

Agro-Economic Policy Briefs

Aiding the Future of India's Farmers and Agriculture



For kind attention of:

The Hon'ble Prime Minister's Office,
the Ministry of Agriculture and Farmers Welfare,
and all others interested

On critical policy issues in India's Agricultural Economy

Issue 3, February 2018

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Based on Research &
Contributions of: 15 Agro-
Economic Research Centers
and Units, supported by
Ministry of Agriculture &
Farmers Welfare

Litchi Production, Marketing and Processing in Bihar and India

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Introduction

- India is the second largest producer of litchis in the world. However, exports of litchi have been decreasing over the years. The area under litchi continues to increase despite poor gains to the growers. Among different litchi producing states, Bihar accounted for the largest share in area and production (around 40 percent) of the fruit in all reference periods; even though the productivity of litchi in the state has declined during the same period. The productivity of litchi has however increased significantly in other states such as Assam, Punjab and West Bengal.
- Historically, India has been one of the biggest exporters of litchi. In the past two decades exports of litchi have increased (with some fluctuations) from 1993-94 and reached maximum during 2006-07. Subsequently, exports decreased. Nevertheless, export basket of litchi has changed significantly from the high unit valued countries (Saudi Arabia, France, United States, Bahrain, Kuwait) to the low unit valued neighboring countries (Bangladesh, Nepal, Kuwait). The present state of exports of litchi was possibly due to increase in domestic demand, lack of initiative for export facilities, high perishability of litchi and non-acceptability of sulphitation (process for prolonging freshness of litchi) in the international market.

Findings

- Area, production and productivity of litchi in India has increased during the reference period (1991-92 to 2013-14), which had three distinct phases with break in the year 1997-98 and 2005-06. In phase I (1991-92 to 1997-98), the production and yield of litchi grew at a rate of 9.86 percent and 9.11 percent respectively. In the subsequent period (1997-98 and 2004-05) production and yield of litchi declined, though area under litchi increased by around 0.38 percent. The increasing trend in the area of litchi continued thereafter, and grew at a rate of 3.76 percent during phase III from 2005-06 to 2013-14). The sources of growth suggest that around 50 percent of increase in total production has been due to change in area and only 30 percent has been due to a change in the yield of litchi during the reference period.
- There are different stages of litchi production: inflorescence, flowering, fruit bearing, and maturity. The phase between inflorescence and flowering stage usually comes during the month of February-March, and during this period around 11 to 15 percent of litchi is spoilt and more spoilage happens due to biotic stresses. In the second phase between flowering and fruit bearing stage, a larger volume of production is spoilt (8.75 to 11.75 percent) due to abiotic stresses like heat waves and winds (Easterly winds). In the third phase, that is between fruit bearing and maturity stage (in the month of May), abiotic factors like long stretch of westerly winds among others are the main factors for perishability (6 to 8.25 percent) of the fruit. Thus abiotic stresses like heat waves and winds (Easterly and Westerly

Figure 1: Litchi picking and processing



Source: www.smartindianagriculture.in, www.juran.co.il

winds during February and April-May respectively) are major reasons for perishability of litchi on the fields. The wastage of litchi in the post-harvest operation varies between 16.25 to 19.50 percent as seen in sample districts. This is due to low shelf-life of fruits, inadequate post-harvest infrastructure.

- The marketed surplus of litchi unlike other agricultural produce, is high (75 percent of litchi produced). The marketing of litchi from producers to consumers takes different routes. Farmer's share in consumer's expenditure for litchi depends on the length of route, market functionaries involved and similar other factors. The primary information shows that four such routes (Channel I to IV) are for domestic market; one is for external market (Channel V) and two for the processing of litchi (Channel VI and VII). In the marketing of litchi, Pre-Harvest Contractors (PHCs) are very important and with alteration of channels, their role varies in production and marketing of litchi. Around 86 percent of litchi was marketed through the PHCs.
- The PHC is absent in one such marketing channel and interestingly, growers' share in consumer's expenditure is maximum (50 percent) in this channel. This requires high involvement of producers in marketing of litchi, but only around 10 percent of litchi is sold through this channel. The marketing of litchi was dominated (43 percent) by the channel wherein producer's share in consumer's rupees was minimal (around 25 percent). The dominance of PHC in spite of poor gain to growers indicates 'absent landlord' in litchi orchard.
- The margin at the wholesale and retail market varies during the marketing period (May-July). Except for first few days of marketing of litchi, the cost plus approach operates in the beginning and end of season while supply influences price at the time of abundance in the whole-sale market. The downward rigidity of retail prices in season of abundance was observed in primary survey. The high margin at retail market owes it to high waste of fruits at the level of

vendor and similar market functionaries.

