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Socioeconomic Analysis on Problems and Prospects of Major Pulse Productions and Consumption in Bihar, India

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A B S T R A C T

The main objective of this paper is to appraise the existing situation of major pulse production and consumption with adoption of technologies and its impact on crop productivity, income, and other socio-economic issues. The average productivity of improved variety of chickpea in adopted villages was estimated at 9.5 quintal/ha & for local variety it was 8.5 q/ha. For pigeon pea the productivity was 18to 19 quintal/ha. The per capita income in the adopted village was more than that of control village accounted 54% of income from the crop enterprises and from pulses its share was estimated only10 to 12percent of total farm income. Human labor accounted highest cost in pulse cultivation (farm family contributed about52 percent of total labor). Comparative cost and benefit analysis indicated that pulse crop were more remunerative in Bihar. Constraints analysis indicates that the non-availability of seeds of high-yielding varieties in the desired quantities was perhaps one of the major constraints followed by moisture stress, high pod borer incidence, and shortage of labor during harvesting and threshing and some of variety found not suitable in flood affected area etc in pulse production. The share of consumption expenditure on pulses was only 15.60 percent of total food expenditure/household. It is suggested that major future expansion of area under pulse crops may take place in rice fallows, (1.2 million ha) where there is no other crop to compete with. Steps to reduce the temporal and spatial variation in price of pulses will definitely help in sustaining as well as enhancing the farmers' interest in pulses production. The government has never treated the MSP as an effective tool for increasing pulses production; High volatility in prices for long periods, low productivity, and stagnation in production technology has acted as disincentives for pulses production.

Introduction

Pulses in India have long been considered as the poor man's only source of protein. Pulses are grown on 23 million hectares of area with an annual production of 15 million tons in 2003-04,it has been increased to25 million hectare in the year 2013-14 and production during the same has been increased from 15 to19.7 million tones. However productivity has been increased from 635Kg/ha to 785Kg/ha over the period. Due to stagnant production, the net availability of pulses has come down from 60 gm/day/person in 1951 to

31 gm/day/person (Indian Council of Medical Research recommends 65 gm/day/capita) in 2008. The requirement of pulses will continue to increase in future mainly due to ever increasing population and preference for pulses as the cheapest source of dietary protein. Our prime Minister call for second green revolution of the country with emphasis on enhancement of pulse production to ensure food and nutritional security of people also finds the Bihar is most suitable for it. The central Agriculture Ministry has also identified gaps in the present strategy to increase production of pulses and also identified lack of availability of new varieties of seeds as an important hindrance in increasing productivity of pulses.

In Bihar Agriculture sector has experienced a considerable growth during the past three decades. The progress has been spectacular in 1980's when state recorded agriculture growth of 2.50 percentages which outpaced the population growth (2.35%) during the period which could not be sustained during nineties (AICRPs, 2011). In the process of technological development in Bihar, pulse crops got major setback and its area declined from6913 thousand hectares in 2003-04 to 500thousand hectare in the year 2013-14. It produces 562.6thousand tones of pulses in 2003-04, which has been declined to522 thousand tones during2013-14 (Govt. of Bihar 2014).This is only 4% of pulse production of the country. However productivity of pulses has been increased from 814 Kg/ha to 1044 Kg/ha during the same period, which is higher than the national average. Definitely, there is ample scope for enhancing the productivity of the individual pulses in the state. However emphasis will be given on an increase in area of pulses bedside adoption of improved production and protection practices (Kumari *et al.,* 2016). The percentage area under pulses to gross cropped area has also been declined with an increase in gross irrigated area (Chopra, 1982). Among pulse crop grown in Bihar Lentil is the only pulse crop whose cropped area increased by 20,000 hectares. Its production is still greater to all India average (991kg/ha). Particular reference to major pulses like chickpea and pigeon pea in Bihar, the area and production of both the pulses has been declined, due to growing popularity and public policy emphasis on Rice-Wheat system (Anonymous, 2012). It has been noted that the area under pigeon pea declined over the year by 35 percent and that of chickpea and lathyrus each by about 60 percent (compiled from data). It was estimated about 22 thousand hectare area of pigeon pea and 42 thousand metric tons production in 20012-13 and its productivity was about 1901Kg/ha DES, 2015).

