st RE: First Revised Estimates, PE: Provisional Estimates.

TABLE 2: QUARTER-WISE GROWTH OF GVA AT CONSTANT (2011-12) BASIC PRICES (PER CENT)

Sector	2014-15				2015-16				2016-17
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1
Agriculture, forestry & fishing	2.3	2.8	-2.4	-1.7	2.6	2.0	-1.0	2.3	1.8
Industry	8.0	5.9	3.8	5.7	6.7	6.3	8.6	7.9	6.0
Mining & quarrying	16.5	7.0	9.1	10.1	8.5	5.0	7.1	8.6	-0.4
Manufacturing	7.9	5.8	1.7	6.6	7.3	9.2	11.5	9.3	9.1
Electricity, gas, water supply & other utility services	10.2	8.8	8.8	4.4	4.0	7.5	5.6	9.3	9.4
Construction	5.0	5.3	4.9	2.6	5.6	0.8	4.6	4.5	1.5

TABLE 2: Quarter-wise Growth of GVA at Constant (2011-12) Basic Prices (per cent)-Contd...

Sector	2014-15				2015-16				2016-17
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1
Services	8.6	10.7	12.9	9.3	8.8	9.0	9.1	8.7	9.6
Trade, hotels, transport, communication and services related to broadcasting	11.6	8.4	6.2	13.1	10.0	6.7	9.2	9.9	8.1
Financial, real estate & professional services	8.5	12.7	12.1	9.0	9.3	11.9	10.5	9.1	9.4
Public administration, defence and Other Services	4.2	10.3	25.3	4.1	5.9	6.9	7.2	6.4	12.3
GVA at Basic Price	7.4	8.1	6.7	6.2	7.2	7.3	6.9	7.4	7.3
GDP at market prices	7.5	8.3	6.6	6.7	7.5	7.6	7.2	7.9	7.1

Source: Central Statistics Office (CSO).

TABLE 3: Production on Major Agricultural; Crops (1st Adv. Est.)

Crops	Production (in Million Tonnes)				
	2012-13	2013-14	2014-15	2015-16 (4th AE)	2015-16 (1st AE)
Total Foodgrains	257.1	265.0	252.0	252.2	135.0
Rice	105.2	106.7	105.5	104.3	93.9
Wheat	93.5	95.9	86.5	93.5	—
Total Coarse Cereals	40.0	43.3	42.9	37.9	32.5
Total Pulses	18.3	19.3	17.2	16.5	8.7
Total Oilseeds	30.9	32.8	27.5	25.3	23.4
Surgarcane	342.2	352.1	362.3	352.2	305.2
Cotton #	34.2	35.9	34.8	30.1	32.1

Source: DEC & FW, M/o Agriculture & Farmers Welfare, 1st AE 1st Advance Estimate of Kharif crops only, 4th AE: Fourth Advance Estimates, # Million bales of 170 kgs. each.

TOTAL 4: Procurement of Crops in Million Tonnes

Crops	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17
Rice #	35.0	34.0	31.8	32.2	34.2[a]	–
Wheat@	28.3	38.2	25.1	28.0	28.1	22.9B
Total	63.4	72.2	56.9	60.2	62.3	—

Source: DFPD. M/o Consumer Affairs and Public Distribution; # Kharif Marketing Season (October-September), @ Rabi Marketing Season (April-March), a; Position as on 09.09.2016, B Position as on 30.06.2016

TABLE 5: Off-Take of Foodgrains (Million Tonnes)

Crops	2012-13	2013-14	2014-15	2015-16	2016-17 (Till April)
Rice	32.6	29.2	30.7	31.8	4.6
Wheat	33.2	30.6	25.2	31.8	3.9
Total (Rice & Wheat)	65.8	59.8	55.9	63.6	8.5

Source: DFPO, M/o Consumer Affairs and Public Distribution

TABLE 6 : STOCKS OF FOODGRAINS (MILLION TONNES)

Crops	September 1, 2015	September 1, 2016
1. Rice	13.9	16.5
2. Unmilled Paddy#	3.6	3.2
3. Converted Unmilled Paddy in terms of Rice	2.4	2.2
4. Wheat	35.5	24.2
Total (Rice & Wheat) (1+3+4)	51.8	42.9

Since September, 2013, FCI gives separate figures for rice and unmilled paddy lying with FCI & state agencies in terms of rice.

Articles

Empirical Analysis of Area Response in Crop Production of Punjab: Determinants of Crop Area Allocation

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Abstract

The present study analyzes the general growth performance and volatility of area, production and yield of major crops (covering about 85 percent of gross cropped area) of Punjab state over the period of four decades, i.e., 1973 to 2013. It brings forth various price and non-price factors affecting the choice of area allocation to various crops. Nerlovian adjustment lag model was employed for analyzing acreage response of different crops. Yield risk and price risk have negative impact on the farmers' decision regarding area allocation, while one year lagged area, yield and farm harvest price (FHP) have a positive bearing on acreage allocation. Among kharif crops, price risk, i.e., the price volatility has a considerable bearing on determining the area allocation of maize and cotton. Among rabi crops, cultivation of barley significant influence on price risk in decision making of area allocation. Since the procurement of paddy and wheat are being supported by MSP along with an assured market, price and risk factors were not entered into the decision making of acreage distribution to these crops. The coefficient of the non-price parameter i.e., One year lagged area was found to be positive and significant for all the crops except rapeseed & mustard. Similarly, one year lagged yield variable was also found to be an important determinant affecting positively and significantly the acreage allocation decision. The regression coefficients for one year lagged farm harvest prices were positive and significant for crops as cotton, groundnut and sesamum. The results indicate that the farmers were price conscious in their area allocation decisions. Thus, farmers may not move towards diversification until incentivized by economically attractive alternatives.

Key Words: Acreage response, Price risk, Yield Risk, Nerlovian adjustment lag model, Modified Entropy Index

Introduction

Punjab is most agriculturally advanced state, popularly known as 'food basket' of the nation. The increase in productivity was the result of simultaneous actions in (a) production and distribution of seed of high yielding varieties (b) increased availability and use of fertilizers (c) large scale development of tubewell irrigation and (d) enhanced power and credit availability. Punjab developed its agriculture to the stage where it has the largest proportion of irrigated area (98%), highest cropping intensity (about 190%) and the most intensive use of chemical fertilizers (246 kg/ha) and other inputs during 2011-12 as compared to other states in the country. By the end of 1990's, the production potential of the available technology was almost fully exploited and the average yield of wheat and rice during 2011-12 reached 5150 and 3741 kg/ha (GoPb, 2013) respectively. The over dependence on wheat and rice and intensive use of farm land with more than 190 per cent cropping intensity have led to a crisis in terms of over exploitation of natural resources viz. soil and ground water (Baljinder et.al., 2015, Srivastava, et.al.,2015). It is well documented that Punjab agriculture has reached a stagnating stage. This poses serious threat to long term sustainability of agriculture in the state. The rate of growth in output is decelerating, farmers' real income is declining and rural distress is rising. As a consequent to low production risk and assured market, the area under wheat and rice has increased manifold to about 80 per cent of the cropped area.

In this backdrop, the present study intends to analyze (i) the growth and instability in area, production and productivity of major crops, (ii) structure and diversification of cropping pattern, (iii) the factors that influence the choice of area under different crop.

Data and Methodology

The study has been carried out for the state of Punjab for a period of 40 years. It has examined following the selected crops: five major crops for the kharif season (Paddy, Maize, Cotton, Groundnut and Sesamum) and three for rabi season (Wheat, Rapeseed & Mustard, Barley), which covered approximately 85 percent of gross cropped area of the state. Data is obtained from various published sources like statistical abstract Punjab, Directorate of economics and statistics (DES) and data from Village Dynamics in South Asia (VDSA). The study has been undertaken for four decades, while analysis has been done by dividing the time period into two parts, viz. Period I: from 1973-74 to 1993-94; Period II: from 1994-95 to 2013-14 and overall: from 1973-74 to 2013-14.

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Growth Rate Analysis

The compound growth rate of area, production and yield for selected crops are estimated for selected periods of time. The crop-wise compound growth rates are estimated to study the growth with the following exponential model.

$Y=ab^t$

Log Y = log a + t log b (by taking the log of both sides)

CGR = (Antilog b-1) x 100

Where,

t = time period in year

Y = area/production/productivity

a & b = Regression parameters and

CGR = Compound growth rate

Crop Diversification Analysis

The extent of crop diversification at a given point in time may be examined by using several indices, namely, (a) Herfindahl Index (HI), (b) Simpson's Index (SI), (c) Ogive Index (OI), (d) Entropy Index (EI), (e) Modified Entropy Index (MEI), (f) Composite Entropy Index (CEI) etc. Among these indices, the HI, SI and the entropy index are widely used in the literature of agricultural diversification. All these indices are computed on the basis of proportion of gross cropped area under different crops cultivated in a particular geographical area.

However in the given study, we have applied the MEI, as it provides a uniform and fixed scale and hence it is used as a norm to compare and rank the extent of diversification spatially.

This index is defined as

$$MEI = -\sum_{i=1}^{i=N} P_i \ log_n (P_i)$$

Where, N= number of crops; i= 1, 2…..N. and Pi is the proportional area of the ith crop in the total area under all crops. MEI is same as EI except that the base of the logarithm is No. of crops (n). The index value varies between 0 and 1. The MEI takes the value 1 when there is maximum diversification and value 0 of MEI indicates perfect specialization.

Instability Analysis

To measure the instability in area, production and productivity, coefficient of variation (CV) has been used as a measure of variability. The CV is calculated by the formula

$CV\ (\%) = \frac{\sigma}{Mean} X\ 100$; where σ stands for standard deviation (SD)

Area Responsiveness Analysis

To examine the area responsiveness, Nerlovian lagged adjustment model (1958) has been applied in the study. The area responsiveness means the change in acreage due to the unit change in the variables under consideration during the period of study. The area responsiveness function has been fitted for the state of Punjab. The general specification of the model is given below:

$Area_t=a+b_1\ Yieldrisk+b_2\ Pricerisk+b_3\ Area_{t-1}+ b_4 Yield_{t-1}+b_5\ FHP_{t-1}+e$

where,

$Area_t$ = Area under crop at t time

Yieldrisk = Yield volatility in last three year

Pricerisk = Price volatility in last three year

$Area_{t-1}$ = Area under crop at t-1th time

FHP_{t-1} = Farm Harvest price of crop at t-1th time

a, b_1 to b_5 are regression coefficients and e is random error term.

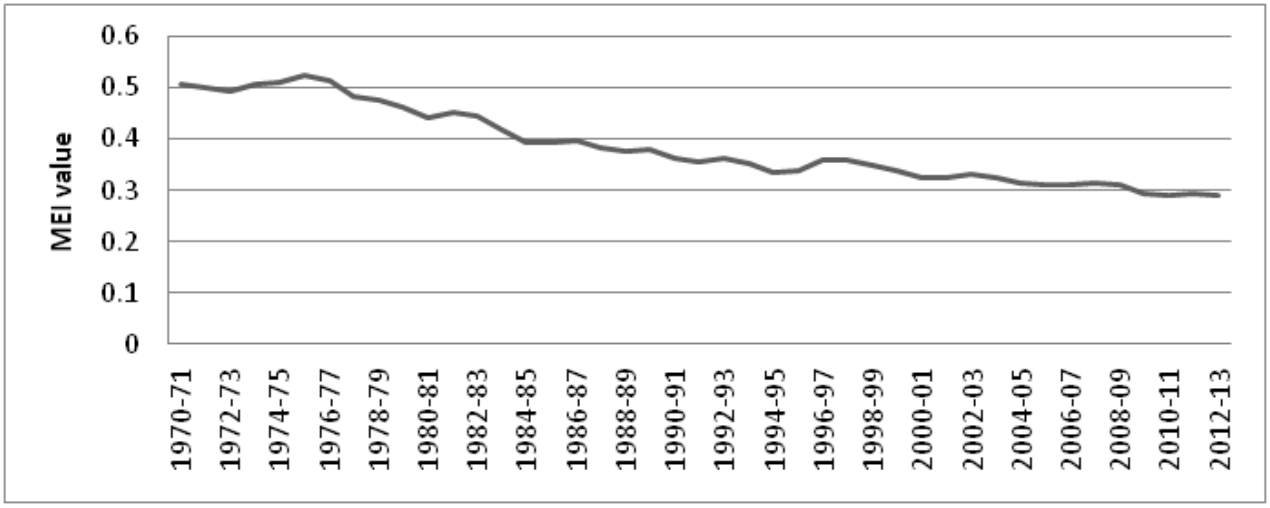
Results and Discussions

Growth Performance of Crop Production in Punjab

In this study, the general growth performance of various crops has been analyzed over the period of 40 years by fitting exponential growth function with time normalization on area, production and productivity. Also, to statistically examine the extent of diversification, Modified Entropy Index (MEI) has been calculated for four decades at the state level. Figure 1 shows the MEI of crop diversification on acreage proportion in Punjab during 1970-71 to 2010-11. As depicted from the figure 1, the curve has been declining over the study period. The value of MEI index declines in 0.51 in 1970-71 to 0.36 in 1990's which further declines to 0.29 in 2012-13. As signaled with the decreasing MEI value, the Punjab state has been moving towards crop concentration during the entire time span.

The MEI provides an insight to the direction and extent of cropping pattern towards diversification or concentration during the entire study period. Further the growth performance of crop production has been done pertaining to two periods and overall period as mentioned earlier in methodology.

Figure 1: Modified Entropy Index (MEI) of Punjab during 1970-71 to 2012-13



Source: Authors' estimation using Agricultural Statistics at a glance, DES (Various issues)

As revealed from the Table 1, during period I (1973-74 to 1993-94), there is positive and significant growth in area for paddy, cotton and wheat, while it is negative for the crops such as maize, groundnut, sesamum, rapeseed & mustard, and barley. During period II (1994-95 to 2013-14), cotton has also recorded the negative growth rate in area. In the overall period of four decades, paddy has registered the highest growth rate of 4.36 percent in area followed by wheat with a modest growth rate of 0.99 percent. On the contrary Punjab has witnessed a significant shift since early-1970s. As depicted in the table 1, except for paddy and wheat, the area under all the selected crops has declined drastically. The crop pattern was directed by the state policy to meet food security in the country by raising supply of rice and wheat in the quickest way.

The growth rate of production for paddy was found to be highest (11.11 percent) during Period I among other crops. The production growth rate for rapeseed, mustard and barley were also positive but not significant. However, in the overall period, except for paddy, cotton, and wheat, all other crops had observed negative growth rate in production. The production of groundnut has declined drastically with a negative growth rate of 11.39 percent, while paddy has achieved the highest growth rate of about 6 percent during the entire period of study. The growth analysis of productivity of various crops of Punjab state reveals that overall productivity has increased in all the crops significantly except for sesamum. The compound annual growth rate (CAGR) of area and production of paddy crop were found to be the highest while the yield growth rate was found to be significant and largest for barley crop (3.43 percent).

TABLE 1: Crop-wise Compound Growth Rates of Area, Production and Yield during 1973-74 to 2013-14 in Punjab

Crop	Period I (1973-74 to 1993-94)			Period II (1994-95 to 2013-14)			Over All (1973-74 to 2013-14)		
	Area	Prod	Yield	Area	Prod	Yield	Area	Prod	Yield
Paddy	8.56***	11.11***	2.35***	1.61***	2.68***	1.06***	4.36***	5.79***	1.37***
Maize	-5.91***	-5.01***	0.96*	-1.67***	2.11***	3.85***	-3.83***	-1.59***	2.33***
Cotton	1.47***	4.03**	2.53	-1.41**	1.7	3.15**	-0.27	1.49***	1.77***
Groundnut	-13.29***	-13.65***	-0.41	-8.87***	-6.17***	2.96***	-11.85***	-11.39***	0.52*
Sesamum	-0.74	-0.92	-0.18	-7.02***	-7.17***	-0.16	-1.79***	-1.92***	-0.13
Wheat	1.97***	4.86***	2.84***	0.45***	1.36***	0.91***	0.99***	2.95***	1.94***
Rapeseed & Mustard	-1.70*	0.98	2.73***	-5.91***	-4.93***	1.04**	-3.71***	-1.96***	1.82***
Barley	-3.68**	1.55	5.42***	-6.67***	-5.45***	1.31***	-4.43***	-1.15**	3.43***

Source: Authors' estimation using Agricultural Statistics at a glance, DES (Various issues)
Note: ***, **, * significant at 1, 5 and 10% levels, respectively

Instability in Crop Production of Punjab

To examine the degree and pattern of changes in the level of acreage, production, and productivity of different crops, instability of area, production and productivity of various crops have been estimated as per different time period categorization in the study. In the table 2, it can be seen that coefficient of instability in area is highest for groundnut (123.82) followed by barley (72.22) and maize (54.37) in the overall period of 1973-74 to 2013-14. Wheat being a staple food of the state, coefficient of instability in area is found to be the lowest in all the periods as compared to rest of the crops. It has declined to the value of 2.87 in the second period while in overall period it is reported as 12.13.

In case of production, the lowest volatility is observed in wheat (32.01 percent) while it is highest foe groundnut (126.22 percent). It is noted that the instability index declined drastically crops viz., wheat and paddy during the 2nd period of 1994-95 to 2013-14. In case of wheat it is 28.86 in 1st period that reduced to 9.78 in the 2nd period while in case of paddy it has decreased from 53.94 to 16.02. These two crops which have low production risks and negligible marketing risks due to procurement at Minimum Support Prices are now occupying about 80% of the cropped area.

TABLE 2: Crop wise Instability Indices for Area, Production and Yield in Punjab

Crop	Period I (1973-74 to 1993-94)			Period II (1994-95 to 2013-14)			Over All (1973-74 to 2013-14)		
	Area	Prod	Yield	Area	Prod	Yield	Area	Prod	Yield
Paddy	44.59	53.94	15.62	9.79	16.02	7.45	41.35	50.84	16.67
Maize	36.76	31.85	14.31	10.74	16.51	24.53	54.37	33.15	33.33
Cotton	13.82	38.13	31.63	15.55	32.65	30.87	15.02	35.91	33.93
Groundnut	66.85	69.33	13.23	54.57	48.93	33.01	123.82	126.22	26
Sesamum	25.65	22.96	12.93	42.4	45.31	10.48	34.21	34.6	11.76
Wheat	12.27	28.86	17.96	2.87	9.78	7.68	12.13	32.01	22.69
Rapeseed & Mustard	28.08	35.16	21.64	44.15	42.71	11.55	48.29	42.79	23.51
Barley	56.49	40.1	34.39	38.85	33.07	9.13	72.22	38.7	36.58

Source: Authors' estimation using Agricultural Statistics at a glance, DES (Various issues)

As indicated from the table, barley (36.58), cotton (33.93) and maize (33.33) are more volatile to yield risks as they have high instability in yields over other crops. It is almost half in case of paddy (16.67) in the overall period while it is three times lower in the 2nd period for paddy (7.45) as well as wheat crop (7.68) when compared with cotton (30.87). Thus, over the period of time (comparison of period I and II), paddy and wheat have emerged as the most stable crops in terms of area, production and yield.

Area allocation decision in Crop Production of Punjab

Area response function was fitted to inspect the effect of the factors that influence the choice of area under different crop. Various price and non-price factors on farmers' decision in allocating the area under different crops have been examined by fitting the acreage response function. The estimated regression model and its results are presented in the table 3. As indicated from the table 3, yield risk and price risk has negative impact on the farmers' decision regarding area allocation. While one year lagged area, yield and farm harvest price (FHP) have a positive bearing on acreage allocation. It is noticed that in case of maize, cotton and barley price volatility plays a significant role in determining the area allocation. Among kharif crops, price risk i.e., the price volatility has a considerable bearing on determining the area allocation of maize and cotton, as the respective coefficients were found to be statistically significant at 1 and 5 per cent level of significance, respectively. In case of paddy, price risk was not significant as paddy has been assured by minimum support price (MSP), resulted into major area allocated towards it. Similarly among rabi crops price risk was not significant for wheat and rapeseed & mustard, while barley has a significant influential of price risk in decision making of area allocation. The coefficient of the non-price parameter i.e., one year lagged area was found to be positive and significant relations for all the crops except rapeseed & mustard. Similarly, one year lagged yield variable was also an important determinant affecting positively and significantly the acreage allocation decision. The regression coefficients for one year lagged farm harvest prices were positive and significant in crops as cotton, groundnut and sesamum. This discussion indicates that the farmers were price conscious in their area allocation decisions.

