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Case Study

Chickpea in Rainfed Rice Fallows of India: Opportunities for Income and Employment Generation

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A B S T R A C T

Rainfed Rice Fallow Lands (RRFL) offers an enormous scope for pulse production in the country. The area of rainfed rice fallow lands accounts for about 12 million ha. Pulses provide colossal opportunities for and ensuring food and nutritional security as well generating employment opportunities under rainfed production systems. Evidence indicates that pulse are the most ideal crops that which can be successfully cultivated in RRFL. Pulse production is comparatively less capital intensive and so is the chickpea production. Chickpea can easily be ingrained in the cropping system of small and medium farmers who often have lower economic backgrounds.

Keywords

Chickpea, rainfed rice, opportunities, employment generation

Introduction

Ensuring food security is one of the major challenges in India. Supply of land is fixed and scope to bring additional area under cultivation is limited because of increasing demand for land for non-agricultural activities. The only opportunities to increase food grain production are to increasing cropping intensity or alternatively grow more than one crop in a year on the same piece of land.

Chickpea is one of the most important pulses, which can be successfully grown in RRFL on residual moisture and can escape terminal drought. Evidence indicates that pulses can be grown in a cost-efficient manner because of their low input requirements (Reddy 2009). It would also augment *in-situ* employment opportunities and income of the farming community.

Production of pulses in India: An overview

The scenario of pulses production in India is shown in table-1. In 2016-17, India had a production of total pulses to the tune of 22140 thousand tonnes, which was 5790 thousand tonnes more than that of year 2015-16. This quantum jump in pulse production may be attributed to the price of pulses that was unprecedentedly high during the corresponding year. It further emanates that gram (chickpea) is the major pulse that contributes to about 41 per cent in the total pulse production followed by Tur and Urd (Blackgram)

India is a net importer of pulses. In order to meet its domestic pulse demand the country has to import a substantial amount of pulses every year (Table-2). In 2016-17, India imported 5420 thousand tonnes of pulses,

with an equal amount of incremental domestic production as stated above.

The rainfed rice fallow lands (RRFL) offers considerable scope to address the twin problems of food and nutritional insecurities (Joshi *et al.,* 2002). About 11.6 million ha of rainfed rice land remains uncultivated in the post-rainy season. It has been mentioned that if the existing rice fallow lands were brought under cultivation, it may usher another green revolution in the pre-dominantly rice-fallow states, benefiting millions of small landholders (Joshi *et al.,* 2002).

Distribution of Rainfed Rice Fallow Lands

Approximately 12 million ha of the 40 million ha rice area cultivated during the rainy season remains uncultivated in the postrainy season (Table 3). Of the total rice fallow area close to 40 percent lies in the states of Madhya Pradesh and Chhattisgarh, with Chhatisgarh having a larger share. In absolute terms, these states control 4.7 million ha of RRFL, which is about half of the country's total chickpea area. The extent of rabi rice fallow area in Chhattisgarh and Madhya Pradesh, as per the satellite image data, is as high as 82 percent and 87 percent, respectively. Together, the RRFL in these two states accounts for about 84 percent of the total kharif rice area. It implies that only 16 percent of the kharif rice area is utilized for the cultivation of rabi crops and rest of the lands remain fallow.

It is a common practice that farmers either leave rice area vacant in rabi after the harvest of rice or cultivate traditional low yielding verities of chickpea without giving much heeds. It is to be noted that rainfall during Kharif season in the RRFL region in the country is usually more than enough to grow rice. Hence, there lie tremendous opportunities for cultivation of the second crop on available soil moisture after harvest of rice with a few agronomical manipulations.

This study endeavors to analyse of role of chickpea in food and livelihhod security along with opportunities and constraints of chickpea production in RRFL with special reference to Chhattisgarh and Madhya Pradesh –two major pulse producing states in India.

Materials and Methods

The study was conducted in the selected villages of the pilot districts in the states of Chhattisgarh and Madhya Pradesh in India. These two states have 28 RRFL districts of which 8 districts are in Chhattisgarh and 20 districts fall in Madhya Pradesh (Table 4).