It has been noticed that as irrigation facilities developed, chickpea gradually gets marginalized in Bihar and other parts of Indo-Genetic Plains (Ranjan, *et al.,* 1996). In addition to this, there is a huge variability in area and production of major pulses during 2000-2009, however the productivity during the same period is more stable which indicates that there is a scope to increase production potential of major pulses in the state if adequate policy measures are taken (Kumari *et al.,* 2015). In this regard it is pertinent to take into account the one million ha of rice fallow land in the state to which the chickpea and other pulses cultivation could be potentially expanded (F.A.O, 2009). To identify the problem and opportunity, this paper has been planned with main aimed at increasing the area and production of chickpea through intervention of improved varieties along with management practices in target districts of Bihar.

Materials and Methods

The study was mainly based on collection of primary data. The target districts were

selected for conducting baseline survey on major pulse cultivation (chickpea and pigeon pea cultivation) in Bihar were Banka and Bhagalpur for the period of 2011-12 under collaborative project of TL-2. In each district a cluster of 3 villages from two different blocks were selected as adopted village and 3 villages from surrounding areas with comparable agro ecological and market condition were chosen to serve as control villages. In total, 6 villages in each district were identified for the same. Stratified Random Sampling technique based on probability proportion to size method to farm size was used to conduct the interview. From each of the adopted villages a sample of 30 farmers &from each of the control villages a sample of 15 farmers were interviewed. Thus, a total of 135 from each district totaling to 270 farmers were interviewed to assess the socio –economic profiles, constraints faced, income and liability of farmer for cultivation of two major pulses in Bihar.

Analytical technique

For assessing the trends in area, production and productivity of major pulses in the states and the study districts of Bhagalpur and Banka, the exponential function of $Y_T = ab^t u^t$ was employed. Where, Y_T= area/production/productivity in the year's' a = intercept indicating Y in the base period (t = 0), b= Regression coefficient, t= Time period in years

U_t= Disturbance term for the year's'.

Garrett's ranking techniques

It was used for constraints analysis, in analysis, rank 1 means most important problem and rank 10 means least important problem. In the next stage rank assigned to each reason by each individual was converted into per cent position by using the formula:

Per cent position = $100 (R_{ij} – 0.5) / N_J$

Where, R_{ij} stands for rank given for the I^t factor (i= 1, 2….5) by the j_{th} individual (j = 1, 2……., n) N_j stands for number of factors ranked by j^{th} individual. Once the per cent positions were found, scores were determined for each per cent position by referring Garrett's table. Then, the scores for each problem were summed over the number of respondents who ranked that factor. In this way, total scores were arrived at for each of the factors and mean scores were calculated by dividing the total score by the number of respondents who gave ranks. Final overall ranking of the factors was carried out by assigning rank 1, 2, 3… etc., in the descending order of the mean scores.

Major findings

The area under major pulse crops over the decade indicated that there was steep decline in area under pigeon pea and chickpea. However productivity of these pulses increased consistently (Kumari *et al.*, 2015).

Status and importance of major pulses in sample districts of Bihar

Relative importance of pulses in the districts as a whole was 20 percent of gross cropped area. Among pulses chickpea accounts 60 percent of area to total pulse area in the districts. In Bhagalpur, the average area under chickpea in triennium ending 2000 was 5042 hectare producing 4416 tons with productivity of 872 kg per hectare. Chickpea is also one of the major pulse crops in Banka district with an area of 3873ha during 2000 after that it has declined to 2477ha till 2009 triennium ending however average production has been stagnated over the period. But productivity level raised from 716 kg/ha to1057kg/ha. This requires the suitable policy to develop the technology of processing, storage and

sustainable production for the livelihood security of people in Bihar.