- According to Garret's ranking of constraints for production of litchi in sample households, the first rank constraints were lack of quality insecticide/pesticide followed by wide fluctuation in temperature, lack of availability of quality manure/fertilizer/bio-fertilizer, older litchi plants and complexities in availing government facilities including credit. The largest constraint in marketing of litchi was dominance of middlemen, PHCs and their oligopoly behavior. This was accompanied with un-remunerative prices due to lack of transparency and absence of big market, high transportation costs, lack of sufficient cold storage and pack houses and lack of litchi producers' association in Bihar (like Uttarakhand).
- Though litchi is highly perishable, the capacity of processing was marginal and its distribution was highly skewed in Bihar. The constraints experienced by sample processors relates to production, marketing and infrastructure. There was a lack of climate resistant varieties, inadequate knowledge in the system for use of non-eatable parts of litchi, lack of cold-chains at major points (airport or railway stations), absence of information network to keep track of raw material prices and its availability for processing.
- The inadequate infrastructural facilities for processing of litchi are low supply of electricity (average 10 hours) with low voltage, high hiring charge for refrigerated vans, lack of temperature controlled pack houses, lack of adequate trained labour, technicians and chemists. Some constraints beyond the above categories are difficulties in assessing policy benefits due to procedural bottlenecks, lack of transparency in credit facilities, reduction in amount of subsidy on refrigerated vans and non-availability of variety of horticultural produce in the region to run factories round the year.
- Table 1 shows the marketing efficiency of litchi under different channels.

Table 1. Marketing efficiency of Litchi under different channels

(In Rs. per '000 pieces of Litchi)

S.N	Particulars	Channel I	Channel II	Channel III	Channel IV	Channel V	Channel VI	Channel VII
1.	Retailer's sale price or consumer's purchase price (PC)	900.00	886.00	756.80	829.00	638	322	239
2.	Total marketing costs (MC)	159.00 (17.67)	160.60 (18.13)	175.00 (23.12)	178.00 (21.48)	115 (18.01)	165 (51.34)	148 (61.92)
3.	Total margins of intermediaries (MM)	503.50 (55.94)	277.65 (31.34)	316.80 (41.87)	289.25 (34.89)	302 (47.33)	168 (52.17)	0
4.	Net price received by producers (FP)	237.50 (26.39)	447.75 (50.54)	265.00 (35.02)	361.75 (43.64)	448	232	239

S.N	Particulars	Channel I	Channel II	Channel III	Channel IV	Channel V	Channel VI	Channel VII
5	Total loss of value of litchi (TL)	100.45	117.77	90.21	105.14	95.5	48.9	42.2
6.	Value added, VA (1-4)	662.50	438.25	491.80	467.25	190	90	0
7	Producers share in consumer INR in percent, (4/1)	26.38	50.54	35.02	43.64	70.2	72.1	100
Index of Marketing Efficiency								
a.	Traditional method, (TME) (3/2)	3.17	1.73	1.81	1.63	2.62	1.02	0
b.	Shepherd's method (SME) (1/2)	5.66	5.52	4.32	4.66	5.55	1.95	1.62
c.	Modified Marketing Efficiency (MME) , (6/2)	4.17	2.73	2.81	2.63	1.65	0.54	0
d.	Acharya's method (4/{2+3+5}) (MME)	0.35	0.81	0.46	0.63	0.87	0.61	1.25

Note: Figures in parentheses are percent of items in retail price. Value of loss is part of retailer's price and marketing cost.

Source: Calculated from primary data collected by AERC, Bhagalpur.

Recommendations

- The suggestions and policy recommendation pertains to the removal of above constraints. The separate policy prescription for the same ranges from commodity specific research institute in Ministry of Agriculture and Farmers Welfare to Division of Micro, Small and Medium Enterprises and Agricultural and Processed Food Products Export Development Authority in different ministries of Government of India and other stakeholders of litchi in India and Bihar.
- Channels differ in marketing efficiency, and those channels which are most efficient should be promoted and encouraged.

Government Intervention in Onion Markets

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Introduction

- Onion is a very important horticultural crop and features in the food basket of most of the individuals. It is considered to be a politically sensitive crop because it is consumed largely by masses. However, due to the fact that the crop is perishable, especially the Kharif variety, there are fluctuations in prices not only within a season but also inter-seasonal. In other words, prices normally tend to rise in the lean season, i.e., from June onwards till the arrival of the Kharif crop in November. From June to November, there is no harvest of the crop and the supply during these six months is totally dependent upon the production of Rabi onions which is harvested in April-May. Further, if the farmers get high prices in a particular season, they tend to allocate more area in the next year which leads to a bumper crop and a fall in prices. These fluctuations in prices are under the constant watch of the policymakers who aim to ensure that there is no major increase in prices.

Hence, there is continuous control over this crop by the government through measures such as bringing it under the ambit of Essential Commodities Act, and fixing Minimum Export Price (MEP) in order to ensure that there are enough domestic supplies and prices do not go up to unduly high levels.