The districts of Durg, Kabir Dham, Raipur, and Rajnandgaon were selected in Chhattisgarh for the study. Rewa, Satna, Jabalpur, and Damoh distracts were selected in Madhya Pradesh to elicit information on different production parameters and socioeconomic indicators pertaining to chickpea production in RRFL. Selection of the pilot distracts and the villages were purposive based on the presence of on-going trials in the area.

Requisite Information were elicited from the selected participating and non-participating farmers with the help of specially designed baseline data records sheets, focusing on pertinent information required to identify opportunities and constraints pertaining to chickpea production in the selected RRFL districts. The number of selected farmers each state was in proportion of the number of districts in these states. The final sample contained 51 participating farmers and 38

non-participating farmers from 24 villages in 4 pilot districts of Chhattisgarh and 123 participating farmers and 68 non-participating farmers from 40 villages in 4 pilot districts of Madhya Pradesh. In order to validate the information Rapid Rural Appraisals (RRA) were also undertaken in Chhattisgarh and Madhya Pradesh.

Economic contribution

The analysis of data reveals that chickpea production in rice fallow areas of Madhya Pradesh and Chhattisgarh has opened several new avenues to the farmers in terms of increased farm income and employment. Production of chickpea in RRFL is economically viable and technically feasible. It tenders one of the most feasible options for improving the economic status of the poor farmers in the region. It can be produced at lesser costs with greater economic benefits (Table 1).

Pulse production is comparatively less capital intensive. Rice fallow states are inhabited by poor people. Chickpea production can help these states in several ways. It can increase employment, enhance income and livelihood conditions, and improve nutritional status of the households. In Chhattisgarh and Madhya Pradesh, where a massive population (about 70% to 80%) depends on agriculture, intensification of chickpea production in RRFL may yield substantial benefits.

Chickpea fits in rotation with the kharif rice and it can successfully be produced on less puddlled heavy vertisol soils with residual soil moisture left after the harvest of kharif rice. In comparison to rice followed by fallow in rabi or rice flowed by wheat, rice-chickpea rotation yield net returns worth Rs14125 in Chhattisgarh and Rs9985 in Madhya Pradesh. Apparently, as compared to rice-fallow, cultivation of improved chickpea varieties generates additional benefits of Rs10211 in Chhattisgarh and Rs18399 in Madhya Pradesh. The benefit-cost ratio in paddy-chickpea rotation is 1.75 in Chhattisgarh to 2.10 in Madhya Pradesh. Even the existing local varieties, cultivated in RRFLs of Chhattisgarh and Madhya Pradesh yield an average additional return of Rs9300 ha^{-1}. The large additional benefits coming from the production of chickpea make it one of the most eligible crops for production in the RRFLs. What is needed is to take initiatives for educating the farmers about the economic and technical aspects of chickpea production and also provide them better technical guidance and market linkage.

In order to supplement the domestic production India imported about 5.42 million tonnes of pulses in 2016-17 to meet the gap in annual demand for pulse consumption. India also exports pulses like green gram and black gram in small quantities (between 0.1 to 0.4 million tons annual) to fulfil the commitments of WTO. Expansion of rabi rice fallow area under chickpea would reduce the import dependency of the country and also check siphoning of the valuable foreign reserves.

Employment generation

Chickpea in RRFL also creates employment substantial employment opportunities in the agrarian rural economy. Production of chickpea in the fallow land after the harvest of kharif rice generates additional employment opportunities of about 47 - 51 mandays ha^{-1} in Chhattisgarh to 47-55 mandyas ha^{-1} in Madhya Pradesh (Fig.1).

The average employment generated due to the chickpea production the region accounted for about 48 mandays ha^{-1}.

Table.1 Production of Pulses in India

Pulses	Pulse Production (Thousand Tonnes)			Share in total Pulse production (%)		
	2014-15	2015-16	2016-17	2014-15	2015-16	2016-17
Tur	2810	2560	4230	16.38	15.65	19.11
Gram	7330	7060	9120	42.74	43.18	41.20
Moong	1500	1590	2130	8.74	9.72	9.62
Urad	1960	1950	2890	11.42	11.92	13.50
Other pulses	3550	3190	3770	26.69	19.52	17.03
Total Pulses	17150	16350	22140	100	100	100