Place of pigeon pea in cropping pattern and productivity level

The other major pulses were pigeon pea, constituted about 12 to 13% in the rainy season cropped area. The percentage of area under pigeon pea was higher (13.31%) in Bhagalpur than that of Banka (8.63%). It clearly reveals that pulses were neglected crop in the study districts and farmers have excessive dependence on a single crop in rainy season that is Rice. The main reasons expressed by the respondents for the cultivation of rice were that, it is stable crop fetches higher yield and is best suited to their marginal lands. In spite of the fact that pigeon pea requires low-input and restores the soil fertility farmers were reluctant to cultivate rice only in rainy season. Other competing crop was maize, which was also more remunerative crop than pigeon pea. That is why majority of area under pigeon pea in Banka were on Bund, despite of fetching higher income without using any fertilizer and other nutrient for their growth (Table 1).

Place of chickpea in cropping pattern and productivity level

However the relative importance of chickpea crop to total cropped area (Kharif, Rabi and summer) was accounted nearly about 20 to 36 percent in control and adopted Village respectively. Size group analysis revealed that the pulse crops were given more importance by the large farmers followed by small and marginal farmers, due to the fact that pulse crop being less capital intensive may be cultivated extensively to cover all the land under cultivation particularly by the large farmers.

From the observation of cropping pattern of sample districts it may be inferred that district Bhagalpur occupied more area under chickpea in Rabi followed by kharif crop across each size group of farms. It clearly indicates that pulse crops were not given equal importance as given to the wheat, maize and paddy by the farmer of selected districts (Table 2).

Productivity of chickpea in selected district of Bihar

Varieties –wise productivity analysis indicated that, average productivity of improved varieties did better in Banka(1042.34kg/ha).Among all varitiesJG-14 proved superior over kak-2 (832.74kg/ha)in particular location but it was observed that they were reaping only half of potential yield due to postharvest losses, germination problems, high disease infestation etc.

Average yield of chickpea in Banka was comparatively higher than that of Bhagalpur, as shown in table 2. Among improved variety given to the farmer JG-14(1000kg/ha) gives better yield in Banka followed by RADHA (1010.45kg/ha) and KAK-2 and it was also reported as most preferred variety among improved cultivar. On the basis of above observation i.e. comparative yield analysis of both district it may concluded that, farmers of both districts were still relying on traditional varieties due to risk associated with improved varieties, more occurrence of disease and pest, Germination problems of KAK2 in few villages like Rajpur.

Postharvest losses in KAK2 were also higher due to rat attack on farmer field. For Better impact some initiative like large number of farmer should have been identified for distribution of seed, early sown variety should be given to the farmers of flood affected area, and late sown variety should be promoted in rice-wheat dominated areas of all villages selected under study to regain the area under pulses in Bihar (Table 3).

Productivity of pigeon pea in selected districts of Bihar

Productivity level of 'local variety like Deshla/Tikariya, gives comparatively higher yield in adopted village of Bhagalpur (1334kg/ha)). Among varieties distributed to the farmers ICPH 2671, ICPH 7035 and Asha were most acceptable variety in both the districts. The major problems associated with these were germination& non-suitability into cropping pattern. The productivity level of improved variety ranged in between 1100 – 1400kg/ha in selected districts of the Bihar state. In Local varieties, Tikaria was observed as a single variety in both of districts selected for survey. Variety ICPH 7035 was most suitable variety among improved varieties (Table 4).

Economic analysis of chickpea cultivation

Economic analysis of growing different crops is very important to understand which crop is most remunerative in terms of getting higher return on investment. The cost of cultivation, input output ratio associated with growing chickpea has been presented in table 5.