Findings

- India has a substantial potential to export onions but due to a high fixation of MEP by the government, the full potential has not been realized. In April 2015, the MEP was fixed at \$250 per metric ton or, Rs. 1560 per quintal and the ruling market prices in Lasalgaon and Ahmednagar were Rs. 1093 per quintal and Rs. 538 per quintal respectively. As prices firmed up in the domestic markets to about Rs. 1554 per quintal in June 2015, the MEP was raised to \$425 per ton (approximately Rs. 2677 per quintal). The MEP further jumped to \$700 per ton (Rs. 4367 per quintal) in August 2015 as prices in Lasalgaon and other domestic markets reached around Rs. 4124 per quintal. On 11th December 2015, the prices of onions began to crash to Rs. 1280 per quintal and the MEP was reduced to \$400 per ton (approximately Rs. 2500 per quintal). As domestic prices started showing a downward trend, the MEP was removed. In the major markets

of Maharashtra, the wholesale price ranged from Rs. 483 per quintal to Rs. 855 per quintal in April 2016. In August 2016, the Government of India announced the Merchandise Exports from India scheme under which the onion exporters would be given 5 percent grant in the form of coupons which can be used by the exporters for imports or for withdrawing it as money.

- Due to the government policy of export promotion, there was an all time high of onion exports from 1.38 million tonnes in 2015-16 (6.8 percent of the domestic production) to 2.4 million tonnes in 2016-17 (12.2 percent of domestic production). However, as onion prices again showed a rising trend in the 2017-18 season, the government announced MEP of \$850 per ton or Rs. 5397 per quintal. If one considers the weighted average price of onion (arrival figures used as weights) in November 2017 across markets in Maharashtra the price works out to Rs. 2767 per quintal and the corresponding figure for December 2017 is Rs. 2681 per quintal. This trend is maintained till date and hence fixing MEP at \$850 per ton or Rs. 5397 per quintal may restrict entry of onion exporters in international markets.
- The details of weighted average in major markets of Maharashtra which account for about 60 percent of produce can be observed below (Table 2):

Conclusions and Recommendations

- Discussions with onion traders revealed that in order to sell onions in the international markets at competitive rates, exports are sometimes made at below MEP but the Letter of Credit (LC) and other documents are prepared on the basis of MEP which overestimates the profits of exporters who in turn have to pay higher taxes and also try to purchase from farmers at lowest prices.
- Also, if MEP serves as a dampener to exports, India will lose its credibility in the export market. Frequent changes in MEP discourage exports on a long term basis and hence the country may not be considered as a reliable exporter in the international market.
- The total demand for onion in the country is about 18 million metric tonnes and usually this level of production is attained. Continuous changes in MEP do not seem advisable in an era of globalization. Instead of constant intervention in onion markets, efforts should be made to increase productivity, especially in Maharashtra which contributes to 40 percent of area and 30 percent of production of onions in the country. However the average yield at an all-India level is 30 percent higher than that of Maharashtra. If productivity increases, there will be enough supply for domestic markets and the country can also capitalize on export potential and earn the much required foreign exchange.

Table 2: Weighted Average Price (per quintal) of Onions in November & December 2017.

(In Rs.)

Market	Weighted Average Price Per Quintal	
	November 2017	December 2017
Solapur	2012	2159
Vashi (New Mumbai)	3235	3548
Pune	2980	2089
Ahmednagar	3340	2786
Lasalgaon	3000	2851
Yeola	2799	2729
Dhule	2730	2700
Maharashtra	2767	2681

Source: <http://www.agmarknet.nic.in/agnew/NationalBEnglish/CommodityWiseDailyReport.aspx>

Problems and Prospects of Production of Small Millets and their Value Added Products in Madhya Pradesh

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Introduction

- Millets are drought tolerant, climate resilient and hardy crops and quite adoptable to poor soil fertility and limited precipitation. Millets are highly nutritious, non-glutinous, non-acidic and easy to digest foods. Compared to rice, especially polished rice, millets release lesser percentage of glucose over a longer period, lowering the risk of diabetes. Millets are particularly high in minerals like iron,

magnesium, phosphorous and potassium. Finger millet (*Ragi*) is the richest in calcium content, about 10 times that of rice or wheat. Millets, like *Kodo* (*Paspalum scrobiculatum*) and *Kutki* (*Panicum sumatrense*) are high on fiber and low on calories, which make them a perfect grain substitute for a diabetic patient. *Kodo* and *Kutki* are Indian origin minor millets. They are short duration Kharif crops that are grown well in warm climate. All these factors have made millet crops quite indispensable to rain fed, tribal and hilly agricultural areas where crop substitution is difficult. *Kodo* is not only drought resistant but also grows on poor soil. It can be stored for 20 years without being spoiled by pests. Tribal communities eat *Kodo* millet when paddy crop fails. Madhya Pradesh covers nearly 33 percent of area under millets in the country and contributes about 27 percent to production of small millets in the total production of the nation. *Kodo* (70 percent) and *Kutki* (24 percent) account together for 94 percent of area of small millets in Madhya Pradesh.