TABLE 3: ESTIMATED COEFFICIENTS OF AREA RESPONSIVENESS FUNCTION FOR VARIOUS CROPS (MULTIPLE REGRESSION ANALYSIS)

Variable	Paddy	Maize	Cotton	Groundnut	Sesamum	Wheat	R&Mustard	Barley
Constant	-24.70	-29.03	400.6***	4.37	6.179	593.73*	160.7***	62.095**
	(207.6)	(28.83)	(70.68)	(3.32)	(6.176)	(330.52)	(37.37)	(29.0137)
Yield risk	-9.18***	-0.043	-0.109	-0.074	-0.267**	-6.25*	-1.54	1.698
	(3.39)	(0.628)	0.492	(0.120)	(0.103)	(3.45)	(1.050)	(1.026)
Price risk	-2.62	-2.23***	-2.68**	0.076	0.059	-2.35	1.06	-1.02**
	(5.35)	(0.530)	(1.30)	(0.167)	(0.096)	(2.302)	(0.71)	(0.498)
One year lagged Area	0.74***	0.846***	0.26**	0.961***	0.398***	0.876***	-0.055	0.0128
	(0.092)	(0.065)	(0.100)	(0.033)	(0.145)	(0.154)	(0.16)	(0.156)
One year lagged Yield	0.24**	0.023	0.308**	0.0099**	0.021*	-0.026	-0.011	0.0155*
	(0.111)	(0.016)	(0.121)	(0.0046)	(0.011)	(0.052)	(0.034)	(0.009)
One year lagged FHP	-0.068	-0.051	0.045***	0.0023**	0.0018***	0.034	-0.048	-0.009
	(0.108)	(0.041)	(0.008)	(0.0010)	(0.0005)	(0.053)	(0.012)	(0.022)
R^2	0.96	0.95	0.33	0.94	0.45	0.92	0.59	0.59
Durbin-Watson	1.31	1.63	1.54	1.97	1.34	1.74	1.71	1.105
F - Value	427.91***	280.81***	11.85	236.87***	22.81***	120.01***	12.57***	12.40***
Observations (years)	40	40	40	40	40	40	40	40

Notes: All variables were expressed in logarithmic form
Figures within parentheses are standard error of estimated parameters
***, **, * significant at 1, 5 and 10% level of significance, respectively

Since the procurement paddy and wheat are protected promised MSP along with an assured market, price and risk factors were not entered into the decision making of area allocation to these crops. As such, rice-wheat cropping pattern is likely to produce the highest and more stable incomes. It clearly indicates that price factors show positive impact on the area. Farmers may not move towards diversification until incentivized by economically attractive alternatives.

As indicated by the table 3, the R^2 value (coefficient of determination) has recorded to be sufficiently high for most of the crops i.e. ranged between 59 to 96 percent except cotton and seasum. F test has a significant value for all the crops, thus it has reasonably explained the variability and model has a good fit.

Conclusion:

The situation of agriculture in Punjab has almost reached a saturation point since technology diffusion and its use is highest in Punjab and further growth in agriculture is not possible under the present conditions. Thus, the study intends to analyze the past trends in agriculture growth and pattern. The growth and instability in area, production and productivity of five major crops for the kharif season (Paddy, Maize, Cotton, Groundnut and Sesamum) and three for rabi season (Wheat, Rapeseed & Mustard, Barley), which covered approximately 85 percent of gross cropped area of Punjab state over the four decades have been examined. Except for paddy and wheat, the area under all the selected crops has declined drastically during the study period. Overall productivity has increased in all the crops significantly except for sesamum. The compound annual growth rate (CAGR) of area and production of paddy crop was found to be highest while the yield growth rate was significantly greatest in barley crop (3.43 percent). The crop pattern was directed by the state policy to meet food security in the country by raising supply of rice and wheat in the quickest way. Instability analysis indicates that paddy and wheat have emerged as the most stable crops in terms of area, production and yield. The instability index of all three parameters viz., area, production and productivity is significantly higher in other crops besides wheat and paddy.

The study further unravels the determinant factors that influence the choice of area allocation to various crops in Punjab state. It is found that yield risk and price risk have negative impact on the farmers' decision regarding area allocation. While one year lagged area, yield and farm harvest price (FHP) have a positive bearing on acreage allocation, it is noticed that in case of maize, cotton and barley price volatility plays a significant role in determining the area allocation. Other than paddy and wheat, the price risk significantly affected the area distribution decision of all other crops. Thus the farmers

were price conscious in their area allocation choices. It clearly indicates that farmers may not move towards diversification until incentivized by economically attractive alternatives. The issues hindering crop diversification have been economic returns from alternative crops; assured marketing and pricing; a reliable and proven technology for alternative crops; and adequate mechanisms to transfer the same to the field. A significant investment is required in Research and Development (R&D) as well as marketing infrastructure, which at present is lacking for alternate crops.

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Performance of Paddy Crop in Western Punjab

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Abstract

Rice is the main source of food for more than half the world's population and its cultivation secures a livelihood for more than two billion people. India is the world's second largest producer of rice after China, accounting for 21.38 per cent of the world's rice production..Punjab state having less than 2 percent of the country's area contributed about 11 percent of national rice production and a significant portion (24.2% of rice) to the central pool for Government distribution during 2014-15. The present study was carried out during 2013-14 to 2015-16 in Western Punjab to assess the adoption and performance of paddy varieties and different resource conservation technologies/practices. It was observed that there was continuous increase in adoption of recommended varieties of paddy in the region. Rise in area along with adoption of high yielding basmati varieties (leading to increase in supply) coupled with huge carryover stock from last year's production resulted in crash in basmati paddy prices in domestic market which drastically affected the profitability of its cultivation. Due to this, the farmers shifted the basmati area towards non-basmati paddy. In Firozpur district, PR 114 variety of non-basmati paddy remained the most preferred variety throughout the study period while the respondent farmers in Moga district preferred Pusa 44 variety the most. Among basmati varieties, Pusa Basmati 1121occupied the major share of the basmati area. The actual use of fertilisers was much higher than the recommended level indicating a strong need for generating awareness among respondents about the usefulness of resource conservation technologies through more extension efforts.The environmental aspects like declining water table, degrading soil health, etc. adversely affecting the paddy productivity needs to be explored further. Thus, the adoption of modern agricultural techniques, curtailing unnecessary input costs, diversified agriculture via demand driven production is the need of the hour to make farming profitable.

Keywords: Adoption, Productivity, Costs, Resource conservation.

Introduction

Rice is the main source of food for more than half the world's population and its cultivation secures a livelihood for more than two billion people. Rice has third-highest worldwide production, after sugarcane and maize (FAO, 2015). In Asia, food security has traditionally been defined as maintaining stable prices for rice in the major urban markets of a country where it is the staple food for more than 50 per cent of the population (Ghose et al, 2013). For South Asia, this figure is the highest in the world (about 70%), and hence food security is essentially a reflection of rice security in this region (Timmer, 2010).The food security issues are on high agenda of policy planners in the world which indicates concern to feed the large number of poor population in the world, especially in developing countries like India..To assure food security in the rice-consuming countries of the world, rice production would have to be increased by 50 per cent in these countries by 2025 and, this additional yield will have to be produced on less land with less usage of water, labour and chemicals (Zeng et al, 2004).

India is the world's largest producer of rice after China, accounting for 21.38 per cent of the world's rice production (Agricultural Statistics at a Glance, 2014).The introduction of high-yielding varieties, fertilisers, pesticides and irrigation has improved rice yields significantly and expanded the paddy area. However, in the last two decades productivity and the area under paddy have stagnated. Punjab state having less than 2 percent of the country's area is contributing about 11 percent of national rice production and a significant portion (24.2 % of rice) to the central pool for Government distribution during 2014-15 (Statistical Abstract of Punjab, 2015).In this backdrop, the present study was carried out to study the performance of paddy crop in Punjab state with the following objectives-

1. To study the trends in area and productivity of paddy
2. To examine the adoption and performance of different varieties of paddy
3. To study the adoption gaps in agronomic practices adopted by the farmers for paddy and give possible solutions to narrow down these gaps.

Methodology

The present study was carried out in Western Punjab comprising two agro-climatic zones i.e., Western Plain

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zone and Western zone of Punjab. Further, one district was selected randomly from each selected zone viz., Firozpur district from Western Plain zone and Moga district from Western zone for the study. Primary data was collected from randomly selected 50 respondents from each district who were growing paddy/basmati. Information were collected for three consecutive years i.e. 2013-14, 2014-15 and 2015-16 by survey method using a structured questionnaire by applying both qualitative and quantitative methods of data collection. Further, descriptive statistical analysis was conducted by using frequencies, percentages and means to facilitate the description of farmers' awareness on different paddy varieties, time of sowing, fertilizer use, different times and methods of transplantation, use of different resource conservation practices etc. Data was also collected from secondary sources like Statistical Abstract of Punjab, Agricultural Statistics at a Glance, etc.

Decomposition Analysis of Growth in Production of Paddy

The observed growth in paddy production was decomposed into area effect, yield effect and interaction effect.

The following additive scheme of decomposition has been used:

$$\Delta P = A_1 \Delta Y + Y_1 \Delta A + \Delta A.\Delta Y$$

Where,

ΔP = Difference in average paddy production during two periods.

ΔY = Difference in average paddy productivity during two periods.

ΔA = Difference in average paddy area during two periods.

A_1 = Average area under paddy crop during the base year.

Y_1 = Average productivity of paddy crop during the base year.

Thus, the changes in production (ΔP) were due to:

i) $Y_1.\Delta A$ represents an area effect,

ii) $A_1.\Delta Y$ represents productivity effect, and

iii) $\Delta A.\Delta Y$ represents an interaction of area and productivity effect.

Results and Discussion

A. Share of Paddy in Cropping Pattern

Punjab agriculture is dominated by rice-wheat production system accounting for almost 80 per cent of the cropped area and over 85 per cent of the gross value of crop output. Over the years cropping pattern in Punjab has shifted towards and is dominated by paddy during kharif season with the share of 69 per cent in the net sown area(NSA) (Table 1).

TABLE 1: Trends in Area Under Paddy in Punjab

(Area in '000 hectares)

Year	Punjab		Firozpur		Moga	
	Area	% to NSA	Area	% to NSA	Area	% to NSA
1970-71	390	10	64	7.70	-	-
1980-81	1183	28	162	32.73	-	-
1990-91	2015	48	233	46.05	-	-
1995-96*	2185	53	233	47.16	108	70.59
2000-01	2611	61	248	52.21	159	80.30
2010-11	2831	68	257	54.33	174	87.88
2011-12#	2818	68	257	55.39	174	87.88
2012-13	2849	69	256	86.70	175	89.74
2013-14	2849	69	189	86.70	176	90.72
2014-15	2894	69	189	86.70	177	91.23

NSA: Net sown area, *Moga was established as separate district in 1995-96, #Fazilka was carved out from Firozpur as separate district in 2011-12
Source: Statistical Abstract of Punjab, various issues and Agricultural Statistics at a Glance, various issues

In Firozpur and Moga also the main share of the net area sown belongs to paddy. In Firozpur, paddy occupied only about 8 per cent of the net sown area in 1970-71 which rose to about 33 per cent in 1980-81 and further more than doubled to about 87 per cent in 2014-15. In Moga also, the share of net area sown under paddy increased from about 70 per cent in 1995-96 to about 91 per cent in 2014-15.

B. Overtime Changes in Paddy Productivity

The adoption of various varieties is one of the most important factors which can influence the overall production of a crop. The introduction of high yielding varieties of paddy developed by Punjab Agricultural University (PAU), Ludhiana has resulted in increased productivity of paddy crop in Punjab as well as in Firozpur and Moga districts (Table 2).

TABLE 2: Over Time Changes in Productivity of Paddy in Punjab

(Quintal per hectare)

Year	India		Punjab		Firozpur		Moga	
	Productivity	%change over previous year	Productivity	%change over previous year	Productivity	%change over previous year	Productivity	%change over previous year
1970-71	16.85	-	33.60	-	27.30	-	-	-
1980-81	20.04	18.97	40.95	21.88	38.20	39.95	-	-
1990-91	26.10	30.24	48.43	18.28	50.05	31.02	-	-
2000-01	28.52	9.25	52.59	8.58	54.33	8.54	56.21	-
2010-11	33.59	17.78	57.42	9.18	55.48	2.13	65.00	15.64
2011-12	35.90	6.88	56.11	-2.27	51.87	-6.51	65.40	0.62
2012-13	36.93	2.88	59.97	6.87	59.40	14.52	67.67	3.46
2013-14	36.36	-1.54	59.28	-1.15	62.79	5.71	69.45	2.64
2014-15	35.85	-1.40	57.57	-2.88	58.20	-7.31	69.05	-0.58

Note: Productivity of paddy includes both basmati and non-basmati paddy

Source: Statistical Abstract of Punjab, various issues and Agricultural Statistics at a Glance, various issues

In Firozpur, the productivity of paddy almost has doubled from 27 Quintals per hectare (Qtls/ha) in 1970-71 to 54. 33 Qtls/ha in 2000-01 and further to about 58 Qtls/ha in 2014-15 while in Moga, it increased from about 56 Qtls/ha in 2000-01 to about 69 Qtls/ha in 2014-15. It was also observed that the productivity of paddy in both the districts as well Punjab is higher than the national level. The average productivity of paddy is comparable with national average for Firozpur with little fluctuations while average yield for paddy was much higher in Moga than at national level (about 47% higher) and state level (about 17% higher). At the same time it was noticed that though average productivity has increased but with time the percent increase in the productivity of paddy has declined at all India level as well as state level and in the selected districts.

The production profile for the paddy crop was also analysed by decomposing it into area, yield and interaction effects. It was observed that it was the increase in area under paddy that affected the paddy production in a positive direction to a great extent (Table 3). In Firozpur, rise in area under paddy affected the production more than rise in yield except TE 1997-98 to TE 2002-03 when no change in area was occurred while area further declined in TE 2002-03 to TE 2007-08. In Moga again area effect remained much higher than the actual increase in productivity except TE 2002-03 to TE 2007-08.

TABLE 3: Decomposition Of Paddy Production in Punjab

Period	Firozpur				Moga				Punjab			
	YE	AE	IE	Increase (+)/ decline(-)	YE	AE	IE	Increase (+)/ decline(-)	YE	AE	IE	Increase (+)/ decline(-)
TE 1972-73 to TE 1977-78	27.2	56.0	16.8	+	-	-	-	NA	31.8	49.1	19.0	+
TE 1977-78 to TE 1982-83	-1.9	102.9	-1.0	+	-	-	-	NA	9.7	82.4	7.7	+
TE 1982-83 to TE 1987-88	29.0	61.8	9.2	+	-	-	-	NA	18.8	73.9	7.2	+
TE 1987-88 to TE 1992-93	66.1	30.6	3.3	+	-	-	-	NA	9.3	89.0	1.6	+
TE 1992-93 to TE 1997-98	34.3	64.5	1.2	+	-	-	-	NA	13.3	85.6	1.0	+
TE 1997-98 to TE 2002-03	100.0	0.0	0.0	+	-2.5	103.6	-1.1	+	26.1	69.8	3.9	+
TE 2002-03 to TE 2007-08	109.1	-8.2	-0.9	+	55.5	39.4	5.2	+	75.5	21.9	2.4	+
TE 2007-08 to TE 2012-13	-559.8	719.3	-59.5	+	40.6	57.9	1.5	+	-24.1	126.0	-1.9	+

Note: YE, AE and IE means productivity effect, area effect and interaction effect, respectively

Source: Statistical Abstract of Punjab, various issues

C. Adoption of Different Varieties of Paddy in Punjab

The study of distribution of area under different prevalent varieties in the study area indicated that total area under recommended varieties in Firozpur increased with time i.e., from about 93 per cent in 2013-14 to about 97 per cent in 2014-15 and further to about 98 per cent in 2015-16 (Table 4).

TABLE 4: Area Under Different Paddy Varieties on Sample Farms in Punjab

(Per cent of total area under paddy)

Variety	Firozpur			Moga		
	2013-14	2014-15	2015-16	2013-14	2014-15	2015-16
Area under recommended non-basmati paddy varieties						
PR 111	5.73	2.79	4.79	-	9.50	-
PR 114	42.38	52.58	38.55	2.74	-	1.45
PR 116	0.75	-	-	-	-	
PR 118	3.08	1.82	1.96	0.98	1.2	6.38
PR 121	9.01	-	-	1.52	-	-
PR 122	8.58	7.6	-	8.32	-	4.64
PR 123	-	1.23	2.27	-	-	-
PR 124	-	-	2.21	-	-	10.16
Sub-total	69.53	66.02	49.78	13.56	10.70	22.63
Area under recommended basmati varieties						
Pusa basmati 1121	22.01	25.73	43.85	2.91	6.7	13.21
Pusa basmati 1509	1.52	5.42	3.97	1.12	4.3	3.29
Sub-total	23.53	31.15	47.82	4.03	11.0	16.5
Total area under recommended varieties	93.06	97.17	97.6	17.59	21.7	39.13
Area under un recommended non-basmati paddy varieties						
Pusa 44	5.55	2.84	-	80.45	78.3	60.87
505	0.51	-	-	-	-	-
HKR 47	0.7	-	-	-	-	-
HKR 127	0.19	-	-	-	-	-
Dogar Pusa	-	-	-	1.57	-	-
1609	-	-	-	0.39	-	-
Sub-total	6.95	2.84	-	82.41	78.3	60.87
Area under un-recommended basmati varieties						
Muchhal 1401	-	-	2.4	-	-	-
Sub-total	-	-	2.4	-	-	-
Total area under un-recommended varieties	6.95	2.84	2.4	82.41	78.3	60.87
Grand-total	100.0	100.0	100.0	100.0	100.0	100.0

Source: Field Survey

About 69 per cent of the total area was under recommended non-basmati paddy varieties during 2013-14 which declined to 66 per cent in 2014-15 and further to about 50 per cent in 2015-16. The major reason behind this change was increase in area under recommended varieties of basmati which more than doubled from 23 per cent in 2013-14 to about 48 per cent in 2015-16. Maximum area under recommended non-basmati paddy varieties was occupied by PR 114 during whole study period while among recommended basmati varieties; Pusa basmati 1121 took away major share. Area under un-recommended paddy varieties has almost vanished in 2015-16 from about 7 per cent in 2013-14 to about 3 per cent in 2014-15, while only 2.4 per cent area was under un-recommended basmati varieties during 2015-16 in Firozpur.

On the other hand, in Moga, area under recommended varieties has more than doubled from about 17 per cent in 2013-14 to about 39 per cent in 2015-16. Area under recommended non-basmati paddy varieties increased from about 13 per cent in 2013-14 to about 23 per cent in 2015-16 with slight decline to about 11 per cent in 2014-15. Area under recommended basmati increased almost four times from about 4 per cent in 2013-14 to about 16 per cent in 2015-16. Among recommended non-basmati paddy varieties, PR 122 remained most preferred in Moga during 2013-14 (8.32% area) which was replaced by PR 111 (9.8% area) in 2014-15 and new short duration variety PR 124 (10.16% area) in 2015-16. Pusa basmati 1121 occupied maximum area under recommended basmati i.e., 2.9 per cent in 2013-14 which increased to 6.7 per cent in 2014-15 and further to 13.21 per cent in 2015-16. Although the area under un-recommended paddy varieties has declined from about 82 per cent in 2013-14 to about 61 per cent in 2015-16, these varieties have occupied maximum share of the total study area in Moga because of higher yield.

