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Original Research Article

An Analytical Study on Declining Trends of Gram and Pea Cultivation in Tal Area of Patna District, Bihar, India

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A B S T R A C T

Pulses in India have long been considered as the poor man's source of protein. India accounts for 33 per cent of the world's area and 22 per cent of its pulses' production Bihar is one of the leading pulse growing states in India contributing about 6.50 per cent to the country's pulses production. Bihar is ranked 9th in terms of production with a contribution of 0.52 million tons to the national pulse pool but the share gets reduced to 7.06 per cent of total area under food grains, with productivity ranging between 819 kg/ha in 2000-01 to 897 kg/ha in 2013-14. The present study was conducted in the Tal area of Patna district in Bihar. The Economic Survey of Bihar reveals that in district Patna, pulses were grown in around 12301 ha under Gram, 28266 ha under Lentil and 3363 ha under Pea production yielding 2011.2 tons of Gram, 3524.8 tons of Lentil and 323.5 tons of Pea in the year 2000-01. In the year 2009-10, the area under pulses declined which was 6994 ha under Gram, 29270 ha under Lentil and 1040 ha under Pea cultivation with a production of 680.5 tons of Gram, 3044.1 tons of Lentil and 156.5 tons of Pea. Based on findings of the study, it can be concluded that the area under Gram and Pea has declined by 43.14 and 69.07 percent while for lentil it has experienced a minor increase of 3.55 per cent. The present study with a sample size of 100 pulse growing farmers from Patna also revealed similar trends and it was found that the declining area under gram was due to various factors like low yield, low market price, late maturity of varieties, high insect infestation, incidence of pest and diseases and use of local seed.

Keywords

Bihar, Pulses production, Constraints, Trends

Introduction

Pulses constitute an essential part of the Indian diet for nutritional security and environmental sustainability. Pulses are important food crops due to their high protein content of around 20 to 25 per cent, carbohydrates ranging from 55 to 60 per cent along with rich calcium and iron content. Pulses also play a major role in improving of soil fertility through biological nitrogen fixation with the help of rhizobium bacteria found in their root nodules. Thus, they play an important role to enhance the fertility of soil in term of yield of subsequent crop (Narayan P, and Kumar S., 2015). Pulses are the second most important group of crops after cereals. In 2009, the global pulses production was 61.5 million tons from an area of 70.6 million ha with an

average yield of 871 kg/ha. Dry beans contributed about 32% to global pulses production followed by dry peas (17%), chickpea (15.9%), broad beans (7.5%), lentils (5.7%), cowpeas (6%) and pigeon pea (4.0%). The major producers of pulses in the country are Madhya Pradesh (24%), Uttar Pradesh (16%), Maharashtra (14%), Rajasthan (6%), Andhra Pradesh (10%) followed by Karnataka (7%) which together share about 77% of total pulse production while remaining 23% is contributed by Gujarat, Chhattisgarh, Bihar, Orissa and Jharkhand (Basu, P.S., 2011). About 90% of the global pigeon pea, 75% of chickpea and 37% of lentil area falls in India. Due to stagnant production, the net availability of pulses has come down from 60 gm/day/person in 1951 to 31 gm/day/ in 2008.

India is the largest producer and consumer of pulses in the world contributing around 25-28% of the total global production (Basu P.S, 2011). The expansion of irrigated agriculture in northern India has led to displacement of chickpea with wheat in large area. The present trend revealed that area under pulses declined from 10.12 million hectare to 8.16 million hectare (about 20%) in north India. On the other hand, area of pulses increased from 11.34 to 15.01 in central and south India during the same three decades. Among pulses, chickpea area decreased more than 50% from north India during 2006-10 considering the base year 1971-75 (Basu P.S, 2011). It has been examined at various levels of field crop researches that the production of pulses in the recent decade has increased but not in a pace with the increase in population (Chatterjee, S. *et al.*, 2015). Thus, an attempt was made to determine the cause for the declining trend in pulses production in Patna district of Bihar.