Table.2 Export and Import of Major Pulses in India

Pulses	Export of Pulses (Thousand Tonnes)			Import of Pulses (Thousand Tonnes)		
	2014-15	2015-16	2016-17	2014-15	2015-16	2016-17
Peas	3.91	6.44	6.43	1951.97	2245.39	2657.24
Chickpea	190.23	216.93	61.21	418.87	1031.48	421.02
Moong/Urd	4.25	6.39	7.86	622.88	581.60	468.34
Lentils	7.98	11.77	11.76	816.46	1260.19	447.85
Pigeon Pea	1.22	9.22	9.22	575.22	462.71	573.74
Total Pulses	222.14	98.47	98.47	4584.84	5797.77	5420.25

Source: Commodity P r o f i l e f o r P u l s e s - M a r c h 2 0 1 7. DES 2016-17, MOSPI

Table.3 State-wise Estimates of Rice Area Cultivated during Rabi (1999-2000)

State	**Kharif-Rice Area (000 ha)**	**Rabi-Fallow (RRFL) (000ha)**	**RRFL as % of Kahrif-Rice Area**	**% of RRFL in India**
Chhattisgarh	3,584	2,936	81.92	25.0
Madhya Pradesh	2012	1,753	87.12	14.7
Bihar	5,974	2,196	36.8	18.9
West Bengal	4,617	1,719	37.2	14.8
Assam	2,234	539	24.1	4.6
Uttar Pradesh	6,255	353	5.6	3
Others	15,508	2,463	15.9	21
Total	40,184	11,652	29	100

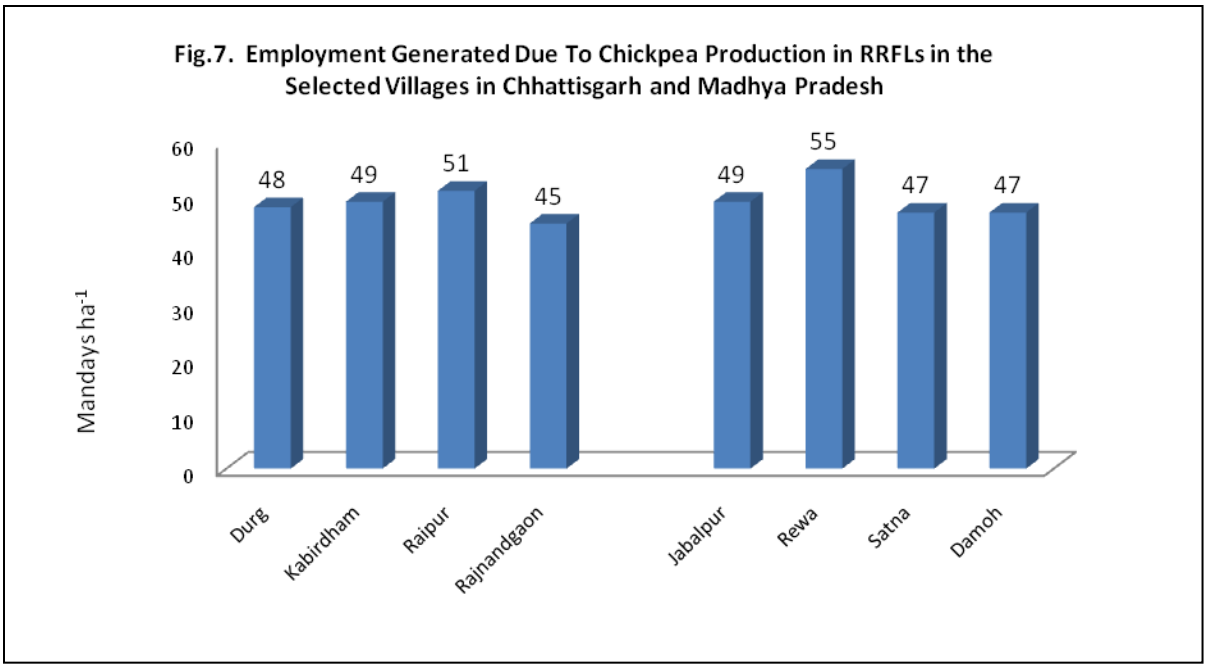
Table.4 Estimated rice-fallows area (000 ha) based on satellite image analysis