D. Varietal Performance of Paddy

Average productivity for major varieties grown by the selected farmers was also observed for the study period. It was found that in Firozpur district, the average productivity of recommended non-basmati paddy varieties ranged between 64 to 67 Qtls/ha (Table 5).

TABLE 5: Varietal Performance in Non-basmati Paddy on Sample Farms in Punjab

(Productivity in Qtls/ha)

Variety	Firozpur			Moga		
	2013-14	2014-15	2015-16	2013-14	2014-15	2015-16
Recommended non-basmati paddy varieties						
PR 111	64.78	67.63	61.50	65.00	65.25	-
PR 114	66.40	67.90	70.75	67.50	-	68.08
PR 116	65.00	70.00	63.50	-	-	-
PR 118	66.25	66.25	-	68.25	67.50	-
PR 121	66.25	68.75	-	-	-	66.25
PR 122	65.25	64.00	-	-	-	64.15
PR 123	-	-	62.00	-	-	-
PR 124	-	-	63.25	-	-	-
Average	65.65	67.50	64.25	67.00	66.50	66.25
Un-recommended non-basmati paddy varieties						
Pusa 44	65.25	66.50	59.25	85.00	82.50	78.75
HKR 47	70.00	60.50	-	-	-	-
DogarPusa	-	-	-	97.50	-	-
Average	67.63	63.50	59.25	91.25	82.50	78.75
Overall average	66.65	65.50	61.75	79.13	74.50	72.50

Source: Field Survey

Though all the recommended varieties were performing equally well but PR 114 gave maximum yield during 2013-14 (66.4 Qtls/ha) and 2015-16 (about 71 Qtls/ha) followed by PR 116 (70 Qtls/ha) during 2014-15. In the case of un-recommended non-basmati paddy, average yield was about 59 to 68 Qtls/ha during the study period. In Moga district, the average yield of recommended non-basmati paddy varieties varied from about 66 to 67 Qtls/ha during the study period. PR 114 and PR 118 performed well and both gave maximum yield between 67.5 to 68 Qtls/ha. Due to better performance of Pusa 44 and Dogar Pusa in the Moga district than in Firozpur district, the average productivity of un-recommended non-basmati paddy varieties ranged between 72 to 79 Qtls/ha during the same period.

In the case of recommended varieties of basmati paddy, the average productivity ranged between 48 to 52 Qtls/ha in Firozpur district (Table 6).Only one un-recommended basmati paddy variety was found to be cultivated by the farmers of Firozpur district during 2015-16 and its productivity was 63 Qtls/ha. In Moga district, the entire basmati paddy area was under the recommended varieties and the average productivity of these varieties varied from 45 to 49 Qtls/ha.

TABLE 6: VARIETAL PERFORMANCE OF BASMATI PADDY ON SAMPLE FARMS IN PUNJAB

(Productivity in Qtls/ha)

Variety	Firozpur			Moga		
	2013-14	2014-15	2015-16	2013-14	2014-15	2015-16
Recommended basmati varieties						
Pusa basmati 1121	47.50	47.75	46.00	45.00	43.00	50.00
Pusa basmati 1509	56.00	48.75	51.75	45.00	55.00	47.50
Average	51.75	48.25	48.87	45.00	49.00	48.75
Un recommended basmati varieties						
Muchhal 1401	-	-	63.00	-	-	-
Average	51.75	48.25	63.00	45.00	49.00	48.75
Overall average	51.75	48.25	56.00	45.00	49.00	48.75
Overall yield of paddy	61.68	59.75	58.87	67.75	66.00	64.58

Thus, overall productivity of paddy (including both recommended and un-recommended varieties of non-basmati paddy and basmati paddy) had declined with time in both the selected districts. In Firozpur, the average productivity of paddy had decreased from about 62 Qtls/ha in 2013-14 to about 60 Qtls/ha in 2014-15 and further to about 59 Qtls/ha in 2015-16. Similarly, in Moga district, the productivity of paddy was 67.75, 66 and 64.58 Qtls/ha during 2013-14, 2014-15 and 2015-16, respectively.

E. Adoption of Resource Conservation Technologies/ Practices

a. Time of nursery transplantation

The analysis related with the awareness of the farmers regarding different resource conservation technologies revealed that maximum area under paddy was transplanted during or after mid June (Table 7). In Firozpur, maximum paddy area was transplanted during 10th to 30th June during the study period. Maximum area i.e., about 43 percent of the area was transplanted during June 10-19 in 2013-14 followed by about 56 per cent area in 2014-15 and about 40 per cent area from 20th to 30th June.

TABLE 7: TIME OF PADDY TRANSPLANTATION ON SAMPLE FARMS IN PUNJAB

(Percent to total area under paddy)

Year	June 1-9	June 10-19	June 20-30	July 1-15	July 16-31	Total
			Firozpur			
2013-14	1.68	42.85	39.63	14.31	1.53	100.00
2014-15	0.62	56.44	14.33	21.16	7.45	100.00
2015-16	1.32	37.41	40.13	19.37	1.77	100.00
			Moga			
2013-14	-	68.73	22.49	3.43	5.36	100.00
2014-15	-	51.33	37.58	9.85	1.24	100.00
2015-16	1.35	52.7	29.36	16.59	-	100.00

Source: Field Survey

It was observed that about 15 to 28 per cent area was transplanted in July during the study period because of basmati cultivation and labour shortage during the peak season of paddy nursery transplantation.

In Moga district, maximum area was transplanted between 10th to 19th June during the study years i.e., about 69 per cent area in 2013-14, 51.33 per cent area in 2014-15 and 52.7 per cent area in 2015-16 was transplanted. Small proportion of area (10 to 16 per cent) was also transplanted in the month of July.

b. Application of Fertilisers

As regards application of nitrogenous fertilisers is concerned, it was observed that in Firozpur, only 32 to 37 per cent farmers were applying recommended dose of nitrogen in non basmati paddy (Table 8). Further, about 8 per cent respondents during 2013-14 and about 6 per cent respondents during 2014-15 were applying about 187-212 kg nitrogen per hectare.

TABLE 8: Nitrogen Application in Paddy on Sample Farms in Punjab

(Percentage of respondents)

Dosage of N (Kg/ha)	Non-basmati Paddy			Basmati Paddy		
	2013-14	2014-15	2015-16	2013-14	2014-15	2015-16
			Firozpur			
12.5-37.5	-	-	-	2.86	7.32	20.45
37.5-62.5	-	-	-	5.71	12.19	45.45
62.5-87.5**	-	-	-	22.86	26.83	31.82
87.5-112.5	-	-	-	45.71	41.47	-
112.5-137.5*	32.66	36.17	37.50	22.86	7.32	-
137.5-162.5	34.69	36.17	45.00	-	4.87	-
162.5-187.5	24.49	21.28	17.50	-	-	2.27
187.5-212.5	8.16	6.38		-	-	-
Total	100.00	100.00	100.00	100.00	100.00	100.00
			Moga			
12.5-37.5	-	-	-	7.69	-	-
37.5-62.5	-	-	-	53.85	-	9.68
62.5-87.5**	4.00	-	1.33	7.69	30.00	41.94
87.5-112.5	2.00	-	1.33	7.69	-	4.84
112.5-137.5*	14.00	-	9.33	7.69	60.00	33.87
137.5-162.5	28.00	32.00	28.00	-	10.00	8.06
162.5-187.5	42.00	56.00	57.33	15.38	-	1.61
187.5-212.5	6.00	6.00	2.67	-	-	-
212.5-237.5	-	4.00	-	-	-	-
237.5-262.5	4.00	2.00	-	-	-	-
Total	100.00	100.00	100.00	100.00	100.00	100.00

*Recommended dose for non-basmati paddy, **Recommended dose for basmati paddy
Source: Field Survey

On the other hand, for basmati, the respondents applying recommended dose of nitrogen i.e., 62.5-87.5 kg per hectare were increased from only about 23 per cent 2013-14 to about 27 per cent in 2014-15 and about 32 per cent in 2015-16 which indicated that maximum number of farmers were using inappropriate dose of nitrogen though they knew that the higher dose of nitrogenous fertiliser may have adverse impact on crop production and productivity.

In Moga district, the farmers were applying even higher doses of nitrogenous fertilizers. Only about 14 per cent of them were applying recommended dose of nitrogen to non-basmati paddy in 2013-14 which declined to about 9 per cent in 2015-16 with none doing so in 2014-15. While in case of basmati, about 8 per cent respondents were using about 62 to 87 kg of nitrogen per hectare in 2013-14 which increased to 30 per cent in 2014-15 and further to about 42 per cent in 2015-16.

As regards the use of phosphorus application is concerned, it was observed that due to application of phosphorus in the preceding wheat crop, maximum percentage of the selected respondents were not applying phosphorus (Table 9).

TABLE 9: Phosphorus Application in Paddy on Sample Farms in Punjab

(Percentage of respondents)

Dosage of P_2O_5	Non-basmati Paddy			Basmati Paddy		
(Kg/hectare)	2013-14	2014-15	2015-16	2013-14	2014-15	2015-16
			Firozpur			
Nil	34.69	21.28	96.00	42.86	41.46	94.00
12.5-25	26.53	36.17	4.00	28.57	48.78	6.00
25-37.5*	18.37	21.28	-	22.86	4.88	-
37.5-50	-	10.64	-	-	4.88	-
50-62.5	20.41	10.64	-	5.71	-	-
Total	100.00	100.00	100.00	100.00	100.00	100.00
			Moga			
Nil	62.00	67.00	-	69.23	80.00	100.00
12.5-25	4.00	1.00	25.00	-	-	-
25-37.5*	26.00	21.00	50.00	7.69	10.00	-
37.5-50	2.00	-	25.00	-	10.00	-
50-62.5	6.00	11.00	-	23.08	-	-
Total	100.00	100.00	100.00	100.00	100.00	100.00

*Recommended dose for both non-basmati paddy and basmati paddy (when phosphorous is not applied to the preceding wheat crop)
Source: Field Survey

In Firozpur district, about 35 per cent farmers did not apply phosphorus in 2013-14 while in 2014-15 maximum respondents applied 12.5-25 kg per hectare phosphorus and in 2015-16 about 96 per cent farmers did not apply phosphorus to the paddy crop. In basmati crop, again same trend was observed that maximum respondents gave no phosphorus dose to the crop i.e,. about 43 per cent respondents in 2013-14 and about 94 per cent in 2015-16 while about 49 per cent of them applied 12.5-25 kg phosphorus per hectare in 2014-15.

In Moga district, maximum respondents (62%) were not applying phosphorus to non-basmati paddy in 2013-14, 67 per cent in 2014-15 though about 50 per cent farmers gave 25 to 37.5 kg per hectare in 2015-16. In basmati paddy, the respondents not applying phosphorus were 69 per cent, 80 per cent and 100 per cent in the three consecutive years of study.

Analysis of data regarding to use of potash in the paddy crop (Table 10) indicated that none of the selected farmers applied potash to non-basmati paddy and basmati paddy in both the districts though in 2014-15 about 4 per cent respondents in Firozpur applied 12.5 to 25 kg potash per hectare, while in Moga, about 2 per cent farmers applied 12.5-25 kg potash and another 8 per cent applied 25 to 37.5 Kg potash per hectare based on soil testing report.

TABLE 10: Potash Application in Paddy on Sample Farms in Punjab

Percentage of respondents)

Dosage of K_2O (Kg/ha)	Non-basmati Paddy			Basmati Paddy		
	2013-14	2014-15	2015-16	2013-14	2014-15	2015-16
			Firozpur			
Nil	100.00	95.74	100.00	100.00	100.00	100.00
12.5-25	-	4.26	-	-	-	-
Total	100.00	100.00	100.00	100.00	100.00	100.00
Moga						
Nil	100.00	90.00	100.00	100.00	90.00	100.00
12.5-25	-	2.00	-	-	10.00	-
25-37.5*	-	8.00	-	-	-	-
Total	100.00	100.00	100.00	100.00	100.00	100.00

*Based on soil test
Source: Field Survey

c. Adoption of Different Resource Conservation Technologies

Data was also collected regarding the use of different resource conservation techniques/practices by the sampled farmers. It was noticed that 70 per cent of the respondents were using laser land leveller covering about 35 per cent of the operational area in Firozpur while all the farmers were adopting laser land leveller in Moga during 2015-16 (Table 11).

TABLE 11: Adoption of Resource Conservation Technologies and Practices in Paddy on Sample Farms in Punjab, 2015-16

Technology/Practice	Firozpur		Moga	
	Adoption (% farmers)	% area under technology	Adoption (% farmers)	%area under technology
Laser land leveller	70.0	34.88	100.0	100.00
Tensiometer	7.14	3.3	0.00	0.00
Leaf colour chart	1.43	2.83	0.00	0.00
Direct seeded rice	2.86	0.66	8.00	1.69
Mechanical transplantation	0.00	0.00	0.00	0.00

Source: Field Survey

Tensiometer was used by only 7 per cent farmers on 3 per cent area in Firozpur and none was using tensiometer in Moga. Rational application of nitrogenous fertilisers by using leaf colour chart was observed for one percent respondent farmers on about 3 per cent operational area in Firozpur only. Direct seeded rice (DSR) technology was used by about 3 per cent farmers on less than one per cent area in Firozpur while 8 per cent farmers were using DSR on about 2 per cent area in Moga. Mechanical transplantation technique for transplanting paddy was adopted in none of the districts during the study period. Reasons for non-adoption of DSR technology would be associated with undesirable weeds. Farmers were willing to adopt mechanical transplantation provided the machinery is available with cooperative societies or on rent. Similar kind of problems were observed in earlier studies (Devi and Poonnarasi, 2009; and Kaur et al., 2015).

e. Economics of Paddy Cultivation

Analysis of data relating to cost of cultivation of paddy crop revealed that in Firozpur district, for non-basmati paddy, returns over variable cost (ROVC) per hectare declined from Rs 52,887 in 2013-14 to about Rs 49,130 in 2015-16 while the total variable cost increased from Rs 34,336 per hectare in 2013-14 to about Rs 38000 per hectare in 2015-16 (Table 12).

TABLE 12: Economics of Paddy Cultivation on Sample Farms in Punjab

(Rs/ha)

Year	Average productivity (Qtl/ha)	Valueof main product	Valueof by- product	Gross returns	TVC	ROVC
Non-basmati Paddy						
			Firozpur			
2013-14	66.6	87213	-	87213	34336	52877
2014-15	65.5	89080	-	89080	36575	52505
2015-16	61.8	87068	-	87068	37937	49130
			Moga			
2013-14	79.1	103654	-	103654	34499	69155
2014-15	74.5	101320	-	101320	37689	63631
2015-16	72.5	102225	-	102225	38804	63421
Basmati Paddy						
			Firozpur			
2013-14	51.7	175738	5427	181165	37296	143869
2014-15	48.3	127863	5428	133291	42927	90363
2015-16	56.0	100800	6300	107100	43220	63880
			Moga			
2013-14	45.0	153000	4725	157725	38175	119550
2014-15	49.0	129850	5513	135363	44021	91341
2015-16	48.8	87750	5484	93234	42843	50391

TVC: Total Variable cost which includes cost of seed, manure & fertilisers, chemicals, human and machine labour, irrigation charges, transportation and marketing costs

ROVC: Returns over variable costs

Source: Field Survey

Along with this, there was decline in average productivity from about 67 Qtls/ha in 2013-14 to about 62 Qtls/ha in 2015-16 though minimum support price for paddy had increased from Rs 1310 per quintal in 2013-14 to Rs 1410 per quintal in 2015-16. Similar trend was observed in Moga district also. With time the total variable cost increased from about Rs34,499 per hectare to Rs 38,804 per hectare in Moga but the ROVC decreased from Rs 69,155 per hectare in 2013-14 to Rs 63,421 per hectare in 2015-16.

In case of basmati, in Firozpur, the variable costs increased from about Rs 37,296 per hectarein2013-14 to Rs 43,220 per hectare in 2015-16, whilethe ROVC per hectare almost halved from Rs1.44 lakh to just Rs 63,880. Rise in area and adoption of high yielding varieties leading to increase in supply coupled with huge carryover stocks led to a crash in basmati rice prices in the domestic market (from Rs 3300/Qtl in 2013-14 to Rs 1800/Qtl in 2015-16). Similarly in Moga, during 2013-14 to 2015-16, the variable costs rose from Rs 38,175 per hectare to Rs 42, 843 per hectare but the per hectare ROVC declined from Rs1.19 lakh to only Rs 50,391 per hectare.

Conclusions and Policy Implications

Continuous increase in adoption of recommended varieties of paddy indicate that farmers are aware about the importance of good quality seed in the Western Punjab.Rise in area along with adoption of high yielding varieties of basmati leads to increased supply coupled with huge carryover stock from last year's production resulted in crash in basmati paddy prices in domestic markets which drastically affected the profitability of its cultivation. Due to this, the farmers shifted the basmati area towards non-basmati paddy. In Firozpur district, PR 114 variety of non-basmati paddy remained the most preferred variety throughout the study period while the respondent farmers in Moga district preferred Pusa 44 variety the most. Among basmati varieties, Pusa Basmati 1121occupied the major share of the basmati area. The actual use of fertilisers was much higher than the recommended level indicating a strong need for generating awareness among respondents about the usefulness of resource conservation technologies through more extension efforts. The environmental aspects like declining water table; degrading soil health, etc. adversely affect the paddy productivity need to be explored further. The primary agricultural cooperative societies should come forward to promote cooperative farming, mechanisation and marketing of agricultural produce also. Thus, the adoption of modern agricultural techniques, curtailing unnecessary input costs, diversified agriculture via demand driven production is the need of the hour to make farming profitable.

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Trade Potential of the Fishery Sector: Evidence from India

VEENA RENJINI K K*

Abstract:

It is to be noticed that the contribution of fisheries sector to Indian merchandise trade and to world fishery trade is marvelous and commendable. But the imposition of food safety standards or measures may blur its performance especially in the case of developing countries; India may not be an exemption. Thus the whole question of comparative advantage comes into the scene of this dynamic trading system. The items traded enter the market in some processed form and the comparative advantage may be taken as an indicator to see whether India could continue with export specialization in this sector. The paper tries to examine the revealed comparative advantage of this Indian sector with its competitors, the intense trade relationship with its partners and the direction of trade in the post WTO frame. The analysis suggests that India is comparatively in an advantageous position while comparing with her competitors. Undeniably, the industry might have undergone a structural change which equipped the sector to maintain its consistency and competency in the global fishery trade scenario.

Key words: Export-Import Ratio, comparative advantage, Trade Intensity Index, Gini-Hirschman's Concentration Coefficient

1. Introduction

As highlighted in the Human Development Report (2013), one of the drivers of development transformation is the tapping of global markets. It is a new approach by which the government is a necessary catalyst that pragmatically adjusts its policies and actions in line with new realities and the challenges of global markets. Though post independence, India diversified trade towards non agricultural commodities, the agricultural sector continues to be a leading sector in earning net foreign exchange (Metha, 1997) and the fishery sector exports happen to be the prime contributor (GOI, 2001-02). Numerous policy reforms have been made in export sector in India to facilitate the brand and quality of the export commodities to create the "Made in India" label in a globalised market place (Tripathi and Leitao, 2013). The Special Focus Initiative of the Foreign Trade Policy of the Government of India identified this sector as the sunrise sector (htpp:/ /dgft.gov.in) and globally, the World Trade Organization (WTO) with its more market access schemes and export subsidies. The fishery sector exports from India are excluded from Most Favoured Nation Tariff of agricultural commodities in the WTO[1]. Given this background, the paper tries to explore the factors which form the basis of trade. It is that objective which leads to the analysis of the concept of Comparative Advantage on a single product - fishery sector exports, in which India tends to be a net exporter.