- Wide adaptability, early maturity, easy cultivation and assured harvests of these crops by and large have ensured regional food and feed security in the country (Michaelraj 2013). Hence, it becomes imperative to enhance the production and productivity of these crops in order to ensure food and nutritional security not only for the people living in harsh and difficult terrains but also in other areas.
- In present scenario, various products made up of small millets are gaining popularity and have become the food of high society people. But the prices received by the producers are very low as compared to the consumer prices. In this junction, an attempt has been made to explore the possibilities of narrowing down the price spread and increasing the production of small millets.

Findings

- Two districts having highest area under the selected crops in the state i.e. Dindori & Mandla for *Kodo* and Chhindwara & Dindori for *Kutki* were selected for the study. One block from each selected districts and 30 farmers from each block viz. Ghughari & Shahpura from Mandla & Dindori, for *Kodo* and Tamiya & Shahpura from Chhindwara & Dindori for *Kutki* were selected for the study on the basis of maximum area under these crops. Thus, the study covered 120 tribal farmers comprising of 60 *Kodo* and 60 *Kutki* growers in the area under study.
- The area and production of small millets decreased significantly, despite an increase in the productivity of small millets at a highly significant rate in Madhya Pradesh as well as in the country as a whole. The area and production of *Kodo* and *Kutki* decreased, while the area, production and productivity of other major Kharif crops viz. paddy, maize and soybean increased during the period from 2001-2015 in Madhya Pradesh.
- Most of the tribal farmers (95 percent) used to grow small millets (*Kodo* & *Kutki*). Majority of them were found to be illiterate (50 percent) and on an average had a family of 5 members. On an average, they were found to have 11.23 acre of land holding, out of which only 5 percent was under irrigation. They were found to devote their maximum gross cropped area in Kharif (76.5 percent) as compared to Rabi Crops (23.5 percent). *Kodo*, *Kutki*, paddy, maize, wheat, gram lentil and field pea were found to be grown by the respondents in Kharif and Rabi seasons, respectively for their livelihood. Some of the farmers were still found to grow traditional crops like *Sama*, *Kangna* and *Jagni* in the Kharif season. An average farmer had total assets of Rs. 34,908 only. There was no remarkable difference between the different parameters of socio economic status of farmers who cultivated *Kodo* or *Kutki* in the area under study.

Figure 2: *Kodo* and *Kutki* millets.



Source: www.timbaktu-organic.org, www.easybreakfast.in

- Although cultivation of small millets was found to be remunerative and provided income and employment to tribal community, these crops were found less remunerative than other Kharif crops such as maize and paddy. Most of the tribals were found to grow these crops with traditional practices in marginal lands by just broadcasting the seeds in the field and harvesting the produce without incorporating any additional inputs.
- Low productivity of *Kodo/Kutki* was observed in farmers' fields as these crops were found to be grown predominantly in shallow soils with low water holding capacity and under rain-fed conditions. Their poor socio-economic conditions and non-availability of High Yielding Variety (HYVs) seeds also hampered the production of small millets. Huge price spread (minimum of 200 percent) and absence of Minimum Support Price (MSP) forced farmers to distress sell their products at un-remunerative prices.
- Value addition of small millets was not found on a commercial scale. The majority of tribal farmers were found to prepare various products of *Kodo* and *Kutki* but for their home consumption only. Very few of them sold value added products in weekly markets (*haats*).