Materials and Methods

The study is based on the data collected in between 2009- 10 and 2013-14 from Tal area of Patna district in Bihar by multistage random sampling. A sample of 100 farmers were selected from five potential block (Mokama, Ghoswari, Pandarak, Bakhtiarpur and Khusrupur), one village from each block (Maranchi of Mokama Block, Karra of Ghoswari Block, Kazichak of Pandarak Block, Sabani of Bakhtiarpur Block and Tilhar of Khushrupur Block) and 20 farmers from each village. Based on reconnaissance survey, lists of pulse growing farmers were prepared. From the prepared list twenty pulse growers from each village was randomly selected and finally data were collected with the help of structured schedule. Garrett's ranking technique proposed by Garrett et al. (1969) was used to prioritize the major constraints faced by the pulse growers. According to this technique, the respondents were asked to assign ranks to different problems. Simple tabulation method was carried out for analyzing the materials and inputs used in pulses cultivation, its cost of cultivation, gross return, net return and benefit – cost ratio of the sample lentil growers.

Results and Discussion

The socio-personal attributes of the farmers under the study area reveal that there were 46% middle age farmers, 38% old age farmers and only 16% young farmers involved in pulse cultivation. With respect to the educational level of the farmers, 48% farmers were having medium level of education, 40% farmers were having high level of education while only 12% farmer were having low level of education. Under social structure, the study revealed that 52% of pulse growers belonged to other backward classes, 40% of general category

while 8% of pulse grower belonged to scheduled castes. The data pertaining to the size of family revealed that 54% of pulse grower were having small family (up to 5 members), 24 % medium family size (having 5-10 members) and 22% of pulse grower were having large family size (>10 members). Data also revealed that about 10% of pulse growers were beneficiaries of governmental schemes while 90% were non-beneficiaries. With respect to the irrigation facilities, out of 519 hectares of land holding about 144-hectare land was found to be irrigated while 375 ha area was un-irrigated or rainfed. Data also depicted that 58% pulse growers were also engaged in livestock production while 54% farmers were having modern implements for agricultural practices (Table 1). The socio-economic constraints were in accordance with the findings of Burman *et al.*, 2008 which says that the socio-economic conditions of farmers restrict growing of valuable pulse crop like gram.

Based on the study, the area, production and percent change in major pulses were taken into consideration before and after 2012.

The data in Table 2 reveal that the area under lentil after 2012 is 258.88 ha instead of 218.78 ha before 2012. Thus, the area under lentil increased by 15.48% after 2012. But, the area under gram declined after 2012 which was 96.18 ha while area before 2012 was 115.8 ha. The percentage change in area of gram was 16.64 % after 2012. The area under Lentil was replaced by Pea, Lathyrus and Coriander by about 6.14%, 3.4% and over 50% respectively. With the use of high yielding varieties in lentil and gram, the production was found to increase 12.68% and 7.68% respectively after 2012. The reduction in Gram growers was also due to farmers to losses attributed because of pod borer (insect), wilt (disease), climate and other constraints supported by the findings of Kumar and Bourai, 2012.

Adoption behavior of different technology used in pulses cultivation reveal that out of 100 farmer, 18 percent farmers follow the recommended seed rate, 30 percent farmers adopted seed treatment, 13 percent farmer used bio-fertilizer, 18 percent farmer adopted recommended dose of fertilizer, 87 percent farmer used chemical insecticide-pesticide while only 8% farmers adopted line sowing. Overall, the farmers were found to be poor in technology adoption.

The prime source of seed material was found to be own seeds (local varieties or farm produced seed) of farmer instead of government/ private high yielding varieties. Out of 100 farmers, 86% farmer used their own seeds while only about 14% of the growers used government/ private sector seed in the pulse growing system.

Table 5 shows that from the farmer's point of view, lentil stands first in the preference rank followed by pea, gram and Lathyrus.

Table 6 reveals that about 63% farmers are of the view that gram was replaced by lentil while 17%, 12% and 8% farmers believe that gram is replaced by pea, Lathyrus and Coriander respectively.

Several constraints were identified which affected the production of pulses. Table 7 reveals the constraints identified by the pulse growers which directly or indirectly affects cultivation of Gram in the study area. According to the respondents, low market prices are the concern of majority of farmers attributing to the declining area of gram. It is followed by low yield from the indigenous varieties. Time factor was ranked the third major constraint since Tal area is often found to be flooded during uncertain period..