As Adam Smith argued in his treatise, "An Inquiry into the Nature and Causes of the Wealth of Nations"(1776) that the absolute advantage in trade would occur when it carries surplus commodities and brings in commodities which are in demand or scarce. It is this mercantilist thinking of Adam Smith that provided the theoretical as well as historical perspective of going ahead with trade. But the credit goes to David Ricardo who explained the crucial factor of trade, namely, the theory of comparative advantage. It is their writings that swayed the way for policy makers even today - the case for free trade[2]. Thus focusing on the production of goods having comparative advantage is a rehabilitation package for the economy to flourish. A dynamic view of comparative cost advantage is that it enables inefficient industries which are unable to withstand foreign competition to became the into drivers of export success once their economies became more open to foreign trade. But considering the other important internal factors like growing population within the country and the growing domestic market, it is imperative or essentially obligatory to see whether any exportable item is potentially exportable or not. To lend empirical support to this view, here is an analysis to examine the 'potential exportable hypothesis' based on comparative advantage of fishery sector items. To have an export potential, the exporters should have capability in product development, distribution, communication and pricing with its various advantages like positional advantages, low-cost advantage and branding advantage along with its performance in the export market over the years (Zou et al., 2003). Based on this background, it would of much significance to observe the performance and contribution of fishery sector exports in the world fishery trade scenario and in India's merchandise trade.

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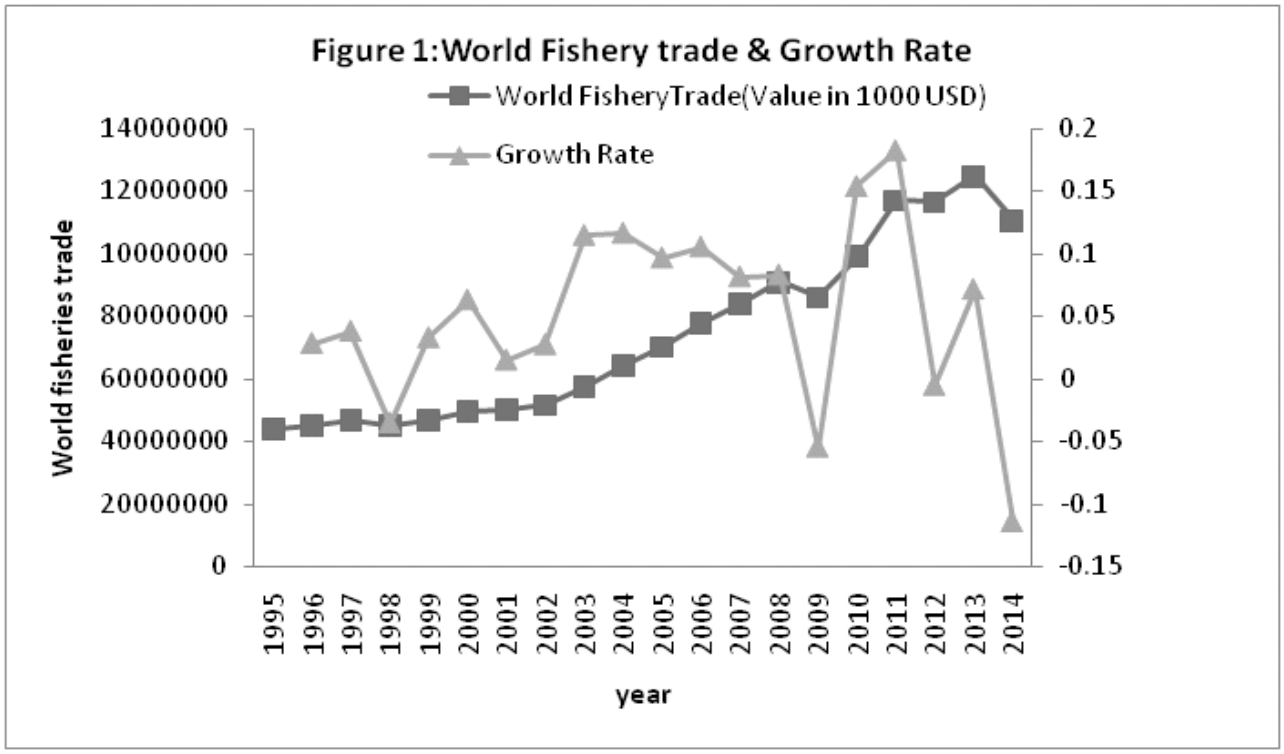
[1]As per WTO guidelines the fisheries sector exports falls in Non-Agricultural Market Access

[2]The opening up of trade enables a country to exploit that good which has an absolute advantage. As a result of it the global production efficiency improves. It is this reasoning of Smith that persuaded the governments to dismantle inefficient barriers even after 100 years of "Wealth of Nations"

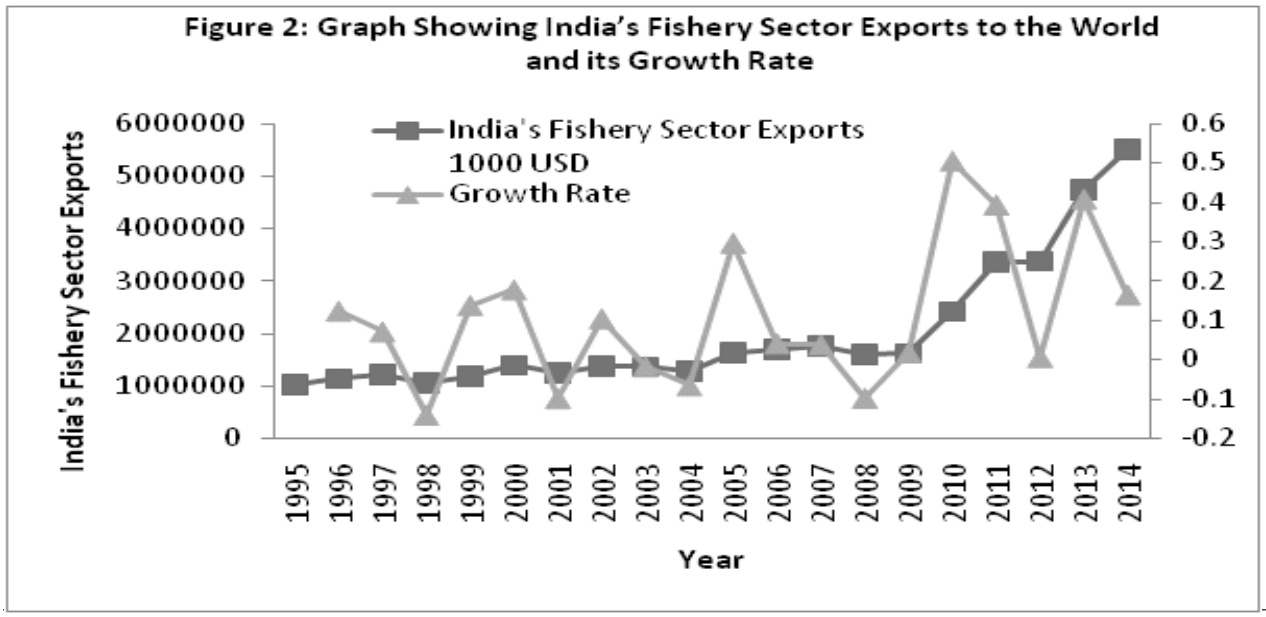
1.1 India's Share in World Trade

World exports of fish and fish products are found to be rising with an annual growth rate of 5.7 percent per annum. Over the span of 15 years since the inception of WTO, except for 1997, 2008, 2012 and 2014, world exports of fishery sector products kept on increasing and even touched double digits as shown in figure1.



There is considerable value addition attached with the trade of this food item with the availability of modern packaging and fish treatment technologies ensuring food safety standard. It is a matter of contention for all the developing countries to cope up with the international sea food safety standard. Hence, it gains space to see the trends in exports and its annual growth rate from India.

Here in figure 2 is the diagrammatic representation of the trends in exports and annual growth rate of fishery sector exports in India over the period 1995 to 2014. It is to be noticed that though India's fishery sector exports to the world keeps on increasing, the growth rate recorded negative, especially for the years 1998,2001,2003,2004 and 2008. But it witnessed 50% growth rate in the year 2010 promising future prospects for exports.



A comparative study of world fishery and Indian fishery trade shows there is a parallel trend and it can be inferred that it keeps pace with world demand.

The international trade of food products is increasingly being dominated by concerns of quality to safeguard human health. It mandates Indian exporters to improve their processing and packaging facilities to meet international quality standards (GOI, 1998-99). Despite that, marine products have emerged as the single largest contributor to agricultural exports from the country accounting for one fifth of the total agricultural exports (GOI, 2001-02, 2013-14).

1.2 Thesis of Trade Theories: A Concise Survey

Ricardian principles of comparative advantage contributed on neo classical reasoning which is a supply driven hypothesis. It underlines the significance of interregional differences in endowments of the factors of production that ultimately driving inter industry trade between countries (Dean and Robert, 2005). Trade theories are indebted to Mill's notion of "Reciprocal Demand" and Alfred Marshall's construction of "offer curve" for incorporating a demand oriented approach. But the credit goes to Austrian School for their notion of opportunity cost that balanced the forces of demand and supply which provided the base for Heckscher - Ohlin theory.

Helpman's (1987) argument favors the complimentarily of new trade and factor endowment theories as they can be reconciled under a single conceptual framework. The merit of comparative advantage doctrine is that it is a synthesis of factor endowment, a country specific characteristic and factor intensity, a product or industry specific characteristic. Thus the theory of comparative advantage falls in normative economics by providing guidelines for government policies on better resource allocation of tradables to exploit the comparative advantage as the contributing factor for exploiting trade potentiality.

1.2.1: A Related Literature:

Conceptual compromise is required to quantify comparative advantage as economic theory specifies the concept in terms of pre trade relative prices in a distortion free world where market functions perfectly. As the researchers are left with post trade data, the credit goes to Liesner (1958) who quantified the comparative advantage between Britain and its European competitors for a single commodity. Balassa (1965) first coined the term revealed comparative advantage by adjusting Liesner's methodology in an attempt to identify the enduring effects of trade liberalization resulting from the Kennedy Round of GATT. Vollrath (1987;1989 cited by Vollrath 1991) analysed the trends of international competitiveness in agriculture using the concept of revealed competitive advantage. He calls them Relative Trade Advantage, Relative Export Advantage and Revealed competitiveness. Balassa (1965) has extensively used this methodology in most pioneering studies to see the "revealed" comparative advantage (RCA) has been treated by UNCTAD (1983) and UNIDO (1982)

Lee (1986) traced the historical changes in the structure of exports and comparative advantage in Korea, Taiwan and Japan devising the Revealed Advantage Index (RCA) of Balassa (1965) which is rendered on the basis of actual export performance of individual countries. Hossain (2006) identified strengths and weakness of Bangladesh's fisheries sector using simpson index, RCA, RSCA etc for the time period 1984-2000.

Kumar (2004) analysed the comparative advantage of fishery products in the international markets by the share of fisheries in India's total exports (Sij) relative to the fisheries share in the total world exports (Siw), RCA = Sij/Siw, the export performance ratio (EPR) as suggested by Baassa (1965) for the time period 1981 to 2000.

1.3 Data Source & Methodology

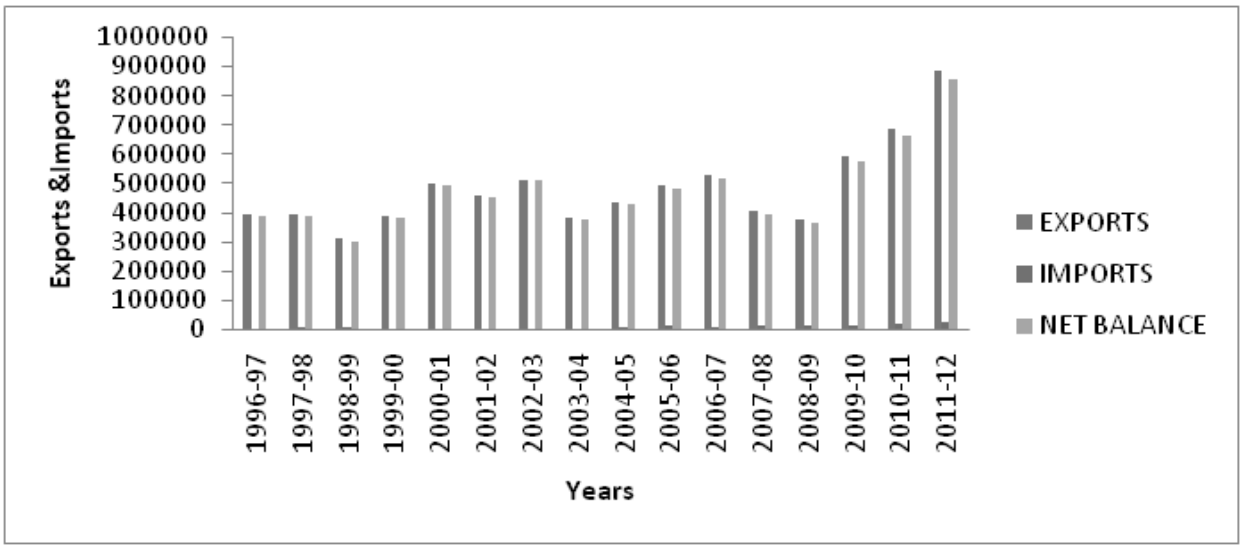
As the focus of the paper is to examine comparative advantage in the post-WTO period, the choice of the data period obviously resorted to 1995-2014. The data on exports and imports for the study period is taken from DGCI&S Export Import data, UN Commodity Trade Statistics data base downloaded through WITS and International Monetary Fund, Direction of Trade Statistics data base. The entire analysis rests with the broad framework of the Ricardian Analysis of Comparative advantage in trade thesis developed by Balassa (1965) and the indices Revealed Trade Advantage, Revealed Competitiveness formulated by Vollrath (1991). Moreover, the study avails other trade indicators like Export-Import Ratio, Trade Intensity Index, Gini-Hirschman's Concentration Coefficient etc.

2.1 Net Trade Balance of Fishery Sector

India has a competitive advantage in several commodities for agricultural exports because of near self-sufficiency of inputs, relatively low labor costs and diverse agro climatic conditions. It is fascinating to note that with regard

to fishery sectors exports as shown in the figure below the exports keep on increasing and imports also steadily increasing at a low pace leaving net balance all positive over the years.

Figure 1: Total fishery sector exports, imports and net balance in quantity(in tonnes)



Although it is understood that the net balance from this sector is positive, the export import ratio provides the competence or potentiality in exports over the years.

2.2 Export Import Ratio of India's Fishery Sector

Let Ixk and Imk denote Indian exports and Indian imports of the group k, then export import ratio for commodity k as EIK= Ixk/Imk. A value of the ratio between zero and one implies that India's imports are greater than exports and if it is greater than one, it indicates India exports more than what it imports. The export import ratios with regard to the Fishery sector has been furnished in the table1. It is now understood that the trade in fishery sector is strong with the lion's share being in export basket and validates the trade potential of the sector exhibiting a revealed comparative advantage in the international market.

TABLE:1 EXPORT IMPORT RATIO OF INDIA'S FISHERY SECTOR

Year	1996-97	1997-98	1998-99	1999-2000	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11
Export Import Ratio	135	55	28	72	112	85	143	81	67	41	50	30	26	44	31

Source: Author's

2.3 The Comparative Advantage of India's Fisheries Sector Exports with its Competitors: Some Indices

The productive resource of one country differs from the other, which exhibits difference in comparative advantage. It is the comparative advantage which is considered both necessary, as well as sufficient, to ensure mutually gainful trade across nations (Sen, 2010).

2.3.1 Revealed Comparative Advantage: Revealed Comparative Advantage[3] Index of Balassa (1965) has been used with some modifications. In the Balassa Index a specific commodity in a particular country/ world is compared with the total export in the country/world. It is assumed that the commodity pattern of trade reflects the inter country differences in relative costs as well as in non price factors. Thus it meticulously reveals the comparative advantage of the trading partners with respect to the particular commodity. The main economic factors that contribute to movements in RCA are: structural change, improved world demand and trade specialization. Thus the RCA is calculated using the following equation

$$RCA = (X_{ij} / X_{wj}) / (X_i / X_w) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

Where,

X_{ij} ith country's exports of commodity j

X_{wj} World exports of commodity j

X_i Total exports of country i

X_w Total World exports

[3]The RCA index greater than one reveals the comparative advantage of a country with respect to the particular commodity.

Given the similarity of the product and the economic geography led factor endowment it is imperative that an analysis of comparative advantage would explain the advantage in the world market of these competitors. Thus the pattern of comparative advantage is estimated using equation (1) for the inter-temporal variation over the post WTO period 1995-2014 and is exhibited in the table 2.

TABLE 2:Revealed Comparative Advantage of India and Top Fishery Sector Products Exporting Countries

Year	India	China	Norway	Thailand	Denmark	Vietnam	USA	Chile	Canada	Spain
1995	3.47	2.11	8.02	8.66	4.94	NA	0.62	7.1	1.32	1.44
1996	3.8	2.14	7.68	8.37	4.92	NA	0.56	7.7	1.28	1.59
1997	3.92	1.82	7.75	8.21	4.87	1.68	0.45	8.3	1.2	1.64
1998	3.63	1.69	10.18	8.79	5.16	1.7	0.39	9.8	1.23	1.64
1999	3.74	1.78	9.4	8.22	4.94	1.66	0.48	10.5	1.29	1.77
2000	4.1	1.85	7.23	7.92	4.8	1.65	0.48	10.7	1.28	1.82
2001	3.39	1.8	6.66	7.45	4.74	1.57	0.53	10.4	1.28	1.92
2002	3.35	1.69	7.1	6.57	4.56	1.44	0.56	10.9	1.49	1.89
2003	2.91	1.54	6.65	6.25	4.65	1.34	0.58	10.7	1.55	1.87
2004	2.3	1.56	6.83	5.83	4.6	1.27	0.64	9.1	1.53	1.97
2005	2.32	1.41	6.68	5.78	4.68	1.24	0.65	8.6	1.43	1.91
2006	2.1	1.39	6.64	5.98	4.75	1.26	0.62	7.7	1.41	1.98
2007	1.91	1.21	7.11	5.81	4.77	1.22	0.59	7.3	1.39	2.04
2008	1.49	1.21	6.66	6.31	4.78	1.32	0.57	9	1.38	2.13
2009	1.27	1.2	8.47	5.71	4.05	1.41	0.53	7.6	1.43	1.95
2010	1.62	1.24	9.84	5.31	4.2	1.26	0.52	5.9	1.46	1.95
2011	1.60	1.29	8.34	5.11	3.87	NA	0.58	6.99	1.38	1.89
2012	1.66	1.26	7.75	5.01	3.87	NA	0.54	6.96	1.31	1.88
2013	1.93	1.20	9.06	4.16	4.08	NA	0.52	7.99	1.29	1.67
2014	2.23	1.14	9.57	3.63	3.93	NA	0.49	8.90	1.22	1.57

Source: Author's

From table table-2, it may be inferred that India is more advantageously placed than China, Vietnam, Canada and Spain. Though Denmark and India are equally advantageously placed, Denmark's indices remain stable when compared to India. Despite of the fact that USA is a potential exporter of fisheries sector products placed at 6th position in world ranking, the RCA index is below one revealing a comparatively disadvantageous position for USA with respect to its competitors. Though Vietnam and Thailand show signs of advantage compared to its counterparts, India's position is commendable and this explicates India's trade potential of this sector. Nevertheless it is a matter of apprehension that the RCA index is coming down overtime, though it slowly picks up since 2010, those policies to strengthen the sector in this dynamic trade scenario needs to be dealt with. The export advantage position draws attention to evaluate the trade advantage and hence Revealed Trade Advantage is elicited using the methodology formulated by Volrath (1991).