Recommendations

- It is observed that more than 90 percent of the small millets are grown under rain-fed conditions particularly in tribal districts of MP. Comparing to other Kharif crops, productivity of small millets was found to be low mainly because they are grown in skeletal or low fertile soils and also due to non-adoption of improved package of practices of crop production technology. Farmers are generally found to sow the seed of small millets and harvest it. Major efforts should be laid to conserve rain water. Compartmental bunding and in-situ moisture conservation technologies are prerequisites for millet production. A pre-season tillage will greatly help in conserving the early showers thereby ensuring timely sowing and quick establishment of millet crops. Such technologies should also be extended to other millet crops for sustaining yield under rain-fed conditions.
- The yield gap between actual and potential yield of small millets was found to be wide. Replacement with recommended varieties, timely sowing, and balanced nutrition with suitable intercropping can bring good income to the farmers. Small millets have better response to small doses of fertilizers and other crop management practices such as optimum spacing and inter-cultivation technologies. Cropping pattern involving short duration varieties of pulses in millets is required to be involved for remunerative farming. Location specific crop production technologies are needed to be identified. Large scale production demonstration combined with value added marketing technologies of the millets are required for enhancing production and income of all the millet growers.
- Quality seed production and distribution of improved cultivars should ensure adequate and timely supply of adequate quantities of true to type seed materials with high seed quality standards at farmers' doorstep. The state seed committees must identify millet cultivars as per regional specific needs. Regional specific seed production should be taken up on priority basis. Extending liberal seed subsidy to the millet farmers needs to be considered and executed. State agricultural departments should take up seed production and distribution, engaging NGOs, producers' companies, farmers' cooperatives, self-help groups etc. for active seed production and supply back to government. Opportunity for strengthening informal seed supply systems including direct trade between villages and between farmers should be encouraged in the area. Major initiatives like 'Initiative for Nutritional Security through Intensive Millets Promotion' (INSIMP) to augment the availability of seeds to farmers at an affordable price should be promoted for promoting millets production.
- Even though nutritional superiorities of millets over other cereals are well known, its advantages are not being explored on a commercial scale. Processing and value addition technology advances have made it possible to process and made value added products available to households. One of the limiting factors for diversified food uses of small millets is the lack of appropriate processing technologies to prepare convenient ready to eat value added products. Advanced technologies such as extrusion cooking, methods of preparation of vermicelli/noodles, pasta, biscuits and other bakery products are also not available in most of the small millets. Due to these facts small millets remain un-researched and their nutritional potential is yet to be plugged in diversified ways. Therefore, processing technologies should take sufficient care while improving the consumer acceptance of millet foods that the nutritional properties are retained.
- Entrepreneurship development of the stakeholder is prerequisite in food processing and product development for any products. The ultimate aim of the entrepreneurship development programme is to disseminate complete knowledge on nutritional importance of millets, linkage of farmers with market, processing, value addition etc. The stake holders should include the urban and rural entrepreneurs, progressive farmers, non-governmental agencies, self-help groups etc. Entrepreneurship development programmes for the farmers and others stakeholders should be organized on regular basis through modern and innovative approaches. Trained entrepreneurs need to be motivated for value addition, product development and marketing in sustainable ways. Liberalization and globalization has opened several opportunities and Public Private Partnerships (PPP) are one among them. Popularization of millets on the ground of promoting nutritional and health benefits should receive adequate government attention. Rational fixation of minimum support price for the small millets will ensure that the farmers growing these crops get fair price for their produce.

- To encourage the small millets processing industries, concessions in form of subsidies/tax exemption while procurement of raw materials, production and processing should be given. Efforts to sensitize the government departments to introduce millets in mid-day meal scheme of school children, and public distribution systems are required. Programmes like INSIMP should be promoted in a bigger way and incentives scale with sufficient budget for promotion of millets in the state.
- As the value added products are prepared from organically produced small millets by the tribal community, the value addition in small millets needs to be scaled up by establishing micro/small level industries with capacity building in preparation of

variety of products having wider acceptance at national and international markets. In this way geographical indicators based small millets products may be prepared matching the international norms/standards and would thereby support tribals with end to end approach and inculcate the entrepreneurial skill among them. A brand image of these value added products at a global level would also be created. This will create an environment of tribal welfare on one hand and the State will also be benefitted by the generation of foreign exchange reserves on the other.

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Introduction

Agricultural extension services throughout the country are suffering from inadequate quality and quantity of skilled manpower. Currently for every 1000 farmers in the country there is only 1 extension worker. Only about 20 percent of the agricultural extension workers are qualified agricultural graduates. Therefore, an impact study was conducted in 2016-17 on the scheme of 'Agri-Clinics and Agri-Business Centres'. The scheme was launched on 9th April, 2002. The objective of the scheme was to strengthen the transfer of technology and agricultural extension services, to the technically trained persons and to provide services to the farmers on payment basis to support agricultural development and entrepreneurship.

Findings

- The study was confined to four states, viz., Assam, Maharashtra, Uttar Pradesh and Telangana and the impact of this scheme was seen on 400 beneficiary farmers and 200 non-beneficiary farmers.
- Farmers were categorized into – proper Agri-services, Allied Agri-services and both Agri & Dairy services.
- Other Backward Castes (OBCs) were found to be the dominant caste among the beneficiaries of the Scheme.
- Majority of sample farmers had received extension services from the agricultural ventures and they received extension services on farm machines and dairy.
- Even though the total area was irrigated on almost all the sample farms, it was found that the coverage under *Zaid* season (March to June) was scanty. Further, growing of cereal crops was the most expensive to the

majority of beneficiaries.