Comparative economics of chickpea indicated that BCR of improved variety was comparatively more than that of local variety. Despite of these fact farmers still prefers local variety to grow pulses. For better impact awareness program as well as proper package of practices should be made available to them easily. Proportion of expenditure on human labor was found highest on harvesting and threshing (Rs 5532.33) followed by material input like seed cost (Rs 3286) in adopted and control village (4554.01 and 2645) respectively out of total cost Rs 15392 /ha and14352 spent on cultivation of chickpea under study. However the cost of cultivation of improved varieties was varies between Rs 18200-19280/ha, which was comparatively higher than local variety. It was mainly due to fact that while using local variety farmer were using own seed and due to higher prices of improved seed and proper package of practices used by the famer while cultivating improved varieties. The estimated net returns wasRs13438 to14368 /ha in sample village for local varieties and Rs17480- 19520 for improved varieties under studies. It clearly indicated the comparative advantage of chick pea than other competing crop like wheat (compiled other crop also). Comparative cost and benefit analysis indicated that pulses crop are more remunerative crop for Banka than Bhagalpur (1.6) as benefit cost ratio for local verities were higher (1.9) in Banka. But for improved verities it was estimated higher in Bhagalpur (2.01). It means improved variety given to farmer were found more suitable in Bhagalpur districts. Results supported by the findings of Meena *et al.,* (2014).

However for pigeon pea, BCR of local variety in Banka district (4.0) was comparatively more than that of Bhagalpur (3.0).The difference between input-output ratio of local and improved variety was only due to difference in the harvest price of improved variety (limited availability of that variety among the farmers), otherwise cost involved in different operation was also more or less similar i.e. ranged from Rs. 12428.97 to Rs. 18082.50 in respective districts. Thus, it is obvious that input-output ratio for improved variety was found similar to local variety& net income per hectare worked out was found highest for improved variety followed by local variety in sample villages under study. These results are quite similar as AICRP (2011). One of the important point noted that despite of better comparative advantage of this crop farmer were not interested to allocate the main land for pigeon pea they usually prefer to grow in bund. These results are similar as obtained by ICAR (2010) and Sahu and Jiyawanv (2012) (Tables 5 and 6).

Income and expenditure analysis of pulses in Bihar

The total household income on an average was worked out to be Rs.250782 for adopted villages of Bhagalpur which was found to be highest followed by adopted village of Banka district (Rs.169839). Among control villages it was comparatively higher for Banka district than that of Bhagalpur and was estimated to be Rs.130629 and Rs.113407 respectively. Regular salaried Job figured to be the major source of income in both the districts i.e. contribution of non-farm income was estimated about 82061 for adopted villages of Bhagalpur and Rs.82167/Year for adopted villages of Banka. Earning from business figured out to be the third most important source of income and accounted for about Rs.2277 out of Rs. 130629 followed (Rs.12222) and (Rs.9967) respectively by adopted and control villages of Bhagalpur. It was further revealed that contribution of income to the total income from crop was Rs70983.5in adopted village which was accounted next to salaried job i.e. placed second and in control village it was estimated only Rs 26905.5, despite of the fact that majority of part of population of selected districts i.e. 53 % of total population mainly depend upon agriculture followed by business and services (Table 7).

The annual household consumption expenditure pattern of sample farmers in Bihar is shown in table 8 since rice is the main staple food for the farmers; it occupied nearly 30 per cent of the share in the total cost on cereal in both control and adopted villages. Among the pulses group the expenditure on chick pea is more than that of pigeon pea because pigeon pea being costly only big farmers have been used for the purpose of consumption. Overall, the average consumption expenditure per household per year is slightly higher in adopted villages when compared with controlled villages. This trend is in contrast to the earlier pattern observed in household income of sample farmers in the adopted and control villages. In both adopted and control villages, the expenditure incurred on pulses was around 15.60% of total food expenditure. Yet, the expenditure on food and non-food items was higher in sample household in adopted villages when compared with control villages. The food expense was around 60-62% whereas non-food expense, education was the single largest component which the make Rs 14000in adopted villages which was more than in control villages (Rs11000). One remarkable point had been observed while analysis that consumption expenditure on food item was comparatively more in control villages under study as indicted in table 8 (Rs 49041). Findings support the angel law, higher the income lower the expenditure on food items and vice-versa.