2.3.2 Relative Trade Advantage (RTA): The items of fishery sector products exported are always demand driven and it is essentially important to look at the export competitiveness of the product which can be used as a proxy to measure the export potential. The export competitiveness of fishery sector in terms of value inputs may be calculated using the indices of competitiveness formulated by Vollrath (1991). The index takes imports also in addition to exports as in Balassa's index. Relative Trade Advantage (RTA) includes both exports and imports and is the difference between Relative Export Advantage (RXA) and Relative Import Advantage (RMA)[4]. The RXA is the same as in RCA Balassa's index. A positive value of RTA indicates a comparative advantage. RTA= RXA-RMA , Where RXA= RCA (Balassa's Index)

RMA = (Mij / Mwj) / (Mi / Mw) ……(2)

[4]The M in equation 2 substitutes imports as it is with exports in equation 1

Table 3: Revealed Trade Advantage of India and its Competitors in Fishery Sector

Year	India	China	Norway	Thailand	Denmark	Vietnam	USA	Chile	Canada	Spain
1995	3.45	1.68	7.04	7.74	2.30	NA	-0.23	6.8	0.76	-1.07
1996	3.79	1.72	6.61	7.45	2.14	NA	-0.27	7.5	0.65	-0.85
1997	3.89	1.43	6.71	6.91	2.28	1.61	-0.46	8.1	0.65	-0.94
1998	3.60	1.20	8.86	6.84	2.45	1.64	-0.53	9.6	0.65	-1.07
1999	3.73	1.24	8.07	6.65	2.22	1.52	-0.42	10.4	0.68	-0.56
2000	4.09	1.24	5.81	6.61	1.88	1.43	-0.45	10.5	0.65	-0.66
2001	3.37	1.22	5.10	5.84	1.79	1.32	-0.42	10.3	0.65	-0.78
2002	3.34	1.11	5.73	4.87	1.83	0.93	-0.41	10.7	0.86	-0.75
2003	2.89	1.01	5.68	4.61	1.74	0.84	-0.45	10.5	0.89	-0.90
2004	2.28	1.02	5.77	4.17	1.82	0.59	-0.37	8.9	0.83	-0.67
2005	2.30	0.83	5.74	4.18	1.75	0.51	-0.32	8.4	0.74	-0.74
2006	2.08	0.83	5.68	4.33	1.80	0.62	-0.40	7.5	0.72	-0.75
2007	1.89	0.67	6.07	4.09	1.92	0.64	-0.46	7.0	0.65	-0.62
2008	1.46	0.70	5.67	4.21	1.87	0.73	-0.51	8.8	0.65	-0.56
2009	1.25	0.72	7.50	3.82	1.42	0.88	-0.59	7.3	0.65	-0.73
2010	1.59	0.79	8.92	3.65	1.09	0.69	-0.60	5.6	0.69	-0.97
2011	1.56	0.77	7.27	3.38	0.77	NA	-0.53	8.38	0.58	NA
2012	1.63	0.76	6.71	3.18	0.82	NA	-0.55	6.75	0.52	NA
2013	1.92	0.71	8.21	2.24	0.84	NA	-0.64	6.15	0.46	NA
2014	2.21	0.64	8.65	2.02	0.63	NA	-0.69	NA	0.40	NA

Source: Author's

A closer look into the table-3 shows that the RTA is moving against USA and Spain and more in favor of Norway, Thailand, Chile. China, Denmark and Canada exhibit revealed trade advantage below unity, especially since 2009, and Canada, though has comparative advantage shows trade disadvantage throughout the years. India is ranked in fourth position ensuring that the performance of India is in better position when compared to her trade partners. On the other hand, the healthier signs need to be channelized for further improvement of the trade advantage. This holds up the trade potential of this sector for India. The restructuring of an economy towards comparative and trade advantages might have ensured the competitiveness of a product and an empirical exercise carried out below to examine it.

2.3.3 Revealed Competitiveness: The Revealed Competitiveness (RC) is the log difference drawn from the equations 1 & 2 which is mentioned below in equation 3. Positive values of Vollrath's RC reveal competitive advantage of the country in the particular commodity's export.

$$RC = \text{In RXA} - \text{In RMA} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3)$$

TABLE4 : Revealed Competitiveness of India and her Competitors in Fishery Sector

Year	India	China	Norway	Thailand	Denmark	Vietnam	USA	Chile	Canada	Spain
1995	5.12	1.59	2.11	2.25	1.65	NA	-0.32	3.2	0.86	-0.55
1996	5.78	1.64	1.97	2.21	1.56	NA	-0.40	3.6	0.72	-0.43
1997	4.93	1.54	2.01	1.85	1.66	4.83	-0.70	3.8	0.78	-0.45
1998	4.62	1.24	2.04	1.50	1.65	5.07	-0.86	4.0	0.76	-0.50

TABLE4 : REVEALED COMPETITIVENESS OF INDIA AND HER COMPETITORS IN FISHERY SECTOR-CONTD...

Year	India	China	Norway	Thailand	Denmark	Vietnam	USA	Chile	Canada	Spain
1999	5.45	1.19	1.95	1.65	1.59	4.21	-0.62	4.0	0.75	-0.28
2000	6.03	1.12	1.63	1.80	1.46	4.06	-0.67	4.1	0.71	-0.31
2001	5.19	1.12	1.45	1.53	1.44	4.03	-0.58	4.1	0.70	-0.34
2002	5.36	1.07	1.65	1.35	1.51	3.36	-0.55	4.1	0.85	-0.34
2003	5.20	1.07	1.92	1.34	1.44	3.33	-0.58	4.1	0.85	-0.39
2004	4.73	1.06	1.86	1.26	1.49	2.93	-0.46	3.7	0.79	-0.29
2005	4.77	0.88	1.96	1.29	1.44	2.82	-0.40	3.7	0.73	-0.33
2006	4.66	0.91	1.94	1.29	1.44	2.98	-0.50	3.6	0.71	-0.32
2007	4.71	0.82	1.92	1.22	1.49	3.06	-0.57	3.5	0.63	-0.26
2008	3.94	0.86	1.90	1.10	1.47	3.03	-0.64	3.6	0.63	-0.23
2009	4.18	0.93	2.17	1.11	1.45	2.98	-0.75	3.5	0.61	-0.32
2010	4.22	1.01	2.37	1.17	1.27	2.90	-0.77	3.1	0.64	-0.40
2011	3.79	0.91	2.78	4.56	0.22	2.52	-0.64	2.89	1.60	NA
2012	4.38	0.94	2.75	4.41	0.23	2.20	-0.69	3.00	1.54	NA
2013	5.21	0.89	2.90	3.57	0.24	2.17	-0.79	3.00	1.48	NA
2014	4.85	0.82	2.90	3.16	0.18	NA	-0.87	3.14	1.42	NA

Source: Author's own calculation

The above table-4 demonstrates the revealed competitiveness of top ten fishery sector exporters in the world. Although USA and Spain are among the top fishery sector exporters in the world, the competitiveness in their fishery products is not promising. It may be observed that India's fishery sector products are highly competitive in nature and can be weighed against its contestants in the world market. Hence, contextually, the argument goes in favor of India's trade potential to be tapped for further exports.

Having seen the comparative advantage and export competitiveness using the indices like RCA, RTA and RC; the intense trade relationship with our trading partners has also been examined with Trade Intensity Index.

2.4 Trade Intensity Index

The trade intensity index[5] takes values between 0 and positive infinity (+α). If the trade intensity index takes values more than 1, then it explains that there is intense trade between the trade partners. The statistic tells us whether or not a region exports more (as a percentage) to a given destination than the world does on an average.

$$\text{Trade Intensity Index} = \frac{Xsd/Xsw}{Xwd/Xwy} \quad \text{.....(4)}$$

Where, "s" is the country in the source, d is the destination, w and y represent countries in the world, and X is the bilateral flow of total exports.

TABLE 5: TRADE INTENSITY INDEX OF INDIA WITH ITS PARTNERS IN FISHERY SECTOR EXPORTS

Year	China	UAE	Canada	Norway	Japan	Thailand	USA	Vietnam	Denmark	Spain	UK
1995	0.78	31.87	0.12	0.60	1.48	1.74	0.70	0.56	0.09	0.9	1.56
1996	2.85	27.84	0.24	0.13	1.61	1.68	0.71	1.16	0.04	0.5	1.21
1997	3.34	29.91	0.29	0.03	1.94	1.69	0.75	5.90	0.03	0.4	0.48
1998	1.94	28.69	0.39	0.11	2.42	2.23	0.87	2.25	0.06	0.5	0.74
1999	2.90	23.44	0.53	0.05	1.87	2.44	0.90	14.23	0.04	0.6	0.90
2000	2.68	21.02	0.58	0.12	1.68	2.96	0.97	15.39	0.02	0.5	1.11
2001	2.60	20.58	0.49	0.07	1.53	2.95	1.13	10.78	0.04	0.8	1.07
2002	2.65	13.13	0.60	0.06	1.18	3.34	1.48	12.18	0.04	0.9	1.24
2003	2.46	12.26	0.93	0.00	1.08	2.80	1.64	10.74	0.07	0.8	1.29
2004	1.77	15.30	1.19	0.03	1.08	1.68	1.73	12.94	0.07	0.9	1.30

[5]It does not suffer from any 'size' bias, so we can compare the statistic across regions, and overtime when exports grow rapidly.

TABLE 5: TRADE INTENSITY INDEX OF INDIA WITH ITS PARTNERS IN FISHERY SECTOR EXPORTS-CONTD....

Year	China	UAE	Canada	Norway	Japan	Thailand	USA	Vietnam	Denmark	Spain	UK
2005	2.32	13.16	1.12	0.09	1.17	1.89	1.48	4.39	0.08	1.0	1.26
2006	2.83	11.55	1.33	0.16	1.20	2.10	1.12	4.14	0.10	1.1	1.26
2007	2.48	12.05	1.32	0.14	1.30	2.00	0.97	2.56	0.13	1.2	1.09
2008	2.07	11.68	0.99	0.12	1.33	2.27	0.90	2.70	0.14	1.1	1.03
2009	1.68	12.47	1.21	0.18	1.07	3.61	0.89	3.94	0.10	1.2	1.22
2010	2.24	6.89	0.87	0.06	1.16	3.69	1.08	5.67	0.10	1.1	0.96
2011	1.33	7.03	1.14	0.05	1.06	2.59	1.34	9.22	0.07	0.97	0.94
2012	1.03	8.26	1.03	0.13	0.85	1.78	1.54	7.60	0.09	1.10	0.86
2013	0.88	4.92	1.40	0.03	0.84	1.58	1.76	7.68	0.14	0.69	0.87
2014	0.57	7.5	1.38	0.03	0.96	1.25	1.99	5.15	0.16	0.80	0.88

Source: Author's

An evaluation of the trade intensity index of India's fishery sector exports with its trade partners exhibits that UAE and Vietnam enjoy greater market share by endorsing an intense relationship. The trade partners like China, Japan, Thailand and U K keep up the intensity by maintaining the index stable overtime. It is to be discerned that the index does not show signs of turning downwards and is getting better with all its partners in recent years.

In this background, there is possibility of culling or reaching out to new markets. Gini-Hirschman's Geographical Concentration Coefficients would be one of the tools by which the trends in direction of exports may be explained.

3.1 Trends in the Direction of Indian Export of Fishery Sector Items: Gini-Hirschman's Geographical Concentration Coefficients

Gini-Hirschman's geographical concentration coefficients[6] are worked out using the following formula for the period 1995-2014 by taking nineteen major trade partners viz. - China, UAE, Canada, Germany, Denmark, Spain, France, UK, Indonesia, Italy, Japan, Srilanka, Netherlands, Norway, Newzealand, Singapore,Thailand, USA and vietnam .

$$Gjx = \sqrt{\sum_{s} \left(\frac{Xsj}{Xj}\right)^2} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (6)$$

Where, 'Xsj' stands for the export of country 'j' to 's' and 'Xj' is the total export of country 'j

TABLE 6 GINI-HIRSCHMAN'S GEOGRAPHICAL CONCENTRATION COEFFICIENTS: TRENDS IN THE DIRECTION OF INDIAN EXPORT OF FISHERY SECTOR ITEMS

Year	Coefficients	Year	Coefficients	Year	Coefficients
1995	44.95	2002	37.81	2008	24.65
1996	45.5	2003	36.57	2009	22.9
1997	43.56	2004	35.46	2010	25.95
1998	50.78	2004	35.46	2011	28.95
1999	45.97	2005	32.3	2012	28.86
2000	43.11	2006	28.44	2013	34.5
2001	38.5	2007	26.1	2014	35.15

Source: Author's

It is of significance that during the post WTO period, the widening of the number of destinations/markets has reduced geographical concentration in the range of 50.78 in 1998 to 22.9 in 2009, it may be because of the impact of WTO with its more market access policies, especially with regard to developing countries exports. Market access liberalization has influenced product specific growth of exports (Mayer, 2004). It is a healthy sign that instead of depending on a few products and countries, the potentiability of fishery sector trade may be increasingly extended to a sizeable lot of new products and partners.

[6]According to Gini-Hirschman coefficient of geographical concentration, the lower the coefficient, larger is the number countries to which goods are exported and vice versa. The highest possible coefficient is 100, where all exports are directed to one country.

4. Conclusion

The paper is an attempt to understand and compare the comparative advantage of India in fishery sector exports with its competitors in the era of stringent sea food safety standards. Neoclassical trade theories support the comparative advantage hypothesis as the contributing factor for exploiting trade potentiability. In the effort to quantify the trade potential of the fishery sector exports, Revealed Comparative Advantage, Revealed trade Advantage, Revealed Competitiveness, Trade Intensity Indices etc were estimated and constituted as the benchmark against which the realism of export potential could be assessed. The RCA indices have been calculated for India and also top exporters of the product, which are India's potential competitors. The RCA index if ranking reveals that India is the third advantageously placed country after Norway and Thailand and this promulgates the trade potential of the sector. The RTA index also favors India keeping its position fourth among the competitors. The RC index is the highest for India which promises that the products are competitive in nature when compared with its contestants in the world market arguing for India's trade potential to be tapped for further exports. The Trade Intensity Index exhibits intense trade relationship with UAE, Vietnam and with other partners which also remains positive and stable over the period assuring future markets. The Gini-Hirschman's geographical concentration coefficients examined the trend of market diversification of fishery sector exports which keeps on declining in the post WTO period unearthing the scope for further market diversification. Among the major fish producing and exporting countries, India retained the export dynamism during the study period from 1995-2014. It is evident that our export market is mainly with developed countries and the export capability, competence and potential has also been comprehended.

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AGRO-ECONOMIC RESEARCH

Assessment of Marketable and Marketed Surplus of Major Foodgrains in Maharashtra*

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1.1 Backdrop:

The production of foodgrains in Maharashtra which was only 6.8 million tonnes in 1962-63, increased to 12.32 million tonnes in 2011-12. This increase in production was possible because of technology, price support and other institutional factors which enabled the farmers to have surplus produce which could be marketed. The Green Revolution in the late 1960s and early 1970s signaled the beginning of a more dynamic agriculture through the use of high yielding varieties which helped to overcome productivity stagnation. Agriculture, therefore, became more commercial and not merely for subsistence. Technology made it possible for integration of subsistence farmers also into the market economy. In this context, the amount of marketed and marketable surplus with producers assume importance. However, despite commercialization, Indian agriculture is still dominated by marginal and small farmers. In Maharashtra, 44.6 percent of holdings are marginal and 30.3 percent are small. These farmers who are resource poor often produce largely for self consumption and other requirements and may market the suplus, if any. Large farmers cultivating foodgrains may also retain for self consumption and other needs, but mostly market the surplus. The entire surplus produce however does not reach the market due to crop losses at various levels, such as field level losses during harvest and post harvest, losses during transport, storage, etc. It is in this context that marketable and marketed surplus assume importance.

The need for precise assessment of Marketed and Marketable Surplus is important in the context of development not only for the agricultural sector but overall economic development. Understanding the magnitude of marketable and marketed surplus and the variables affecting it, can be of great importance in the development of sound policies with respect to agricultural marketing, pricing and distribution of important agricultural commodities, imports and exports and overall rural and economic development. The estimated marketed and marketable surplus ratios enable the government to frame appropriate policies.

The Directorate of Marketing and Inspection had been conducting surveys on marketed surplus, marketable surplus and post harvest losses. However, this data has become outdated and there is persistent demand from user organizations for revision and updating of the data to make it more realistic with the changing agricultural scenario, Data on crucial items also, such as farm retention for family consumption, seed, feed, wastage at various levels, wages to be paid in kind, etc, are equally important in the context of planning for agricultural development, distribution programmes, food security and pricing policies for agricultural commodities.

In light of the above, a primary survey was conducted in the state of Maharashtra to estimate marketed and marketable surplus, farm retention and post harvest losses for three crops, namely, tur, gram and maize.

1.2 Methodology

Maharashtra makes substantial contribution to the production of tur, gram and maize to the all India production. With respect to tur, the state has highest area (2009-10) in the country, which accounts for 31.54 percent share and contributes to 37.29 percent of production, which is again the highest in the country. In case of gram, the state is the second largest producer after Madhya Pradesh, contributing to 14.90 percent of production (2009-10) and 15.80 percent of area. In case of maize, the state is among the top five producers in the country and occupies 9.61 percent area and contributes to 10.93 percent of production.

In Table 1, the multi-stage sampling procedure at the district, taluka and village level which has been adopted for the primary survey is indicated. In can be observed from Table 1 that majority of farmers fall in the marginal and small category as expected. The percentage of farmers in medium category was less than 10 percent in most cases, while there were no farmers in category larger than 10 hectares. During discussion, it was noted that due to division and subdivision of holdings, the number of holdings above 10 hectares started diminishing. Hence, with the above sample size, the field survey was conducted.

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TABLE: MULTI-STAGE SAMPLING FOR SELECTED CROPS:

	Tur				Gram				Maize			
	District Amravati			District Latur		District Amravati		District Latur		District Nashik		District Aurangabad
	Taluka											
Group	Amaravti	Daryapur	Ausa	Ahmedpur	Bhtukali	Daryapur	Ausa	Nilanga	Satana	Malegaon	Sillod	Kannad
Land	Village											
Holding)	Yavali	Nardoda	Lakhangaon	Ujna	Sayat	Thilori	Talani	Lambota	Unoli	Vajirkheda	Georai semi	Nandgirwadi
<1 ha	8 (32)	8 (32)	4 (16)	11 (44)	7 (28)	8 (32)	9 (36)	10 (40)	12 (48)	12 (48)	6 (24)	9 (36)
1.01 to 2 ha	12 (48)	9 (36)	12 (48)	8 (32)	10 (40)	10 (40)	10 (40)	9 (36)	9 (36)	10 (40)	7 (28)	8 (32)
2.01 to 4 ha	3 (12)	5 (20)	8 (32)	5 (20)	5 (20)	4 (16)	4 (16)	4 (16)	3 (12)	2 (8)	10 (40)	6 (24)
4.01 to 10 ha	2 (8)	3 (12)	1 (4)	1 (4)	3 (12)	3 (12)	2 (8)	2 (8)	1 (4)	1 (4)	2 (8)	2 (8)
Total	25 (100)	25 (100)	25 (100)	25 (100)	25 (100)	25 (100)	25 (100)	25 (100)	25 (100)	25 (100)	25 (100)	25 (100)

Note: Figures in brackets are percentage to total sample size

In Table 2, the distribution of sample size, crop-wise and land holding pattern is indicated. It can be observed from Table 2 that out of the total sample size, small and marginal farmers were the main category. There were no farmers in the large category in the selected talukas. Infact, for the state as a whole, the number of large farmers constituted barely 0.5 percent of total farm households.