State	**Area under Rice-Fallows**	**Rice Fallow Districts (No.)**	**Selected RRFL Districts for IPPPT**	**Number of Selected Blocks**	**Number of Selected villages**
Chhattisgarh	2936	8	Durg, Kabir Dham Raipur and Rajnandgaon	5	24
Madhya Pradesh	1753	20	Rewa, Satna, Jabalpur and Damoh	9	40
Total	**4689**	**28**	**8**	**14**	**64**

Table.5 Economics of rice based cropping systems in the selected villages of Chhattisgarh and Madhya Pradesh

Cost &Return in Rs ha^{-1}

Crop Rotation	Chhattisgarh				Madhya Pradesh			
	Gross Return	Variable cost	Net Return	B/C Ratio	Gross Return	Gross Cost	Net Return	B/C Ratio
Paddy-Fallow	15750	11836	3914	1.33	12340	10754	1586	1.15
Paddy-wheat	31064	24712	6352	1.26	34973	24335	10638	1.44
Paddy-Chickpea	32914	18789	14125	1.75	38126	18141	19985	2.10
Paddy-lentil	39950	25971	13979	1.5	-	-	-	-



The season, after the harvest of rice in the selected regions, becomes lean for the on farm employment.

This results in substantial out-migration of the human labour from the villages to the nearby towns or to the metropolitan cities in the country or in shifts to available non-farm employment opportunities in the region.

Chickpea production can create significant opportunities for on-farm employment in the rural areas in the selected region. It will help the farm to retain the labour force on the farm that will solve the problem of scarcity of farm agricultural labour in the area.

Main constraint to production

However, a number of technical, institutional, socioeconomic and ecological factors limit growing of a second crop after rice in rainfed rice fallow lands (RRFL). Many of the available rainfed production technologies have either not been transferred appropriately or failed to cater the needs of the farmers. Financial institutions remain reluctant financing rainfed agriculture. These factors affect the cropping systems but lack of irrigation is the main limiting factor to RRFL in the post-rainy season. Extraction and use of ground and surface water for irrigation is difficult and costly.

Creation of public irrigation infrastructure involves huge investment and social cost. Private investment in irrigation has its own limitations.

Introduction of crops that can escape terminal drought is one of the plausible options to harness the potential opportunities in RRFL. Pulses are water efficient crops and are known for their drought tolerance. These complement cereals in both production and consumption.

These improve soil fertility; require less water in comparison to cereals; and improve moisture holding capacity of the soils. The nutritional benefits of pulses are enormous. Most pulses contain 18-25% protein and comprise one of the cheapest sources of protein.

Suggestions/ Recommendations

Increase R&D endeavour to develop short duration cultivars with multiple resistance against major biotic and abiotic constraints like dry rot, pod borer, terminal drought, etc.

Strengthen formal seed markets and value chains to safeguard interests of farmers

Advocacy of chickpea as a part of farming system

Development of low cost and effective insect pest/ disease management technologies

Provisions for dissemination of relevant information on different aspects of production, crop protection, soil and water conservation, markets, prices, etc.

Sufficient regulatory and policy mechanisms to regulate role of private sector in seed and input marketing and delivery

Easy provisions of institutional credit

Enhanced access to seeds an input market

Better seed multiplication and distribution system: Private sector, NGOs, SHGs/ Farmers organizations, Govt organization can play a vital role in this area.

It is imperative that these are encouraged to come forward in this direction and be supported with adequate financial, technical and other supports.

Creation and establishment of sufficient numbers of processing and value addition facilities in the region. Private sector should be encouraged to take lead in his area and integrate pulse producers in their value chain.

Train and educate farmers about the economic and technical aspects of chickpea production and also provide them better technical guidance.

Training of input dealers and progressive farmers and their use in farm advisory services at village level.

Chickpea production is highly vulnerable to production risks, farmers expect some assured policy interventions like crop insurance coverage as well as buy back guarantee. Insurance against production risk and assured market with buy back guarantee at the remunerative prices would provide impetus to the pulse production.

Encourage formation of farmers' societies, cooperative

Establish more number of mandis in the villages or at least in the clusters of villages. Strengthening of the public procurement system can also play a vital role.

Extend the project support to the farmers for 2-3 years to establish the faith of the farmers in the chickpea production with IPPPT.

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