Problem and prospects of major pulse production in Bihar

Major constraints among cultivar in Bhagalpur for local variety was observed as low yield followed by high pod borer incidence, low market price, having no attractive color and small grain size was ranked 1^{st}, 2^{nd} 3^{rd}, 4^{th} and 5^{th} respectively (Table 9). For improved varieties it was high pod borer incidence followed in not attractive color, High disease incidence, not fitting into cropping system and poor taste were given the 1^{st} 2^{nd}, 3^{rd}, 4^{th} and 5^{th}ranked respectively. In Banka district, the major constrains in order of importance were low yield, high pod borer incidence, high disease incidence, small grain size and low recovery of dal percentage as 1^{st}, 2^{nd}, 3^{rd}, and 5^{th} rank respectively for local variety and high pod borer incidence followed by low yield, high disease incidence, long duration& not fitting into cropping system as 1^{st}, 2^{nd}, 3^{rd}, 4^{th}, and 5^{th}respectively for

improved variety. Thus it may be concluded that major constraints among cultivar was the pest and disease for improved variety and Low yield was the main problem for local varieties of chickpea production in study districts of Bihar.

In conclusion, decline in area of pulses was mainly due to insecure harvest of crop in isolated pockets due to social factor. Among variety targeted for cultivation, JG-14, KAK2 and Subhra were found most acceptable and suitable variety in the farmer's field of both the districts in Bihar for chickpea, however for the pigeon pea ICPH 7035 was most suitable variety among improved varieties. Regarding local variety one of the major setbacks was that it has not been replaced by the farmer from 20 to 25 years. One remarkable point has been observed that consumption expenditure on food item like rice and wheat was comparatively more than pulses (only15percent) despite of having nutritional importance in the dietary pattern**.** Particularly among the poor people who cannot afford animal products to supplement protein requirement of macro and micro nutrients. Major constraints for pulse production in Bihar are that, the suitable variety is not available in the market; erratic rainfall causes moisture stress, disease and insect infestation etc. To increase area and production of pulses we need region specific approaches which should be adopted in the overall framework of system approach. There is a ample scope for pulses industry also that's why special attention in these areas needs to explore the technology for optimization of pulse production. Because, for diversification pulse crop is one of the reliable option with new technology interventions (improved seed, package and practice) to regain some area in the state as whole and districts in particular.

Table.1 Relative importance of pigeon pea crop in cropped area of Bihar sample, 2011-12

Cropped area	Bhagalpur		Banka		Pooled Sample	
	Adopted	Control	Adopted	Control	Adopted	Control
Rainy season cropped area (ac)	**422.50**	**188.50**	**275.44**	**62.23**	**697.94**	**250.73**
Post rainy season cropped area (ac)	**419.00**	**320.50**	**317.00**	**50.75**	**736.00**	**371.25**
Area under Pigeon pea (ac)	117.00	64.50	51.15	12.48	168.15	76.98
Proportion of Pigeon pea area to total	13.31%	12.46%	8.63%	11.05%	11.43%	12.21%

Table.2 Relative importance of chickpea crop in cropped area of Bihar sample, 2011-12

Cropped area	**BHAGALPUR**		**BANKA**		**Pooled Sample**	
	A	C	A	C	A	C
Rainy season cropped area (ha)	55.66	16.39	73.53	32.18	129.19	48.58
Post rainy season cropped area (ha)	321.40	20.14	82.94	36.84	404.35	56.98
Area under post- rainy season chickpea area post rainy area (ha)	60.17	16.49	45.90	21.96	106.07	38.46
Proportion of chickpea area to total cropped area (%)	16%	45%	29%	32%	20%	36%

(Source: compiled by the Authors)

Table.3 Productivity of chickpea by varieties in Bihar sample, 2011-12 (kg /ha)