TABLE 2: Distribution of Sample Size, Crop wise, according to Land Holding Pattern

Category	Marginal /Crop	Small	Semi Medium	Medium	Total
Tur	31	41	21	7	100
Gram	34	39	17	10	100
Maize	39	34	21	6	100

Source: Field Survey

Thus, in order to conduct the field survey, the total sample size was 300 households and 100 for each selected crop.

1.3 Main Findings of the Study:

The Following are the major findings of our study:

1. In the four selected districts. it was observed that not only agriculture was the main economic activity, but its share in workforce was much higher than state average. In other words, while total workforce engaged in agriculture in Maharashtra is 55.41 percent,the share in Amravati district is 70.80 percent, in Latur district it is 73.42 percent, while in Nashik and Aurangabad districts it is about 63 percent. It is also worth nothing that in Amravati, the share of agricultural laborers is much higher than that of cultivators, thus indicating limited job opportunities outside agriculture in the district.

2. The constribution of agriculture to the District Domestic Product was very low and ranged between 14.30 percent in Latur to 21 percent in Amravati. This clearly indicates the low level of productivity from agriculture.

3. In Nasik and Aurangabad districts about 70 percent of gross cropped area was under foodgrains, while in Amravati it was 46.22 percent. This is because cotton and oilseeds are also important crops in this district. In Latur, 41.52 percent of gross cropped area is under foodgrains, while oilseeds occupy 33.55 percent of GCA.

4. The Socio-economic profile of the sample households indicated that our of a sample of 300 households, 104 households (34.67 percent) were marginal, 114 households (38 percent) were small 59 were semi-medium (19.67 percent) and 23 were medium (7.66 percent). There were no farmers in the large category. In fact, even at the state level, the percentage of farmers in the large category was only 0.5. percent:

The average age of the decision maker of the household across all districts was about 49.55 years and the main occupation was corp farming. In about 2 percent of the cases, service was mentioned as the main occupation while it was 2.33 percent in case of farm labour.

With respect to education, it was observed that in maximum cases (30.33 percent), the level of education was only till the Primary level while in 28.33 percent of the cases it was upto secondary level, Further, 15.67 percent of the sample had Higher Secondary level of schooling. About 14 percent of the sample had households where the decision maker was illiterate, while in 9 percent of the cases they were graduates.

The average size of the family was 6 percent all households with 50 percent in each sex group. the social grouping reveals that 36.67 percent of the households belonged to General category. However, more than half of the sample households belonged to reserved category. There were 38.67 percent households which belonged to OBC category, while 12.67 percent belonged to SC and 2 percent were ST. In 95.33 percent of cases, the head of the Household was male.

5. It was observed that across all districts for the total sample size, the average size of holding was 1.92 hectares. Hence, the overall picture that emerges from the table depicts that the average operational holding of a household in less than 2 hectares and mainly unirrigated. Across all farms, the unirrigated area was 61.97 percent. Mrginal farmers had a higher share of irrigated area (43.46 percent) as compared to other categories. It was also observed that almost half of the households were using a combination of canal and tank irrigation. Open Well irrigation was also common with about 37 percent of households.

6. It was observed that after taking into consideration all farm households, only 1.67 percent of them were leasing in land and the land leased in was 1.87 percent of cultivated area. Thus the households were mainly cultivating owned land and the cases of leasing in were negligible. More specifically, out of a samle of 300 households, only 5 households leased in land out of which 3 were marginal farmers, while 1 each in the small and medium category. the terms of lease indicated that only in one case, fixed money was paid while in other cases the rent was in terms of share of produce with a ratio of 50:50.

7. In vase of all categories of farmers, some part of the area was double cropped. The cropping intensity was highest for marginal farmer (137.5 percent) and across all size classes it was 129 percent. Farmers were mainly cultivating in the Kharif season and across all size classes, area under kharif crops was 69.27 percent, while it was 30.73 percent for rabi crops.

It can be observed that as the three selected crops, namely, tur, gram and maize are concerned, across all groups, these crops constituted 41.5 percent of GCA. In case of marginal category, the area under these crops was 49.1 percent and in case of small group, it was 45 percent. However, for semi-medium and medium groups, this share was 35.5 percent and 38.44 percent, respectively. Hence, although in percentage terms the share of the selected crops was lower for semi-medium and medium category, in absolute terms it was higher.

Besides the selected crops, other crops cultivated by sample farmers were oilseeds (19.92 percent), cotton (9.80 percent) mung (7.38 percent), and jowar (5.68 percent).

8. In case of selected crops, the yield of sample farmers was higher than state average in case of tur and gram. In case of tur, while state average yield was 749 kg per hectare, that of sample households was 898 kg per hectare and they yield across all size classes was higher than state average. With respect to gram, while sample households had a yield of 971 kg per cent hectare that of the state average was 904 kg per hectare. However, in case of maize, the sate average yield was higher than that of sample households. In case of kharif maize, the state showed a higher yields by 5 percent than sample households, while in case of rabi, maize was higher by 18 percent.

Wtih respect to other crops such as soyabean and kharif jower, while the yield of sample farmers was almost similar to that of state average, in case of cotton the sample farmers experienced about 50 percent higher yield than state average.

9. Across all categories of households. the level of investment per hectare was Rs 84447/-. As the land holding class increased in size, the level of investment also increased. In case of marginal category, the level of investment was Rs 43692/- per heactare, while in case of medium farmers it was Rs. 179348/- per hectare. The livestock owned by sample farmers indicated that all categories of households owned cattle and buffalo and across all groups the cattle owned was 2.05 and buffalo owned was 0.47. Calf and bullock cart was owned only by marginal and samll farmwers, Perhaps, the semi medium and medium category perferred to invest in machinery rather than livestock.

10. The sale pattern revealed that in case of tur, across all categories of landholding, 95.5 percent of the produce was sold to private traders and barely 4.5 percent was sold to processors. It can also be observed that by and large the farmers had to travel about 25 kms to sell their produce. This indicates that markets were located far away farmers' land and since most farmers here marginal and small, they have to travel long distances to market their produce. In case of gram, the entire sale was to private traders and there was no instance of sale to any processor. But it was again observed that farmers had to commute long distances of around 30 kms to reach the market. It therefore appears that the selected sample villages did not have any regulated market nearby. In case of maize, however, with respect to small farmers, about 7.4 percent was sold to processors. In no other size category did the farmers sell to processors but sold the entire stock to private traders.

Another important point observed from out sample size in that there was no instance of the produce being sold to government agencies although the MSP was announced for each of the selected crops. In case of tur, although MSP for 2011-12 was announced at Rs. 3200/- per quintal, across all sixe groups, farmers sold at Rs. 3080/- per quintal, *i.e.* about 4 percent below MSP, farmers in the sample revealed that even if prices are prevailing below MSP, the state agencies do not enter the markets and even if they are percent, their produce is often rejected on quality considerations. In case of gram, the farmers in the sample had sold at prices higher than MSP and there was no case of state purchases. In case of maize, however, farmers had sold at prices which were about 6 percent higher than MSP.

11. With respect to tur, maximum farmers in the sample sold in March (26 percent), followed by February (20 percent). About 13 percent of farmers in the sample sold in January soon after harvest of the crop. Overall, it appears that farmers did not store their produce for long to take advantage of any rise in lean season price but mostly sold it in a month or so after harvest.

Gram is a rabi crop and it was observed that more than half the farmers in the sample sold their produce in March and April, *i.e.* soon after harvest. There seemed to be no instance of any farmers storing the produce to take advantage of any off seasonal rise in price.

In case of maize also the produce was mainly sold in November and December, soon after harvest. Overall, it appeared that since farmers in the sample were mainly marginal and small, their ability to store the produce may be limited may be limited and hence they did not store the produce for long but disposed it off immediately or a few months after harvest.

12. The retention pattern for the selected crops revealed that across all size groups, in case of tur it was 14.86 percent, in case of gram it was 9.55 percent and in case of maize it was only 1.70 percent of net availability of the crop with the sample households. In case of **tur,** it was observed that retention was mainly for self-consumption. Across all size groups, 81.82 percent of the availability was retained for self consumption. It was also observed that marginal farmers retained on-fifth the quantity of tur as compared to all size groups. More

specifically, while marginal farmers sold 91.67 percent of their net availability, in case of all size category, the corresponding figure was 83.24. Perhaps due to need for cash, they had to market a larger share and retain a small quantity. Further, it was also observed that sometimes farmers sold their produce at a lower price than what they puchased it again for consumption. This shows their urgent need for cash. Since tur is not an ingredient for any fodder, no quantity by any size class was retained for feed. However, across all size groups, about 18.2 percent was retained as seed which amounts to about 10 kgs. Farmers revealed that they preferred to but seed rather than retain it, because if they used the same seed in the following seasons, the yield levels would come down. There was only one instance of a small farmer making a payment in kind of 1 kg. of tur. Across all size groups of farmers, it was observed that farmers besides retaining the crop for self consumption, also purchased from the market to meet their requirements. Infact, in case of small farmers, the quantity retained and purchased is the same. The farmers revealed that they were in urgent need for cash after harvest and hence retained less than required. In case of other groups also farmers retained less than requied mainly to meet their cash needs. However there were a few cases when farmers stated that the quality of their production was low and hence they purchased a better quality tur from the market for consumption.

In case of **gram,** it was observed that retention across all size groups for self consumption was 55.34 percent. Further, all size group of farmers purchased some quantities to supplement their requirements. However, the price at which farmers sold was higher than the price at which they purchased by about 16 percent across all size groups. Some farmers stated that they could sell their produce at a higher price because it was a better quality, while they purchased a lower quality for consumption and hence it was at a lower price. Since gram is not often consumed directly but ground into flour bedore use, farmers were not particular about the quality of consumption and hence purchased lower quality at lower price. Since gram is not used as feed for livestock, it was not retained as feed while about 31.97 percent was retained as seed. Farmers also made payment in kind which was on an average 13.59 percent across all size groups.

Maize was a crop mainly cultivated for sale and hardly retained for self consumption. In fact, in case of our sample farmers, more than 95 percent of available produce was sold. Since maize is an important ingredient in animal feed especially poultry), major share of retention was for feed. Across all size groups, only 11.54 percent was retained for self consumption while 88.46 was retained for feed. Since maize is not an important part of the consumption pattern in Maharashtra, probably farmers barely retained for self consumption. Among the sample farmers, there was no instance of purchase from market for consumption, retention for seed or payment in kind.

13. At the time of harvesting the crop, losses were incurred by the farmer. It was observed that in case of **tur,** 92 percent of farmers were still resorting to harvesting by manual method. However with respect to threshing and winnowing, more than half the sample farmers used mechanical method. The maximum losses were also during harvesting and across all size groups of farmers 51.72 percent of the losses were during harvesting. Since it was mainly manual, farmers sometimes did not use the proper sickle which reduced the production of the crop. In case of medium farmers, harvesting was entirely dependent on manual methods and losses to the extent of 60 per cent were observed. In case of threshing and winnowing, across all size groups, the losses were 27.59 percent and 20.69 percent respectively.

In case of **gram,** it was observed that 98 percent of harvesting was done manually and only in two cases mechanical method was used. In fact manual method was largely popular for threshing as well as winnowing. Across all size groups, 55.1 percent of losses on farm were at harvesting stage, 26.53 percent during threshing and 18.37 percent during winnowing.

In case of **maize** harvesting was done by manual method and only farmer reported to have used mechanical method. However, in case of threshing, except in one instance all sample farmers seem to be used mechanical methods. Threshing of maize is very labour intensive, and lack of availability of labour has been an important reason making the farmers to use mechanical labour for threshing. In case of winnowing, almost half the sample farmers used mechanical power. Losses to the sample household were maximum at the stage of threshing (45.16 percent), followed by harvesting (38.71 percent) and then at winnowing stage (16.13 percent).

14. The transport loss across all size of households revealed that out of total losses, it was 5.71 percent in case of tur, 8.70 percent in case of gram and 4.55 percent in case of maize. The main reason cited for the loss was due to breakage of bags during transport. The storage loss was 11.43 percent in case of tur, 20.29 percent in case of gram and 25 percent in case of maize out of total losses. The loss in storage was mainly due to pest infestation, rodents and driage. Most farmers revealed that they did not get any subsidy for creating storage.

15. The total losses as a percentage of net availability of the concerned crop with the sample households was 9.46 percent for tur, 6.4 percent for gram and 1.45 percent for gram and 1.45 percent for maize. The same can be observed in Table 3.

TABLE 3: TOTAL LOSSES INCURRED BY SAMPLE FARMERS (QUINTALS)

	Marginal	Small	Semi-Medium	Medium	All
			TUR		
Harvesting	0.17	0.37			0.29
	(89.47)	(84.09)	0.45 (80.36)	0.28 (80)	(82.86)
Transport	0	0.03	0.03	0.01	0.02
	(0)	(6.82)	(5.36)	(2.86)	(5.71)
Storage	0.02	0.04	0.08	0.06	0.04
	(10.53)	(9.09)	(14.29)	(17.14)	(11.43)
Total	0.19	0.44	0.56	0.35	0.35
	(100)	(100)	(100)	(100)	(100)
Losses as a % of net availability	11.3	11.02	12.17	4.26	9.46
			GRAM		
Harvesting	0.43	0.54	0.72	0.68	0.49
	(40.19)	(78.26)	(75.79)	(61.26)	(71.01)
Transport	0.14	0.01	0.01		0.06
	(13.08)	(1.45)	(1.05)	0.09(8.11)	(8.70)
Storage	0.5	0.14	0.22	0.34	0.14
	(46.73)	(20.29)	(23.16)	(30.63)	(20.29)
Total	1.07	0.69	0.95	1.11	0.69
	(100)	(100)	(100)	(100)	(100)
Losses as a% of net availability	15.76	6.68	7.34	4.96	6.4
			MAIZE		
Harvesting	0.24	0.4	0.56	0.78	0.31
	(70.5)	(72.6)	(73.68)	(100)	(70.45)
Transport	0.00	0.06	0.00	0.00	0.02
	(0)	(11)	(0)	(0)	(4.55)
Storage	0.1	0.09	0.19	0	0.11
	(29.5)	(16.4)	(25)	(0)	(25.00)
Total	0.34	0.55	0.76	0.78	0.44
	(100)	(100)	(100)	(100)	(100)
Losses as a % of net availability	1.69	2.00	2.10	0.97	1.45

Source: Field Survey. Note: Figures in brackets are percentage to total.

16. It is observed from Table 4 that marketable surplus for tur across all size groups is 85.95 percent while the marketed surplus is 83.24 percent. Across all size groups the marketable surplus is observed to be higher than marketed surplus. However, in case of marginal farmers, it is observed that marketed surplus is greater than marketable surplus which indicates his urgent need for cash and hence retaining smaller quantity than required. In case of gam also, across all size groups the marketable surplus is 93.88 percent while marketed surplus is 88.5 percent. In case of maize the marketable surplus is 99.79 percent while that actually marketed is 97.87 percent. Farmers barely retain maize for self consumption or any other requirement.

Overall, the study observed that marketable surplus is greater than marketed surplus which indicates that the farmers are retaining some surplus produce. it is possible that farmers have retention capacity and retain the produce in the hope of getting higher prices or farmers may substitute pulses for another crop either for family consumption purpose or other farm requirement due to variation in prices. The marketed and marketable surplus for the selected crops can also be observed from Table 4.

TABLE 4: MARKETED AND MARKETABLE SURPLUS RATIOS FOR SELECTED CROPS:

Size category	Net Availability (quintals)	Marketed Surplus (quintals)	Marketable Surplus (quintals)
Marginal	1.68	1.54 (91.67)	1.50 (89.29)
Small	3.99	3.22 (80.7)	3.36 (84.21)
Semi medium	4.60	3.63 (78.91)	3.89 (84.56)
Medium	8.21	7.5 (91.35)	7.57 (92.20)
All	3.70	3.08 (83.24)	3.18 (85.95)

GRAM

Size category	Net Availability (quintals)	Marketed Surplus (quintals)	Marketable Surplus (quintals)
Marginal	6.79	5.71 (84.09)	6.27 (92.34)
Small	10.32	9.18 (88.95)	9.66 (93.60)
Semi medium	12.94	11.68 (90.26)	12.16 (93.97)
Medium	22.40	0.35 (90.85)	21.41 (95.85)
All	10.78	9.54 (88.5)	10.12 (93.83)

MAIZE

Size category Maize	Net Availability (quintals)	Marketed Surplus (quintals)	Marketable Surplus (quintals)
Marginal	20.15	19.41 (96.33)	20.1 (99.75)
Small	27.38	26.65 (97.33)	27.26 (99.56)
Semi medium	36.14	35.71 (98.81)	36.04 (100)
Medium	80.0	80 (100)	80 (100)
All	29.56	28.93 (97.87)	29.50 (99.79)

Source: Field Survey. Note: Figure in brackets are precentage to net availability

The marketed and marketable surplus in Maharashtra, using the ratios obtained from sample farmers can be observed from Table 5.

TABLE 5: MARKETED AND MARKETABLE SURPLUS IN MAHARASHTRA (00 TONNES)

Maharashtra	Total Production	Marketed Surplus	Marketable surplus	Retention	Losses
Tur	10496	8123	9021	1450	923
Gram	13581	11507	12750	1242	832
Maize	26289	25470	26234	442	377

17. It was observed that 97 percent of farmers in the sample sold in regulated markets while only 3 percent sold in local markets which were unregulated. By and large, the farmers had to travel 22 kms on an average to reach the market. Further, almost the entire road leading to the market was so fair quality except a stretch of 1 kilometer. The main reason cited by farmers for selling in distant regulated markets was that they did not have much option as there were no nearby markets and also they were aware of the rates before sale. The farmers mentioned that millers and processors themselves purchase their requirements from regulated markets and seldom buy from farmers directly.

18. Only 2 percent of the total households stated that they had access to storage facilities while 98 percent had no such facility. The farmers who had access to storage facilities revealed that there was one government, one private and three cooperative agencies where they could store their produce. Although these facilities were sufficient to meet their requirements, 50 percent of the farmers who had access to storage facilities revealed that the quality was unsatisfactory. However, none of the households in the sample used storatge facilities available and stored their produce in their own space. Further, only 12 percent of households in the sample were aware of warehouse receipts while 96 percent were unaware of such a facility.

19. It was observed that only 32 percent of sample households were aware of Minimum support Price (MSP) while 68 percent were not aware. Perhaps since pulses are in short supply and prices hardly fall below support level, farmers hardly require support. It was also revealed by government officials in selected districts that even if prices touch support level, government agencies are not present to purchase or reject the produce on quality considerations. With respect to futures trading, only 2 respondents had awareness while all others were not aware of this kind of marketing. However, the two respondents who were aware of futures trading revealed that they were not conversant with the utility of futures trading or the trading techniques and preferred to trade with physical quantities.

Since price is an important factor motivating farmers to sell more, they asked about their willingness to market more in case they have access to better markets at

remunerative price. Out of 300 households, only 158 households or 52.67 percent gave positive responses. They stated that they would increase their marketed surplus mainly be retaining less for seed and feed or even change their consumption pattern.

20. About 79.67 percent of sample households had access to credit while 20.33 percent did not have access. Across all size groups, cooperative societies were the main source of credit and about 56.5 percent of households accessed this source. Another major source of credit was commercial banks which Were accessed by 42.66 percent of households. Only In case of medium sized farmers, commercial banks were accessed more as compared to cooperative societies. It therefore appears that farmers accessed their credit requirements almost entirely from institutional sources. There was only one instance each when a household depended upon the moneylender and miller. Further, in 93 percent cases, the loan was taken for crop husbandry, while only in 2.5 percent cases the loan was for investment. While 77.33 percent of households did not face problems availing loans from banks, while 22.67 percent did face some problems. About 38 percent of respondents had Kisan Credit cards while 62 percent did not have this card.