- The scheme, even though started in 2002, was in the nascent stage in the study area and the agricultural ventures were found selling only a few inputs.
- Farms under the category of allied agricultural services were found to be more productive and profitable.
- Rearing milch animals was an attractive source of additional income and the agricultural ventures were found to supply more inputs and extension services on machines for dairying and rearing of milch animals under the scheme.
- A majority of farmers received extension services and expert advices on cropping practices and protection from pests and diseases, which increased their income.
- The gross cropped area of all the three seasons of the reference year (2015-16) was estimated as 3.75 hectare per farm and the total area was irrigated. Thus, gross irrigated area was equal to gross cropped area which confirms that the irrigation intensity was 100 percent in the study area.
- In *Zaid* season, the farms under the category of both agriculture and dairy services were comparatively more profitable in the study area. The net income per farm was accounted as Rs. 59,215 from all the crops.
- Net income from milch animals reared by beneficiaries was Rs. 25,613 per farm which was a considerable income in addition to raising crops on their farms in the area under study.
- Farms under the category of allied agricultural services were comparatively more productive in rearing animals on their farms in comparison with the farms under other two categories.
- The farms under the category of allied agricultural services were found to be more productive and profitable in comparison with the farms under the categories of both agriculture and dairy services in rearing milch animals because net income per farm was maximum i.e., Rs. 42,500 on the farms under the

category of allied agricultural services.

- Only the inputs such as seeds, fertilizers, pesticides and animal feeds were made available to the needy farmers on payment. No other services were provided except a few extension services and expert advices.

Recommendations

- Agricultural ventures must strengthen their services and must first demonstrate and train farmers about the use of inputs and then sell them.
- Formal training of long duration must be facilitated to all the beneficiary farmers.
- The agricultural ventures must cooperate and support the beneficiary farmers to increase coverage during *Zaid* season for increasing their cropping intensity.
- The farmers must shift to pulses or other crops which require minimum inputs. The ventures must encourage the beneficiaries to grow vegetables or cash crops as well.
- Farmers must shift to the rearing of milch animals on their farms for more profit realisation.
- Expert advices on other aspects of farming starting from the preparation of land to the final disposal of outputs will increase income of the farmers. So the ventures must take utmost care of it.
- All the concerned agencies such as MANAGE (National Institute of Agricultural Extension Management), NABARD (National Bank for Agriculture and Rural Development), Ministry of Agriculture and Farmer Welfare, Government of India and Nodal Training Institutes must envision to make the scheme more purposeful for the farmers in need.
- Proper network system of trainees and trained candidates should be provided by the Central Government and institutions such as NABARD, MANAGE etc.

Understanding the problem of Fallow Land in Kerala

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Introduction

- Agriculture and allied activities is one of the most crucial sectors of Kerala's economy as it provides livelihood to approximately two-thirds of the population and contributes nearly a fourth to the state GDP. The population pressure on land has been increasing in

Kerala and the position of land has shifted from being a resource of production to an asset. This has forced many farmers to shift from farming to other non-farming avenues. Out of the total geographical area of 38.86 lakh hectares in the state, net area sown is 20.71 lakh hectares or nearly 53.3 percent of the total area. Food crops, comprising rice, pulses, millets and tapioca occupy only 12.05 percent of the gross cropped area of 26.47 lakh hectares (Agricultural Statistics 2010-11). The state is facing serious challenges in retaining even this meager area. Even though Kerala has the least waste land available when compared to the rest of the country, nearly 2.01 lakh hectares of area can still be put to use for agricultural purposes.

Table 3: Major and minor reasons for leaving land fallow

S.N.	Reasons	Palakkad	Kannur	Overall Kerala (Total)
		Average Rating		
1	Land is not suitable for cultivation	3	3	3
2	Land set apart for conversion into non-agricultural purposes	2	3	3
3	Not able to recover costs in farming/low profits	3	5	4
4	Lack of assured irrigation	4	2	3
5	Moved into other occupations which are more profitable	2	3	2
6	Providing grazing lands for the cattle	3	2	2
7	To conserve moisture & prepared land for next crops	2	2	2
8	Labor is not available for cultivation	4	5	4
9	High yield volatility in the previous years	3	1	2
10	Lack of assured market for the produce	2	4	3
11	High price volatility in the previous years	3	2	2

S.N.	Reasons	Palakkad	Kannur	Overall Kerala (Total)
		Average Rating		
12	High production cost/lack of resources	4	1	3
14	Lack of agricultural extension services	3	4	3
15	No access to credit	2	4	3
16	Surface runoff	2	3	2
16	Lack of watershed or similar efforts which could recharge ground water	4	3	4
17	Water logging	3	4	3
18	Uncertainty in rainfall	4	4	4
19	Issues related to land entitlement	3	4	3
20	Lack of expertise/experience in cultivation	2	2	2
21	Shocks in personal life (like accident or death of a family member)	2	3	2
22	Low fertility of soil & lack of interest in cultivation in unfavorable season	2	4	3
23	Lack of plough/tractor/Farm Yard Manure (FYM)	2	2	2
24	Weed infestation	3	3	3
25	Close to mountains/forests	2	2	2
26	Left land fallow for crop rotation	1	2	2

Note: Rating is on a scale of 1-5 as 1 is the least valued and 5 is the most valued reason.

Source: AERC Chennai.