	BHAGALPUR		**BANKA**		**Pooled Sample**	
	Adopted	Control	Adopted	Control	Adopted	Control
DESHLA ROON	732.77	741.00	946.83	900.35	848.03	890.70
DESLA PLAIN	668.66	626.32	776.09	638.08	702.53	627.11
JG-14	790.40	0	1042.34	0	1000.35	0
KAK-2	988.00	0	806.87	0	832.74	0
RADHA	864.50	494.00	0	671.84	1010.45	630.80
SUBHARA	839.80	0	0	370.50	790.40	370.50
VAIBHAV	699.83	0	0	0	699.83	0

(Source: compiled by the Authors)

Table.4 Variety wise productivity of pigeon pea in selected districts of Bihar (kg/ha)

Varieties	Banka		Bhagalpur		Pooled	
	Adopted	Control	Adopted	Control	Adopted	Control
Pusha-9	0	0	1363	1375	681.5	687.5
Tikariya	1027	300	1334	1172	1180.5	736
Local/Maghauya	929	0	1350	1236	1139.5	618
Asha	984	0	1363	1333	1173.5	666.5
ICPH-2671	1147	0	1400	0	1273.5	0
ICPH-2678	0	0	1250	0	625	0
ICPH-2740	937	0	1260	0	1098.5	0
ICPH-3762	1109	0	1415	0	1262	0
ICPH-7035	750	0	1140	0	945	0

Source: Field survey, 2011-12

Table.5 Gross returns and cost incurred from different verities of chickpea grown by sample farmers in Bihar 2011-12 (Rs.'000/ha)

	BHAGALPUR (Rs per ha)		BANKA (Rs per ha)	
	Adopted	Control	Adopted	Control
Rain fed /Local DESHLA PLAIN (LOCAL) DESHLA RUN(LOCAL)				
Yield (kg/ha)	708	616	794	839
COC(Rs/ha)	15392	11942	14352	14997
Gross returns(Rs/ha)	24780	21560	27790	29365
Net returns (Rs/ha)	9388	9618	13438	14368
BCR	1.6	1.8	1.9	1.95
Irrigated /Improved IMPROVED KAK-2(IMPROVED)				
Yield (kg/ha)	970	0	892	0
COC (Rs/ha)	19280	0	18200	0
Gross returns (Rs/ha)	38800	0	35680	0
Net returns (Rs/ha)	19520	0	17480	0
BCR	2.01	0	1.96	0

(Source: compiled by the Authors)

Table.6 Economics of local and improved cultivars of pigeon pea in selected districts in Bihar

	Bhagalpur (Rs Per Ha)		Banka (Rs Per Ha)	
	Adopted	Control	Adopted	Control
Local cultivars				
Yield (kg/ha)	1141.48	1024.76	1100.13	1178.19
COC(Rs/ha)	18082.50	17892.90	11536.70	12428.97
Gross returns(Rs/ha)	52446.52	48016.21	50154.66	43609.81
Net returns (Rs/ha)	34364	30123	38617.96	35037.32
BCR	3.0	3.0	4.0	4.0
Improved cultivars				
Yield (kg/ha)	1452.75		1472.12	
COC (Rs/ha)	18082.50		12428.97	-
Gross returns (Rs/ha)	57468.94		46376.38	-
Net returns (Rs/ha)	39386.44		33947.41	-
BCR	3.0		4.0	-

Source: Field survey, 2011-12

Table.7 Net household income of sample farmers, in 2011-12 (Rs/Year)

Source of income	**BHAGALPUR**		**BANKA**		**Pooled**	
	Adopted	**Control**	**Adopted**	**Control**	**Adopted**	**Control**
Income from crops	92717	27544	49250	26267	70983.5	26905.5
Farm work (labor earnings)	28367	11156	15744	12311	22055.5	11733.5
Non-farm work (labor earnings)	11222	7089	7000	7667	9111	7378
Regular Farm Servant (RFS)	622	1556	0	444	311	1000
Livestock (milk and milk products selling)	3611	2844	611	21111	2111	2477.5
Income from hiring out bullocks	0	222	0	0	0	111
Income from livestock selling	1172	729	378	4356	775	2542.5
Selling of water for agriculture purpose	0	0	0	67	0	33.5
Rental income	2444	133	1600	0	2022	66.5
Business (specify)	12222	9667	5667	23295	8944.5	16481
Regular salaried jobs (Govt./private)	82061	39956	82167	35111	82114	37533.5
Out migration	6111	5000	0	0	3055.5	2500
Pension from employer	10233	7511	7422	0	8827.5	3755.5
Grand Total	2,50782	1,13407	1,69839	1,30629	2,10310.5	1,12518