21. Sources of price information revealed that print media, followed by telephonic message and information from cooperative societies were important sources of price information for farmers. Farmers also obtained information from buyers who came to the village. From the field visit, it was observed that several farmers have mobile telephones and use it to get price information.

22. It was observed that in case of **tur**, 69 percent of sample households used improved variety of seeds. This percentage was much higher for gram which was 84 percent while in case of maize it was as high as 95 percent. The farmers used only one type of seed and hence for those using improved varieties, their entire area was under improved varieties, while those using local had their entire area under local variety. Overall, it appears that improved seeds were more popular with farmers and farmers preferred it as it was a yield enhancing technology.

Contract farming which enables farmers to get access to inputs and technology and also finally sell the finished product to the contracting firm could be useful to farmers. This is because firstly. the farmers get quality inputs and extension services from the firm and finally sell to them, often at a pre determined price. Hence contract farming besides increasing yield also serves as a risk mitigating method. However, no farmer in our sample had entered into contract farming for any of the crops.

5.4 Policy Implications:

The following policy implications emerge from our study:

1. It was observed that sample households besides retaining pulses for self consumptions, also purchased from the market. In some cases they purchased better quality tur than that cultivated by them. Therefore, it is important to increase productivity of pulses and also improve the quality cultivated. In Maharashtra, pulses are cultivated almost entirely witbout irrigation in arid and semi arid regions. Hence, the Technology Mission on Oilseeds and Pulses must develop appropriate technology to improve production and its quality so that marketed surplus can increase.

2. Farmers normally sold their produce in regulated markets. However, they had to travel long distances. It is therefore necessary to have sub-yards near the villages of farmers and also promote direct marketing, contract farming. etc. which may ensure better returns and also increase his productivity.

3. Despite sales in regulated markets, farmers still complained about commission agents taking away a part of their produce as sample. This practice must be stopped so as to improve the net returns of the farmer.

4. Although, by and large sales were made in regulated markets, farmers in the sample were not aware about MSP. Procurement agencies are hardly present to take care of sales below MSP. It is important to educate the farmers about price policy of the government so that it can be an incentive for them to adopt new technology. Farmers must also be made aware of futures trading as a risk mitigating measure.

5. The crop losses on farm are mainly during harvesting which is manual. With rising wages, and lack of easy availability of labor, manual harvesting may further add to losses. Hence, effficient machinery should be utilized for harvesting which would minimize losses and therefore increase production and marketed surplus.

6. The losses during transport were mainly due to breakage of bags. Hence better quality packaging is required so that losses are reduced.

7. Farmers normally had their own storage facilities and there was lack of availability of public storage. Appropriate storage facilities should be available so that losses from pest infestation, rodents, etc. do not arise. Also if production is increased and suitable storage facilities are available, farmers may store to get the benefit of lean period rise in price and avoid selling most of their produce in the post harvest glut.

Overall, the study concludes that bottlenecks in production and marketing must be addressed so that marketed surplus may increase.

Commodity Reviews

Foodgrains

During the month of September,2016 the Wholesale Price Index (Base 2004-05=100) of pulses decreased by 5.45%, cereals increased by 0.28% & foodgrains decreased by 1.28% respectively over the previous month.

INDEX NUMBER OF WHOLESALE PRICES

(Base: 2004-2005=100)

Commodity	Weight (%)	WPI for the month of September, 2016	WPI for the month of August, 2016	WPI A year ago	Percentage Change during	
					A month	A year
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Rice	1.793	249.1	248.5	238.0	0.24	4.66
Wheat	1.116	231.9	230.2	216.7	0.74	7.01
Jowar	0.096	296.5	292.2	271.9	1.47	9.05
Bajra	0.115	297.5	305.6	254.8	-2.65	16.76
Maize	0.217	291.6	291.6	251.3	0.00	16.04
Barley	0.017	277.3	280.0	223.5	-0.96	24.07
Ragi	0.019	339.3	336.7	326.2	0.77	4.02
Cereals	3.373	249.8	249.1	233.8	0.28	6.84
Pulses	0.717	415.0	438.9	334.7	-5.45	23.99
Foodgrains	4.09	278.7	282.3	251.4	-1.28	10.86

Source: Office of the Economic Adviser, M/O Commerce and Industry.

The following Table indicates the State wise trend of Wholesale Prices of cereals during the month of September, 2016.

Commodity	Main Trend	Rising	Falling	Mixed	Steady
Rice	Falling	A.P.	Jharkhand	U.P.	Gujarat
		Karnataka	Kerala		
			West Bengal		
Wheat	Rising	Gujarat	Rajasthan		
		Karnataka			
		M.P.			
Jowar	Falling		Gujarat	Rajasthan	Karnataka
			Maharashtra		
Bajra	Falling		Gujarat	Rajasthan	
			Maharashtra		
Maize	Rising & Falling	Karnataka	Gujarat	Rajasthan	
		U.P.	Punjab		

Procurement of Rice

0.053 million tonnes of Rice(including paddy converted into rice) was procured during September 2016 as against 0.219 million tonnes of rice(including paddy converted into rice) procured during September 2015. The total procurement of Rice in the current marketing season i.e 2015-2016, up to 30.09.2016 stood at 34.20 million tonnes, as against 32.10 million tonnes of rice procured, during the corresponding period of last year. The details are given in the following table.

PROCUREMENT OF RICE

(in Thousand Tonnes)

State	Marketing Season 2015-16 (upto 30.09.2016)		Corresponding Period of last Year 2014-15		Marketing Year (October-September) 2014-15		2013-14	
	Procurement	Percentage to Total	Procurement	Percentage to Total	Procurement	Percentage to Total	Procurement	Percentage to Total
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Andhra Pradesh	4326	12.65	3601	11.22	3591	11.17	3722	11.76
Chhatisgarh	3442	10.06	3423	10.66	3423	10.64	4290	13.56
Haryana	2861	8.36	2015	6.28	2015	6.27	2406	7.60
Maharashtra	230	0.67	199	0.62	199	0.62	161	0.51
Punjab	9350	27.33	7786	24.25	7786	24.21	8106	25.62
Tamil Nadu	1191	3.48	1049	3.27	1049	3.26	684	2.16
Uttar Pradesh	2910	8.50	1698	5.29	1698	5.28	1127	3.56
Uttarakhand	598	1.75	465	1.44	465	1.45	463	1.46
Others	9301	27.19	11871	36.97	11936	37.11	10678	33.75
Total	34209	100.00	32107	100.00	32162	100.00	31637	100.00

Source: Department of Food & Public Distribution.

Procurement of Wheat

The total procurement of wheat in the current marketing season i.e 2016-2017 up to June, 2016 is 22.93 million tonnes against a total of 27.89 million tonnes of wheat procured during last year. The details are given in the following table.

PROCUREMENT OF WHEAT

(in Thousand Tonnes)

State	Marketing Season 2016-17 (upto 30.06.2016)		Corresponding Period of last Year 2015-16		Marketing Year (April-March) 2015-16		2014-15	
	Procurement	Percentage to Total	Procurement	Percentage to Total	Procurement	Percentage to Total	Procurement	Percentage to Total
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Haryana	6722	29.32	6692	24.00	6778	24.13	6495	23.20
Madhya Pradesh	3990	17.40	7195	25.80	7309	26.02	7094	25.34
Punjab	10645	46.42	10346	37.10	10344	36.83	11641	41.58
Rajasthan	762	3.32	1300	4.66	1300	4.63	2159	7.71
Uttar Pradesh	802	3.50	2267	8.13	2267	8.07	599	2.14
Others	9	0.04	85	0.30	90	0.32	6	0.02
Total	22930	100.00	27885	100.00	28088	100.00	27994	100.00

Source: Department of Food & Public Distribution.

Commercial Crops

Oil Seeds & Edible Oils

The wholesale Price Index (WPI) of nine major oilseeds as a group stood at 222.4 in September, 2016 showing a decrease of 2.4% over the previous month and an increase of 2.2 % over the previous year. The WPI of sunflower increased by 5.5%, copra (coconut) by 2.1%, safflower (kardi seed) by 0.5% and cotton seed by 0.2 % over the previous month. The WPI of Groundnut Seed decreased by 5.7%, soybean by 5.3%, gingelly seed by 1.7% and rape & mustard seed and niger seed by 0.4% over the previous month.

The WPI of edible oils as a group stood at 156.9 in September, 2016 showing an increase of 0.8% and 5.9% over the previous month and year respectively. The WPI of cotton seed oil increased by 2.2%, groundnut oil by 1.4%, sunflower oil by 1.3%, mustard & rapeseed oil by 1.0% and soybean oil by 0.1% over the previous month. The WPI of gingelly oil decreased by 1.5% and Copra Oil by 0.1% over the previous month.

Fruits & Vegetable

The WPI of fruits & vegetable as a group stood at 275.1 in September, 2016 showing a decrease of 3.9% over the previous month and increase of 1.6% over the previous year.

Potato

The WPI of potato stood at 300.0 in September, 2016 showing an increase of 0.5% and 73.3% over the previous month and year respectively.

Onion

The WPI of onion stood at 230.8 in September, 2016 showing a decrease of 7.9% and 70.5% over the previous month and year respectively.

Condiments & Spices

The WPI of condiments & spices (group) stood at 355.7 in September, 2016 which shows a decrease of 1.2% and an increase of 4.3% over the previous month and year respectively. The WPI of turmeric, chillies (dry) and black pepper decreased by 3.0%, 1.2% and 1.1% respectively over the previous month.

Raw Cotton

The WPI of raw cotton stood at 233.3 in September, 2016 showing a decrease of 5.3% over the previous month and an increase of 20.6% over the previous year.

Raw Jute

The WPI of raw jute stood at 411.1 in September, 2016 showing a decrease of 1.7% over the previous month. However, it shows an increase of 10.7% over the previous year.

WHOLESALE PRICE INDEX OF COMMERCIAL CROPS

Commodity	Latest	Month	Year	% Variation Over	
	September, 2016	August, 2016	September, 2015	Month	Year
OIL SEEDS	222.4	227.9	217.7	-2.4	2.2
Groundnut Seed	271.5	287.9	263.3	-5.7	3.1
Rape & Mustard Seed	241.8	242.8	224.2	-0.4	7.9
Cotton Seed	226.6	226.1	206.1	0.2	9.9
Copra (Coconut)	120.2	117.7	154.7	2.1	-22.3
Gingelly Seed (Sesamum)	323.2	328.9	307.3	-1.7	5.2
Niger Seed	321.9	323.3	354.1	-0.4	-9.1
Safflower (Kardi Seed)	156.8	156.0	148.0	0.5	5.9
Sunflower	195.7	185.5	194.3	5.5	0.7
Soyabean	201.3	212.6	194.0	-5.3	3.8
EDIBLE OILS	156.9	155.7	148.2	0.8	5.9
Groundnut Oil	222.7	219.7	197.0	1.4	13.0
Cotton Seed Oil	197.7	193.4	182.5	2.2	8.3
Mustard & Rapeseed Oil	186.2	184.3	182.3	1.0	2.1
Soyabean Oil	153.7	153.6	144.7	0.1	6.2
Copra Oil	138.3	138.4	150.2	-0.1	-7.9
Sunflower Oil	135.4	133.7	130.6	1.3	3.7
Gingelly Oil	186.0	188.9	166.4	-1.5	11.8
FRUITS & VEGETABLES	275.1	286.4	270.7	-3.9	1.6
Potato	300.0	298.6	173.1	0.5	73.3
Onion	230.8	250.5	782.8	-7.9	-70.5
CONDIMENTS & SPICES	355.7	360.1	340.9	-1.2	4.3
Black Pepper	742.1	750.4	731.7	-1.1	1.4
Chillies(Dry)	394.1	398.9	344.3	-1.2	14.5
Turmeric	242.5	249.9	245.4	-3.0	-1.2
Raw Cotton	233.3	246.4	193.4	-5.3	20.6
Raw Jute	411.1	418.2	371.5	-1.7	10.7

STATISTICAL TABLES

WAGES

1 : DAILY AGRICULTURAL WAGES IN SOME STATES (CATEGORY-WISE)

(In Rs.)

State	District	Centre	Month & Year	Daily Normal Working Hours	Field Labour		Other Agri. Labour		Herdsman		Skilled Labour		
											Carpenter	Black Smith	Cobbler
					M	W	M	W	M	W	M	M	M
Andhra Pradesh	Krishna	Ghantasala	Dec,15	8	200	200	300	NA	250	NA	300	NA	NA
	Guntur	Tadikonda	Dec,15	8	270	218	275	NA	225	NA	NA	NA	NA
Telangana	Ranga Reddy	Arutala	Feb, 16	8	350	269	NA	NA	NA	NA	350	300	NA
Karnataka	Bangalore	Harisandra	May, 16	8	375	360	400	305	400	305	600	400	NA
	Tumkur	Gidlahali	Nov, 15	8	180	170	180	NA	NA	NA	200	190	NA
Maharashtra	Nagpur	Mauda	Sep, 14	8	100	80	NA	NA	NA	NA	NA	NA	NA
	Ahmednagar	Akole	Sep, 14	8	NA	NA	NA	NA	NA	NA	NA	NA	NA
Jharkhand	Ranchi	Gaitalsood	March,14	8	120	120	100	100	75	75	200	200	NA

1.1: DAILY AGRICULTURAL WAGES IN SOME STATES (OPERATION-WISE)

(In Rs.)

State	District	Centre	Month & Year	Type of Labour	Normal Daily working Hours	Ploughing	Sowing	Weeding	Harvest-ing	Other Agri Labour	Herds-man	Skilled Labour		
												Carpenter	Black Smith	Cobbler
Assam	Barpeta	Laharapara	May, 16	M	8	300	250	250	250	250	200	350	300	250
				W	8	NA	200	200	200	200	NA	NA	NA	NA
Bihar	Muzaffarpur	Bhalui Rasul	June,16	M	8	300	300	300	300	300	300	400	400	NA
				W	8	NA	300	NA	NA	300	NA	NA	NA	NA
	Shekhpura	Kutaut	June,16	M	8	250	NA	225	100	NA	NA	500	NA	NA
				W	8	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chhattisgarh	Dhamtari	Sihava	Feb,16	M	8	179	180	170	NA	150	200	300	200	120
				W	8	NA	120	125	NA	100	80	NA	80	100
Gujarat*	Rajkot	Rajkot	Sep, 15	M	8	215	205	163	180	150	188	450	450	360
				W	8	NA	175	150	175	135	117	NA	NA	NA
	Dahod	Dahod	Sep,15	M	8	180	160	160	160	130	NA	260	210	210
				W	8	NA	160	160	160	130	NA	NA	NA	NA
Haryana	Panipat	Ugarakheri	Mach, 16	M	8	400	400	400	400	400	NA	NA	NA	NA
				W	8	NA	300	300	300	300	NA	NA	NA	NA
Himachal Pradesh	Mandi	Mandi	Jun,15	M	8	NA	200	200	200	200	200	350	350	NA
Kerala	Kozhikode	Koduvally	March,16	M	4-8	1290	675	NA	675	1008	NA	825	NA	NA
				W	4-8	NA	NA	475	575	550	NA	NA	NA	NA
	Palakkad	Elappally	March,16	M	4-8	NA	500	NA	500	467	NA	600	NA	NA
				W	4-8	NA	NA	300	300	300	NA	NA	NA	NA
Madhya Pradesh	Hoshangabad	Sangarkhera	July, 16	M	8	250	250	250	NA	250	150	400	400	NA
				W	8	NA	200	250	NA	200	150	NA	NA	NA
	Satna	Kotar	July,16	M	8	200	200	200	200	200	200	300	300	300
				W	8	NA	200	200	200	200	200	NA	NA	NA
	Shyopurkala	Vijaypur	July,16	M	8	NA	300	300	300	NA	250	300	300	NA
				W	8	NA	300	NA	300	NA	NA	NA	NA	NA

1.1 : Daily Agricultural Wages in Some States (Operation-wise) - *Contd.*

(In Rs.)

State	District	Centre	Month & Year	Type of Labour	Normal Daily working Hours	Ploughing	Sowing	Weeding	Harvest-ing	Other Agri. Labour	Herds-man	Skilled Labour		
												Carpenter	Black Smith	Cobbler
Odisha	Bhadrak	Chandbali	April, 16	M	8	300	NA	NA	300	300	300	350	300	250
				W	8	NA	NA	NA	200	200	200	NA	NA	NA
	Ganjam	Aska	March, 16	M	8	300	200	200	250	300	NA	400	400	200
				W	8	NA	100	100	200	200	200	NA	NA	NA
Punjab	Ludhiyana	Pakhowal	Nov, 15	M	8	395	NA	395	395	380	100	400	400	200
				W	8	NA	NA	NA	NA	NA	NA	NA	NA	NA
Rajasthan	Barmer	Kuseep	Aug,15	M	8	NA	NA	300	NA	NA	300	700	500	NA
				W	8	NA	NA	200	NA	NA	200	NA	NA	NA
	Jalore	Sarnau	Aug,15	M	8	NA	NA	NA	NA	NA	NA	NA	NA	NA
				W	8	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tamil	Thanjavur	Pulvarnatham	June, 16	M	8	NA	343	NA	355	344	NA	NA	NA	NA
Nadu*				W	8	NA	NA	110	133	128	NA	NA	NA	NA
	Tirunelveli	Malayakulam	June, 16	M	8	NA	350	375	400	491	NA	NA	NA	NA
				W	8	NA	NA	171	180	329	NA	NA	NA	NA
Tripura		State Average	June, 15	M	8	299	280	280	281	279	295	328	291	297
				W	8	NA	216	218	216	215	225	NA	NA	NA
Uttar	Meerut	Ganeshpur	March,16	M	8	275	258	256	262	256	NA	377	NA	NA
Pradesh*				W	8	NA	200	207	200	207	NA	NA	NA	NA
	Aurraiya	Aurraiya	March,16	M	8	150	150	150	150	160	NA	314	NA	.NA
				W	8	NA	NA	NA	NA	160	NA	NA	NA	NA
	Chandauli	Chandauli	March,16	M	8	200	NA	200	NA	200	NA	350	NA	NA
				W	8	NA	NA	200	NA	200	NA	NA	NA	NA

M-Man
W-Woman
NA- Not Available
* States reported district average daily wages

2. WHOLESALE PRICES OF CERTAIN AGRICULTURAL COMMODITIES AND ANIMAL HUSBANDRY PRODUCTS AT SELECTED CENTRES IN INDIA

Commodity	Variety	Unit	State	Centre	Sep-16	Aug-16	Sep-15
Wheat	PBW 343	Quintal	Punjab	Amritsar	1700	1600	1600
Wheat	Dara	Quintal	Uttar Pradesh	Chandausi	1660	1625	1470
Wheat	Lokvan	Quintal	Madhya Pradesh	Bhopal	1780	1740	1425
Jowar	-	Quintal	Maharashtra	Mumbai	2350	2350	2300
Gram	No III	Quintal	Madhya Pradesh	Sehore	9150	7181	4426
Maize	Yellow	Quintal	Uttar Pradesh	Kanpur	1380	1360	1360
Gram Split	-	Quintal	Bihar	Patna	8550	8550	5750
Gram Split	-	Quintal	Maharashtra	Mumbai	10750	9500	5800
Arhar Split	-	Quintal	Bihar	Patna	11000	11000	10000
Arhar Split	-	Quintal	Maharashtra	Mumbai	8350	8600	11000
Arhar Split	-	Quintal	NCT of Delhi	Delhi	9775	12150	9650
Arhar Split	Sort II	Quintal	Tamil Nadu	Chennai	11400	11500	12500
Gur	-	Quintal	Maharashtra	Mumbai	4100	4400	3100
Gur	Sort II	Quintal	Tamil Nadu	Coimbatore	4600	3800	4000
Mustard Seed	Black (S)	Quintal	Uttar Pradesh	Kanpur	4375	4400	4000
Mustard Seed	Black	Quintal	West Bengal	Raniganj	4700	4850	4500
Mustard Seed	-	Quintal	West Bengal	Kolkata	5000	5100	4950
Linseed	Bada Dana	Quintal	Uttar Pradesh	Kanpur	6530	6500	4240
Linseed	Small	Quintal	Uttar Pradesh	Varanasi	4900	4435	3980
Cotton Seed	Mixed	Quintal	Tamil Nadu	Virudhunagar	2600	2500	2000
Cotton Seed	MCU 5	Quintal	Tamil Nadu	Coimbatore	2500	2500	2000
Castor Seed	-	Quintal	Telangana	Hyderabad	3325	3450	3950
Sesamum Seed	White	Quintal	Uttar Pradesh	Varanasi	9020	10500	13500
Copra	FAQ	Quintal	Kerala	Alleppey	6400	6400	7800
Groundnut	Pods	Quintal	Tamil Nadu	Coimbatore	5500	5500	4500
Groundnut	-	Quintal	Maharashtra	Mumbai	8400	8300	6500
Mustard Oil	-	15 Kg.	Uttar Pradesh	Kanpur	1474	1474	1369
Mustard Oil	Ordinary	15 Kg.	West Bengal	Kolkata	1585	1650	1575
Groundnut Oil	-	15 Kg.	Maharashtra	Mumbai	1900	2100	1650
Groundnut Oil	Ordinary	15 Kg.	Tamil Nadu	Chennai	2010	2070	1920
Linseed Oil	-	15 Kg.	Uttar Pradesh	Kanpur	1541	1553	1391
Castor Oil	-	15 Kg.	Telangana	Hyderabad	1125	1170	1283
Sesamum Oil	-	15 Kg.	NCT of Delhi	Delhi	1495	1490	1890
Sesamum Oil	Ordinary	15 Kg.	Tamil Nadu	Chennai	2205	2205	1800
Coconut Oil	-	15 Kg.	Kerala	Cochin	1380	1395	1650
Mustard Cake	-	Quintal	Uttar Pradesh	Kanpur	2260	2240	2055
Groundnut Cake	-	Quintal	Telangana	Hyderabad	4000	4143	4071
Cotton/Kapas	NH 44	Quintal	Andhra Pradesh	Nandyal	5500	5800	4000
Jute Raw	TD 5	Quintal	West Bengal	Kolkata	3875	3730	4400
Jute Raw	W 5	Quintal	West Bengal	Kolkata	3875	3680	4350

2. Wholesale Prices of Certain Agricultural Commodities and Animal Husbandry Products at Selected Centres in India - *contd*.