- The above table has drawn a contrast between two districts – Palakkad and Kannur. Table 3 illustrates the major and minor reasons for leaving the land fallow by farmers in Kerala. Palakkad is one of the driest districts in Kerala because of the Palghat Pass in the Western Ghats. In addition to this, over exploitation of major rivers for sand mining such as Baharathappuzha has resulted in drought before the advent of summer itself. Further, shortage of rainfall increases the need for proper irrigation facilities for maintaining agricultural activities. But this is not happening and the lack of assured irrigation is one of the major reasons for leaving land fallow. However, average of Kannur and overall Kerala have a better rating (2 and 3 respectively) in this regard.
- Labour scarcity is another major contributor to the fallow land in Kannur. Being the only 100 percent literate state in India, a major part of the population is averse to working in farms. The educated youth migrate to urban cities in India for other jobs, creating a grave issue for the agri-labour market of the state.
- The cost of farming agriculture in Kerala, right from the land value till the harvesting is much higher compared to the other states in India. Lack of watershed or similar efforts which could recharge ground water and uncertainty in rainfall are other major reasons. Since there are no well-established agricultural irrigation systems or water conservation systems in the state, the farming is highly dependent on rainfall and disturbance in rainfall of any sort affects the farming severely. The cases of Palakkad and the State on the whole are alike in this regard.
- In Kannur, it was reported that the farmers were not

able to recover costs in farming and used to end up with a low profit which in turn led to leaving of the lands as fallow. It is mainly due to the high cost of resources including labour, that farming is often expensive for farmers. As reported in both Kannur and the State, market for the agricultural produce is not assured in Kerala. There is no such centralized setup to market domestic produce in the state. The domestic producers have to compete with the bulk commercial imports from the neighboring states. However, Palakkad was found to be in a better position comparatively.

- Lack of agricultural extension services, low/no access to credit, water logging, issues related to land entitlement, low fertility of soil and lack of interest in the cultivation in unfavorable seasons are other major reasons reported from the farmers of Kannur for leaving their land fallow. In Palakkad, there are a number of other reasons which farmers perceive as a moderate reason for leaving land fallow. Sometimes the land is not suitable for cultivation due to many reasons such as proximity of forests, no water facility, difficulty in accessing the land etc. It is also noted that there is labor scarcity for cultivation, lack of watershed or similar efforts which could recharge ground water and uncertainty in rainfall.

Findings

- Many acres of agricultural field in the state are simply left as fallow due to a number of reasons and the quantum is increasing year by year.
- Usually, a land is intentionally left fallow to convert agricultural field into non-agricultural field and thereby to use the area for commercial purposes such as construction. However, due to strict regulations

and control measures in the recent years (Kerala Conservation of Paddy Land and Wetland Act, 2008), no farming field has been converted into any other form except for non-commercial residential construction (limited to 5 percent provided he/she has no other land under his/her ownership).

- It is interesting that all the fields surveyed were under paddy cultivation before they were left as fallow. Most of these fallows in Kerala are wetland paddy fields which come under legal protection from conversion of the nature of land. This legal protection also helps the land remain fallow; otherwise those could have been converted into other forms.
- Notably, 100 percent of the farmers surveyed would like to return to farming by reviving fallow lands if the necessary facilities are available or the concerned problems were resolved.
- According to the survey, there are high requirements for irrigation facility, credit facility, proper market, insurance, fair procurement and pricing. If these facilities are made proper, there is higher chance to get the fallow lands revived.
- Integration of Kudumbashree (SHG) Scheme of Kerala Government and MGNREGA Scheme of Central Government in reviving fallows in Kannur has worked out positively for the fallow lands.
- Palakkad, popularly known as the rice bowl of Kerala, known for its wide stretch of paddy fields, marks a severe problem of fallow land due to migration, lack of water resources and labour shortage. As an expected phenomenon there is an alarming threat

of the fallow lands being converted into commercial lands as Palakkad is close to three predominant and fast growing cities – Calicut, Thrissur and Coimbatore.

Recommendations

- The Kerala Conservation of Paddy Land and Wetland Act, 2008 has to be followed strictly.
- Paddy centric financial and technical (subsidy-machine) assistance should be provided for the revival of fallow land.
- The Kudumbashree scheme must be integrated with agricultural sector and fallow land revival in the state should be done just as in the case of Kannur. Mechanization through group farming initiatives like Kudumbashree platform can be encouraged to curb the issue of labour shortage.
- MGNREGA can immediately be integrated with agricultural sector to overcome the issue of labour scarcity in Kerala, as in the case of Kannur.
- Strong legislation is required against exploitation of rivers and proper irrigation facilities should be provided.
- Diversion of agricultural credit for other purposes should be monitored and extension of agricultural credit in connection with revival of fallow land should be initiated in the state.
- The agricultural authorities should make necessary arrangements for marketing and selling the agricultural produce or support them with schemes such as the minimum support price scheme, since the market in Kerala is highly prone to bulk agricultural imports from neighboring states.