(Source: compiled by the Authors)

Table.8 Consumption expenditure of sample farmers, 2011-12 (Rs/Year)

Food item	Banka		Bhagalpur		Pooled	
	Adopted	Control	Adopted	Control	Adopted	Control
Cereals	16290	17913	12208	11465	14249	14689
Pulses	9757	9363	5173	5530	7465	7446.5
Milk and Milk products	11660	11280	13270	14817	12465	13048.5
Edible oils	3214	3206	2666	2804	2940	3005
Non-Veg. Foods	4539	4388	4597	4716	4568	4552
Fruits and vegetables	4757	5388	5467	5224	5112	5306
Others	1068	902	997	1086	1032.5	994
Total food expenditure	**51285**	**52440**	**44378**	**45642**	**47831.5**	**49041**
Health	5955	4261	7544	7355	6749.5	5808
Education	18298	11291	11447	11663	14872.5	11477
Entertainment and travel	1651	944	1871	1568	1761	1256
Clothing and shoes	6702	6571	9075	11888	7888.5	9229.5
Ceremonies	2250	0	3791	5000	3020.5	2500
Alcohol and Cigarettes	945	658	1177	1343	1061	1000.5
Cosmetics	2064	1586	1907	1826	1985.5	1706
Others	1920	1693	5724	5422	3822	3557.5
Total Non-food	**39785**	**27004**	**42536**	**46065**	**41160.5**	**36534.5**
Total expenditure	**91070**	**79444**	**86914**	**91707**	**88992**	**85575.5**

Source: Field survey, 2011-12

Table.9 Major constraints among cultivars (Wt. Scale)

CONSTRAINTS	BHAGALPUR		BANKA	
	Local(d.p)	Local(d.r)	Local	Improved
Low yield	1st		1st	2nd
High pod borer incidence	2nd	1st	2nd	1st
High disease incidence		3rd	3rd	3rd
Long duration				4th
Small grain size	5th		4th	
Not attractive colour	4th	2nd		
Poor taste		5th		
Low market price	3th			
Not fit into cropping system		4th	5th	
Susceptible to storage pest				5th

(Source: compiled by the Authors)

Implications and Recommendations

The policy recommendations emerged out from the paper are those; farmer should replace their own seed with improved varieties for getting higher productivity. Secondly for getting higher prices there is a need to improve market information system and for diversification chickpea in rabi and pigeon pea in kharif is one of the reliable

options with new technology interventions (improved seed, package and practice) to regain some area in the state as whole and districts in particular, the co-ordination of research extension and farmers to encourage farmer's participatory research would be need of the day.

For getting better impact Tal and diara land along with large number of beneficiaries should be included while targeting the technology. The major future expansion of area under pulse crops may take place in rice fallows, where there is no other crop to compete (1.2 million ha) however there are limitations on the successful propagation of these crops in this system. Most of the farmers in Bihar are not aware of the potential economic benefits of using these fallows for legume cultivation. In pulses, improved varieties hardly have a yield advantage of 15-20 percent over the traditional varieties.

Steps to reduce the temporal and spatial variation, in price of pulses will definitely help in sustaining as well as enhancing the farmers' interest in pulses. Since the last 10 years, the minimum support price (MSP) announced for all pulse crops has been below the market price. For example, the current MSP is below Rs 30 per kg, while the market price is hovering around Rs 100 for pigeon pea. The government has never treated the MSP as an effective tool for increasing pulses production; it is of the opinion that market forces will take care of acreage allocation and production of pulses. High volatility in prices for long periods, low productivity, and stagnation in production technology has acted as disincentives for pulses production.

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