Table.1 Socio personnel attributes of the respondent

Age	**Young**	**Middle**	**Old**	**Total**
	16	46	38	100
Education	**Low** Below Matriculation	**Medium** Up to Higher Secondary	**High** Above Graduation	100
	12	48	40	
Social Structure	**General**	**Backward**	**SC**	100
	40	52	08	
Family Size	**Small** Up to 5 members	**Middle** 5 to 10 members	**Old** Above 10 members	100
	54	24	22	
Family Type	**Nucleus**	**Joint**		100
	48	52		
Govt. Beneficiaries	**Govt. Beneficiary**	**Non-Beneficiary**		100
	10	90		
Land Holding(ha)	**Irrigated**	**Un-irrigated**		519
	144	375		
Livestock	**Yes**	**No**		100
	58	42		
Farm Implement	**Yes** **54**	**No** **46**		100

Table.2 Area, production and % change in pulse before and after 2012

Particulars	**Area before 2012**	**Area after 2012**	**% Change**
Area under Lentil (in ha.)	218.78	258.88	+15.48
Area under Gram (in ha.)	115.38	96.18	-16.64
Production of Lentil (Q/ha)	296.16	339.20	+12.68
Production of Gram (Q/ha)	269.20	291.60	+7.68

Table.3 Adoption behavior of different technologies in pulses cultivation

Technology adopted	**Adopted**	**Non-adopted**	**Total**
Use of Recommended Seed rate	18	82	100
Seed treatment	30	70	100
Use of Bio-fertilizer	13	87	100
Use of Recommended dose of fertilizer	18	82	100
Use of Line Sowing	08	92	100
Use of Insecticide-Pesticide	87	13	100

Table.4 Source of seed by the respondents

Particulars	Government / Private company	Own Seed	Total
Source of Seed	14	86	100

Table.5 Rank/ preference of pulse crop by the respondent

Crop	Rank / Preference of Crop
Lentil	I
Pea	II
Gram	III
Lathyrus	IV
Coriander	V

Table.6 Crop replacement

Actual Crop	Replaced by Crop	Ranked by Farmers
Gram	Lentil	63
	Pea	17
	Lathyrus	12
	Coriander	8
Total		**100**

Table.7 Rank order of the constraints identified

Constraints	Mean score	Rank by order of merit
Low market price	62.14	I
Low yield	58.66	II
Time Factor	57.22	III
Late Maturity	52.91	IV
Social problem	48.64	V
High Infestation by Insect, Pest and Diseases	36.25	VI
High cost of cultivation	32.18	VII
Lack of Suitable Insecticide for Pod borer	29.14	VIII
Lack of Suitable Varieties	27.42	IX
Lack of Capital	25.67	X
Crop Rotation	24.36	XI
Lack of Rhizobium culture in local market	21.10	XII
Wilt Problem	18.80	XIII

The farmers were also of the view that the maturity period of gram is higher than that of lentil, pea and Lathyrus due to which the sowing of next season crop gets affected. The social problem arising due to picking up the gram pods before the physiological maturity also leads to decline in the yield. The insect infestation with pod borer and diseases are also the causes of decline along with high cost of seed and pest management. Lack of suitable high-yielding varieties for adapting to biotic and abiotic along with lack of suitable crop rotation measures since more than 60% area in gram is under rainfed conditions with no irrigation facilities also leads to decline in production. There are little chances of crop rotation due to which there are regular incidences of wilt infestation leading to declining gram area. The lack of rhizobium culture availability in the local market is also observed as a major constraint. Some of the above mentioned constraints restricting the growing of pulse crop is also consistent with the findings of Kumar and Bourai, 2012.

The study reveals that cultivation of gram and pea has become most labour-intensive. However, the crisis for realizing better marker prices along with good seed material for the farmers has become the prime barrier leading to low production in the district. Along with it, management of insect-pest and diseases, better fertilizer and nutrient management, price policy implication and reorientation of marketing scenario is very much needed in Bihar to streamline the pulses production.

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