Losses in Pulse Crops due to Blue-Bulls in Uttar Pradesh

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Introduction

- Ever since the advent of Green Revolution in India, followed by extension of irrigation networks and availability of quality inputs, the area under wheat and rice has been increasing continuously, but at the cost of pulses. The production of pulses in UP which was 24.30 lakh metric tonnes during 2004-05 decreased to 23.97 lakh metric tonnes during 2012-13 thereby showing a 1.4% decrease over the period. The reasons for the shortfall in production of pulses in UP are - shrinkage in the area covered by pulses, frequent occurrence of droughts, excessive rainfall, hailstorms, attack of pests, diseases etc. Besides these issues, the attack of blue-bulls to pulse crops is found to be a major cause of decline in production of pulses in UP. Of the 75 districts in the state, 43 districts are under the attack of blue-bulls at present. The population of blue-bulls has

been increasing at a rate of 14 percent per annum. The programmes related to the enhancement of production of pulses in the state would not yield results unless the attack of blue-bulls is completely stopped.

Findings

- The study finds that in Uttar Pradesh the share of pulse crops in the total Gross Cropped Area (GCA) was 16.05 percent in 1970-71 which went down to 9.39 percent in 2012-13, showing a decline of 41.49 percent over the period.
- In the total production of pulses of 23.97 lakh million tonnes during 2011-12, the contribution of Gram was 29.63 percent followed by 19.88 percent and 18.60 percent of *Masoor* and *Pea* respectively. The contribution of *Urad*, *Arhar* and *Moong* was 15.94 percent, 13.81 percent and 2.14 percent respectively during the same period.
- In the year 2014-15, among the kharif pulses, maximum damage had been recorded in *Arhar* crop, i.e., to the extent of 61.82 percent of the area under it; followed by *Urad* (41.95 percent) and *Moong* (28.38 percent). Among the Rabi pulses, the maximum damage was recorded in *Gram* crop, i.e., to the extent of 62.38

percent of the area under it; followed by Pea (49.17 percent) and Masoor (45.40 percent).

- The study finds that production of all pulses on the sample farms in the reference year was below the average production of state as a whole and the cause of low yield of pulses on the sample farms was the attack of blue-bulls to pulse crops in the reference year.
- According to the study, pulse growers had made best efforts to save their crops from attack of blue-bulls. The preventive measures namely the use of dung/neem solution, use of chemical materials, use of effigies, wiring, crackers, sticks/stones, guns, ringing bells, shining taps etc., were adopted by sample farmers to check the attack of blue-bulls.
- According to the study, at present, the attack of blue-bulls to pulses is also a major cause of shifting of area of pulses to its alternative crops. Blue-bulls generally attack at midnight and the number of attacks may be more than ten times in some cases. Nature of attack differed from crop to crop. These animals attack in groups of 10 to 15.
- The total losses in production of all pulses by attack of blue-bulls were 1.23 quintals per hectare against a production of 2.81 quintals per hectare. It shows that the losses in production of all pulses were 43.80 percent due to attack of blue bulls on the sample farms in 2014-15. The losses in production of different pulses varied from each other. The maximum losses being 59.98 percent was witnessed in *Moong* followed by 59.48 percent in *Arhar*. Next to these pulses, the losses in production of Pea, *Urad*, *Masoor* and Gram were 55.02 percent, 43.86 percent, 36.95 percent and 33.53 percent.
- According to the study, there have been no preventive measures adopted by the Government to control the attack of blue-bulls. The constraints faced by the farmers in the prevention of blue-bull attacks were

deforestation, attack of blue-bulls at night, religious attachment to the ban on hunting down of blue-bulls, etc. The attack of blue-bulls at night and the ban on hunting down of blue-bulls were found to be the most important issues as reported by the majority of sample farmers.

Conclusions and Recommendations

- It is required to check the population of the blue-bulls. The population of blue-bulls has been increasing at a high rate in the state. The forest and animal husbandry departments should make joint efforts to check the growth of population of blue-bulls by the use of castration techniques.
- In order to provide better shelter for the blue-bulls in forest, forest department should take appropriate measures to stop deforestation.
- The government should take necessary policy measures to declare blue-bulls as vermin in the state so that their infestation on pulses can be curbed.
- The pulse growers should be advised by the staff of agricultural departments to barricade the pulses by fencing with wire of iron/plastic.
- The use of cow dung /solution of neem products would be helpful in reducing the attack of blue-bulls to pulse crops. These types of preventive measures should be propagated among the farmers across the state.
- Farmers should also be advised to barricade the area of pulses by the use of bamboo which is easily available in the villages.
- The use of Solar Fence Guard System has been found to be a very effective preventive measure to control the attack of blue-bulls to crops in the state of Gujarat. In this context, the study suggests that the state government should provide the financial assistance to interested growers in the installation of the system.