Commodity	Variety	Unit	State	Centre	Sep-16	Aug-16	Sep-15
Oranges	Big	100 No	Tamil Nadu	Chennai	NT	750	500
Banana	-	100 No.	NCT of Delhi	Delhi	420	400	375
Banana	Medium	100 No.	Tamil Nadu	Kodaikkanal	520	497	502
Cashewnuts	Raw	Quintal	Maharashtra	Mumbai	80000	80000	65000
Almonds	-	Quintal	Maharashtra	Mumbai	80000	69000	73000
Walnuts	-	Quintal	Maharashtra	Mumbai	55000	55000	72000
Kishmish	-	Quintal	Maharashtra	Mumbai	11000	11000	20000
Peas Green	-	Quintal	Maharashtra	Mumbai	3400	4200	4100
Tomato	Ripe	Quintal	Uttar Pradesh	Kanpur	1760	1385	1750
Ladyfinger	-	Quintal	Tamil Nadu	Chennai	1500	1500	1500
Cauliflower	-	100 No.	Tamil Nadu	Chennai	1600	1200	1350
Potato	Red	Quintal	Bihar	Patna	1550	1550	780
Potato	Desi	Quintal	West Bengal	Kolkata	1620	1710	660
Potato	Sort I	Quintal	Tamil Nadu	Mettuppalayam	2417	2293	-
Onion	Pole	Quintal	Maharashtra	Nashik	400	550	3800
Turmeric	Nadan	Quintal	Kerala	Cochin	15500	15500	12500
Turmeric	Salam	Quintal	Tamil Nadu	Chennai	8500	9100	8100
Chillies	-	Quintal	Bihar	Patna	9500	9800	9400
Black Pepper	Nadan	Quintal	Kerala	Kozhikode	65000	67000	NT
Ginger	Dry	Quintal	Kerala	Cochin	15000	16000	20000
Cardamom	Major	Quintal	NCT of Delhi	Delhi	130000	129500	131000
Cardamom	Small	Quintal	West Bengal	Kolkata	100000	100000	105000
Milk	Buffalo	100 Liters	West Bengal	Kolkata	3800	3800	3600
Ghee Deshi	Deshi No 1	Quintal	NCT of Delhi	Delhi	34684	34351	30015
Ghee Deshi	-	Quintal	Maharashtra	Mumbai	46000	46000	47000
Ghee Deshi	Desi	Quintal	Uttar Pradesh	Kanpur	36300	36350	34600
Fish	Rohu	Quintal	NCT of Delhi	Delhi	11000	8000	9600
Fish	Pomphrets	Quintal	Tamil Nadu	Chennai	34500	35000	33000
Eggs	Madras	1000 No.	West Bengal	Kolkata	4000	4100	4250
Tea	-	Quintal	Bihar	Patna	21200	21200	21100
Tea	Atti Kunna	Quintal	Tamil Nadu	Coimbatore	34000	34000	33000
Coffee	Plant-A	Quintal	Tamil Nadu	Coimbatore	26500	26500	31000
Coffee	Rubusta	Quintal	Tamil Nadu	Coimbatore	16000	15700	13000
Tobacco	Kampila	Quintal	Uttar Pradesh	Farukhabad	-	4800	4600
Tobacco	Raisa	Quintal	Uttar Pradesh	Farukhabad	-	3600	3600
Tobacco	Bidi Tobacco	Quintal	West Bengal	Kolkata	13200	13000	NA
Rubber	-	Quintal	Kerala	Kottayam	10000	10500	9800
Arecanut	Pheton	Quintal	Tamil Nadu	Chennai	32700	32600	31500

3. Month end Wholesale Prices of Some Important Agricultural Commodities in International Markets during Year 2016

Commodity	Variety	Country	Centre	Unit	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
CARDAMOM	Guatmala Bold Green	U.K.	-	Dollar/MT	9000.00	9000.00	9000.00	9000.00	9000.00	9000.00	9000.00	9000.00	9000.00
				Rs./Qtl	61281.00	61542.00	60210.00	59796.00	60255.00	60516.00	60309.00	60309.00	60138.00
CASHEW KERNELS	Spot U.K. 320s	U.K.	-	Dollar/MT	8350.09	8143.20	8333.00	9184.69	9568.85	9560.20	9620.02	8629.11	10342.18
				Rs./Qtl	56855.76	55683.20	55747.77	61023.08	64063.45	64282.78	64463.75	57823.67	69106.45
CASTOR OIL	Any Origin ex tank Rotterdam	Netherlands	-	Dollar/MT	1374.00	1244.70	1244.70	1244.70	1274.70	1249.90	1249.90	1335.00	1439.70
				Rs./Qtl	9355.57	8511.26	8327.04	8269.79	8534.12	8404.33	8375.58	8945.84	9620.08
CHILLIES	Birds eye 2005 crop	Africa	-	Dollar/MT	4100.00	4100.00	4100.00	4100.00	4100.00	4100.00	4100.00	4100.00	4100.00
				Rs./Qtl	27916.90	28035.80	27429.00	27240.40	27449.50	27568.40	27474.10	27474.10	27396.20
CLOVES	Singapore	Madagascar	-	Dollar/MT	8650.00	8650.00	8650.00	8700.00	8750.00	8750.00	8900.00	8250.00	8250.00
				Rs./Qtl	58897.85	59148.70	57868.50	57802.80	58581.25	58835.00	59638.90	55283.25	55126.50
COCONUT OIL	Crude Phillipine/Indonesia, cif Rotterdam		Netherlands	-	Dollar/MT	1155.00	1255.00	1545.00	1535.00	1430.00	1600.00	1500.00	1610.00
1475.00													
				Rs./Qtl	7864.40	8581.69	10336.05	10198.54	9573.85	10758.40	10051.50	10788.61	9855.95
COPRA	Phillipines cif Rotterdam	Phillipine	-	Dollar/MT	687.50	714.50	811.00	813.00	767.00	798.50	797.00	818.00	789.00
				Rs./Qtl	4681.19	4885.75	5425.59	5401.57	5135.07	5369.11	5340.70	5481.42	5272.10
CORRIANDER		India	-	Dollar/MT	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00	1650.00	1650.00
				Rs./Qtl	13618.00	13676.00	13380.00	13288.00	13390.00	13448.00	13402.00	11056.65	11025.30
CUMMIN SEED		India	-	Dollar/MT	2200.00	2200.00	2500.00	2500.00	2500.00	2500.00	2500.00	2500.00	2500.00
				Rs./Qtl	14979.80	15043.60	16725.00	16610.00	16737.50	16810.00	16752.50	16752.50	16705.00
GROUNDNUT OIL	Crude Any Origin cif Rotterdam	U.K.	-	Dollar/MT	1200.00	1200.00	1200.00	1200.00	1200.00	1200.00	1200.00	1200.00	1200.00
				Rs./Qtl	8170.80	8205.60	8028.00	7972.80	8034.00	8068.80	8041.20	8041.20	8018.40
MAIZE		U.S.A.	Chicago	C/56 lbs	369.25	359.75	368.50	380.75	404.75	393.00	335.75	327.50	329.25
				Rs./Qtl	988.09	966.77	968.85	994.17	1064.95	1038.52	884.20	862.47	864.62
OATS		CANADA	Winnipeg	Dollar/MT	283.14	250.42	250.99	247.92	244.91	263.38	314.33	221.77	214.72
				Rs./Qtl	1927.90	1712.37	1679.12	1647.18	1639.67	1770.97	2106.33	1486.08	1434.76
PALM KERNAL OIL	Crude Malaysia/Indonesia, cif Rotterdam		Netherlands	-	Dollar/MT	890.00	1030.00	1320.00	1285.00	1200.00	1410.00	1350.00	1505.00
1410.00													
				Rs./Qtl	6060.01	7043.14	8830.80	8537.54	8034.00	9480.84	9046.35	10085.01	9421.62
PALM OIL	Crude Malaysian/Sumatra, cif Rotterdam		Netherlands	-	Dollar/MT	575.00	637.50	705.00	710.00	717.50	710.00	655.00	775.00
740.00													
				Rs./Qtl	3915.18	4359.23	4716.45	4717.24	4803.66	4774.04	4389.16	5193.28	4944.68
PEPPER (Black)	Sarawak Black lable	Malaysia	-	Dollar/MT	10000.00	10000.00	10000.00	10000.00	10200.00	10200.00	10200.00	10200.00	8200.00
				Rs./Qtl	68090.00	68380.00	66900.00	66440.00	68289.00	68584.80	68350.20	68350.20	54792.40
RAPESEED	Canola	CANADA	Winnipeg	Can Dollar/MT	481.20	460.70	469.50	499.50	524.80	480.00	453.90	468.80	464.20
				Rs./Qtl	2334.78	2298.89	2378.02	2643.85	2707.97	2515.20	2312.62	2432.60	2358.14
	UK delivered rapeseed, delivered Erith(buyer)		U.K.	-	Pound/MT	247.00	247.00	245.00	245.00	245.00	232.00	252.00	252.00
255.00													
				Rs./Qtl	2415.66	2352.43	2314.03	2378.22	2405.66	2271.05	2222.39	2227.93	2208.81
RAPESEED OIL													
	U.K.	-	Pound/MT	660.00	614.00	615.00	658.00	602.00	602.00	594.00	594.00	670.00	
				Rs./Qtl	6454.80	5847.74	5808.68	6387.21	5911.04	5892.98	5238.49	5251.55	5803.54
SOYABEAN MEAL	UK produced 49% oil & protein ('hi-pro') ex-mill seaforth UK bulk			U.K.	-	Pound/MT	248.00	255.00	249.00	291.00	342.00	325.00	
331.00	314.00	295.00											
				Rs./Qtl	2425.44	2428.62	2351.81	2824.74	3358.10	3181.43	2919.09	2776.07	2555.29
SOYABEAN OIL		U.S.A.	-	C/lbs	30.87	30.92	33.36	33.62	31.34	31.55	29.53	33.57	32.64
				Rs./Qtl	4632.67	4659.94	4918.85	4923.10	4624.46	4675.61	4361.29	4957.95	4806.93
	Refined bleached and deodorised ex-tanks,broker price			U.K.	-	Pound/MT	618.00	639.00	650.00	616.00	590.00	596.00	653.00
714.00	714.00												
				Rs./Qtl	6044.04	6085.84	6139.25	5979.51	5793.21	5834.24	5758.81	6312.47	6184.67
SOYABEANS		U.S.A.	-	C/60 lbs	883.00	867.50	905.25	1019.00	1085.50	1137.50	1010.50	1030.75	945.50
				Rs./Qtl	2206.53	2177.03	2222.60	2484.68	2667.14	2807.02	2485.09	2534.89	2318.64
	US NO.2 yellow	Netherlands	Chicago	Dollar/MT	377.20	372.90	385.60	409.20	426.00	456.40	412.00	420.90	397.10
				Rs./Qtl	2568.35	2549.89	2579.66	2718.72	2852.07	3068.83	2760.81	2820.45	2653.42

3. Month end Wholesale Prices of Some Important Agricultural Commodites in International Markets during Year 2016—*Contd.*

Commodity	Variety	Country	Centre	Unit	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
SUNFLOWER SEED OIL	Refined bleached and deodorised ex-tanks,broker price	U.K.	-	Pound/MT	674.00	720.00	720.00	720.00	720.00	720.00	746.00	748.00	781.00
				Rs./Qtl	6591.72	6857.28	6800.40	6989.04	7069.68	7048.08	6578.97	6613.07	6765.02
Wheat		U.S.A.	Chicago	C/60 lbs	476.50	442.75	463.00	474.25	466.00	458.75	414.75	404.00	403.25
				Rs./Qtl	1190.73	1111.10	1136.77	1156.39	1144.99	1132.06	1019.98	993.54	988.89

Source- Public Ledger

Foreign Exchange Rates

Currency	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
CanDollar	48.52	49.90	50.65	52.93	51.60	52.40	50.95	51.89	50.80
UKPound	97.80	95.24	94.45	97.07	98.19	97.89	88.19	88.41	86.62
USDollar	68.09	68.38	66.90	66.44	66.95	67.24	67.01	67.01	66.82

Crop Production

4. Sowing and Harvesting Operations Normally In Progress During The Month of December, 2016

State	Sowing	Harvesting
(1)	(2)	(3)
Andhra Pradesh	Summer Rice, Jowar (R), Maize, Ragi, Small Millets (R), Gram, Urad (R), Mung (R)	Winter Rice, Urad (K), Bajra, Ragi (K), Small Millets (K), Sugarcane, Ginger, Mesta, Sweet Potato, Groundnut, Nigerseed, Onion
Assam	Wheat	Winter Rice, Sugarcane, Castor seed, Sesamum
Bihar	Wheat, Barley, Gram, Winter Potato (Plains), Sugarcane, Linseed	Winter Rice, Jowar (K), Bajra, Winter Potato (Plains), Groundnut, Cotton
Gujarat	Winter Potato (Hills), Sugarcane, Onion	Winter Rice, Jowar (K), Sugarcane, Ginger, Chillies (Dry), Tobacco, Caster seed, Sesamum, Cotton, Turmeric
Himachal Pradesh	Onion	Sugarcane, Ginger, Cillies (Dry), Cotton, Turmeric
Jammu & Kashmir	Onion	Winter Potato (Plains), Sugarcane, Ginger, Chillies (Dry), Sesamum
Karnataka	Summer Rice, Gram, Urad (R), Mung (R), Winter Potato (Plains), Summer Potato (Plains), Sugarcane, Onion	Summer Rice, Gram, Urad (K), Mung (K), Ragi, Small Millets (K), Tur (K), other Kharif Pulses, Winter Potato (Plains), Summer Potato (Plains), Sugarcane, Chillies (Dry), Tobacco, Groundnut, Castor seed, Sesamum, Cotton, Mesta, Sweet Potato, Sannhemp, Nigerseed, Kardiseed, Tapioca
Kerala	Summer Rice, Sugarcane, Sesamum (3rd Crop), Sweet Potato (3rd Crop)	Winter Rice, Ragi, Small Millets (R), Tur (R), Other Kharif Pulses, Other Rabi Pulses, Sugarcane, Ginger, Pepper Black, Sesamum (2nd Crop), Sweet Potato (2nd Crop), Turmeric, Tapioca
Madhya Pradesh	Winter Potato (Hills), Sugarcane, Castorseed, Onion	Autumn Rice, Jowar (K), Bajra, Small Millets (K), Tur (K), Mung (R), Other Rabi Pulses, Summer Potato (Plains), Chillies (Dry), Tobacco, Ginger, Sugarcane, Castorseed, Sesamum, Cotton, Jute, Mesta, Sweet Potato, Turmeric, Sannhemp, Nigerseed
Maharashtra	Maize (R), Other Rabi Pulses, Sugarcane, Onion	Winter Rice, Jowar (K), Small Millets (K), Sugarcane, Chillies (Dry), Groundnut, Sesamum, Cotton, Sannhemp, Nigerseed
Manipur		Winter Rice, Sweet Potato
Orissa	Summer Rice, Bajra (R), Urad (R), Mung (R), Chillies (Dry), Rape & Mustard, Cotton (Late)	Winter Rice, Sugarcane, Chillies (Dry), Groundnut, Castorseed, Cotton (Early), Mesta, Nigerseed

4. Sowing and Harvesting Operations Normally In Progress During The Month of December, 2016—*Contd.*

(1)	(2)	(3)
Punjab and Haryana	Wheat, Barley, Winter Potato (Plains), Tobacco, Onion	Summer Potato, Sugarcane, Ginger, Chillies (Dry), Groundnut, Cotton, Sweet Potato, Turmeric, Sannhemp
Rajasthan	Wheat, Barley, Tobacco, (3rd Crop)	Autumn Rice, Jowar (K), Small Millets (K), Tur (K), Urad (K), Mung (K), other Kharif Pulses, Winter Potato (Plains), Sugarcane, Chillies (Dry), Tobacco, Groundnut, Sesamum, Cotton
Tamil Nadu	Winter Rice, Jowar (R), Bajra, Tur (R), other Rabi Pulses (Kulthi), Winter Potato (Hills), Sugarcane, Chillies (Dry), Tobacco, Onion	Autumn Rice, Jowar (K), Bajra, Ragi, Small Millets (K), Gram, Tur (K), Mung (K), Winter Potato (Hills), Sugarcane, Pepper Black, Chillies (Dry), Groundnut, Castor seed, Sesamum, Cotton, Onion, Tapioca
Tripura	Summer Rice, Urad (R), Mung (R), other Rabi Pulses, Winter Potato (Plains), Chillies (Dry), Tobacco	Winter Rice, Sugarcane, Cotton
Uttar Pradesh	Wheat, Winter Potato (Hills), Sugarcane, Tobacco, Onion	Winter Rice, Jowar (K), Tur (K), Winter Potato (Plains), Summer Potato, Sugarcane, Groundnut, Rape & Mustard, Cotton, Sweet Potato, Tapioca
West Bengal	Summer Rice, Wheat, Gram, Urad (R), Mung (R), other Rabi Pulses, Sugarcane, Tobacco, Chillies (Dry)	Winter Rice, Tur (K), Urad (K), Mung (R), other Rabi Pulses, Sugarcane, Ginger, Chillies (Dry), Sesamum, Mesta
Delhi	Tobacco	Sugarcane
Andaman & Nicobar Island		Winter Rice

(K)—Kharif (R)—Rabi

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