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Research Article

ECONOMIC ANALYSIS OF YIELD GAP AND CONSTRAINTS INHIBITING THE ATTAINMENT OF HIGHER YIELD OF MOTH BEAN IN RAJASTHAN

KUMAWAT SUBHITA[1*], YADAV MUKESH KUMAR[2] AND SINGH I.P.[3]

[1]Department of Agricultural Economics, College of Agriculture, Swami Keshwanand Rajasthan Agricultural University, Bichhwal, Bikaner, Rajasthan 334006
[2]Rajasthan State Warehousing Corporation, Chomu, Jaipur
[3]Department of Agricultural Economics, College of Agriculture, Swami Keshwanand Rajasthan Agricultural University, Bichhwal, Bikaner, Rajasthan 334006
*Corresponding Author: Email-subhita.kumawat@gmail.com

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Abstract- This paper gives an overview of the current status of research in Nagaur district the gap between the actual and potential yield and the level of inputs used in production of moth bean. The potential yield with the recommended package of practices was 10.00 qtl./ha of main product and 20.00 qtl./ha of by product. The yield on farmers' field was merely 4.47 qtl./ha of main product and 8.58 qtl./ha of by product. Preparatory tillage especially in pulses are highly desirable for higher yield. Treatment of seed with Rhizobium culture and vitavex at the rate of 2.5 g./kg seed is a must for pulse crops. Weeds are quite commonly found in moth bean field and it is estimated that they reduce yield by 30 to 50 percent depending upon their intensity. It has been found that farmers were neither using mechanical method nor any chemical method to control the weeds in the moth bean fields. According to package of practices, the recommendations are 600 g./ha Pendimethalline for the weed control, one irrigation to be applied when these is deficiency of rainfall in field and 25.00 tonnes/ha F.Y.M. should be used in the moth bean field. The other recommendations are use of 10.00 kg./ha Chlorophayriphos for plant protection and 15.00 Kg./ha Urea and 20.00 Kg./ha SSP in moth bean for higher yield. The constraints attainment the higher yield is agro-climatic, technological and economic constraints.

Key words- Yield gap, Existing yield, Potential yield, Constraints, Moth bean, Nagaur

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Introduction

Demand for both food and energy is quickly rising and will continue to rise with increases in global population and average income. By 2030, global cereal demand for food and animal feed alone is expected to total 2.8 billion tons per year, or 50% higher than in 2000. Moth bean was used for preparing soup and several confectionary items like papad, bhujia, namkeen, wada etc [2]. which are used as daily snacks. The medical uses of moth bean, especially in reducing fever, as well as the narcotic property of its roots are well known. Pulses production and consumption are important in maintaining nutritional security. They occupy an important place in human diet, as they are rich source of protein and constitute 10 to 15 per cent of food diet of Indians. Major portion of Indian population belongs to vegetarian group and every person, on an average, requires 70-80 gm. of pulses every day in order to maintain good health. Over the years, pulses cultivation in India has been pushed to marginal lands and rain-fed areas. The major area under pulses lies in Madhya Pradesh (20%), Rajasthan (17%), Maharashtra (14%), Uttar Pradesh (10%), Karnataka (9%), Andhra Pradesh (8%), Chhattisgarh (4%), Bihar (3%) and Tamil Nadu (3%). India ranks first in the world in terms of pulse production and produces 25% of total worlds production. In Rajasthan, pulses occupied 4197.72 thousand hectares and production was 2471.10 thousand tonnes in 2013-14 (www.rajasthankrishi.gov.in). These are mainly cultivated in arid and semi-arid districts including Nagaur, Jaipur, Jodhpur, Sikar, Pali, Jhunjhunu and Ajmer.

Although the need for higher yields is clear, the prospects for achieving them are less so. There is increasing evidence of stagnation in crop yield potential as measured under the best possible growing conditions. It is important to recall that history is littered with many examples of yield projections based on short-term trends that quickly proved far too pessimistic. Yet, the lack of progress in yield potential, coupled with absence of recent yield growth for some of the major cereal crops in several countries, is certainly cause for concern and raises the critical issue of how much average yields can continue to increase in the face of potentially stagnant yield potential.

Materials and Methods

For the present study, Nagaur District of Rajasthan was selected. The Nagaur and Ladanu tehsil were purposively selected on the basis of highest area under the moth bean cultivation among all tehsils of the Nagaur district. Two villages namely Rohini and Nimbi jodha were selected on basis of highest area under moth bean crop. A sample of 60 farmers from Nagaur district for moth bean was selected according to probability proportional to number of farmers in each size group. Primary data were collected for the year 2014-15 for moth bean on pre-structured schedules. The potential yield of moth bean crop was obtained from package of practices developing Regional Research Stations. Simple tabular analysis was done to study yield gap and constraints *viz*; agro climatic constraints, technological constraints and economic constraints in production of the selected pulse crops.

Results and Discussion

Scientists generally assume the existence of ideal agro-climatic conditions such

as irrigation facilities, soil type, fertility and use of other inputs but under the real-world situation, all these factors do not exist on the majority of farmer's fields. Due to this reason, the actually realized yield on farmers' field is found to be quite low than the yield level realized by the scientists in their field experiments. The inputs are transformed into output while undergoing production process. The newly evolved high yielding varieties (HYV) require higher doses of fertilizer, irrigation, plant protection measures etc. In case of moth bean, the local varieties are generally used which have relatively very low yield potential. The yield performance and profits from the existing varieties with costly inputs are quite uncertain in rainfed areas. Therefore, the farmers are reluctant to use the recommended package of practices in moth bean crop. Thus, there exists a wide gap between actually realised and potential yields. The yield gap between the actual and potential yield is due to resource gap and efficient management of the resources by the farmers. The yield gap is a concept that rests on the definition and measurement of yield potential. Here, we define yield potential as the yield of an adapted crop variety or hybrid when grown under favorable conditions without growth limitations from water, nutrients, pests, or diseases [13].

Yield Gap between Existing and Potential Yields of Moth bean in Nagaur district of Rajasthan.

A wide range of yield gaps are observed around the world, with average yields ranging from roughly 20% to 80% of yield potential. This implies that yield gains in these regions will be small in the near future, and yields may even decline if yield potential is reduced because of climate change. [9, 10, 14] Raising average yields above 80% of yield potential appears possible but only with technologies that either substantially reduces the uncertainties farmers face in assessing soil and climatic conditions or that dynamically respond to changes in these conditions. [1] [Table-1] shows the gap between the actual and potential yield and the level of inputs used in production of moth bean in Nagaur district. The potential yield with the recommended package of practices was 10.00 qtl./ha of main product and 20.00 qtl./ha of by product. The yield on farmers' field was merely 4.47 qtl./ha of main product and 8.58 qtl./ha of by product. Preparatory tillage especially in pulses are highly desirable for higher yield. Treatment of seed with Rhizobium culture and vitavex at the rate of 2.5 g./kg seed is a must for pulse crops. Weeds are quite commonly found in moth bean field and it is estimated that they reduce yield by 30 to 50 percent depending upon their intensity. It has been found that farmers were neither using mechanical method nor any chemical method to control the weeds in the moth bean fields. According to package of practices, the recommendations are 600 g./ha Pendimethalline for the weed control, one irrigation to be applied when these is deficiency of rainfall in field and 25.00 tonnes/ha F.Y.M. should be used in the moth bean field. The other recommandations are use of 10.00 kg/ha Chlorophayriphos for plant protection and 15.00 Kg./ha Urea and 20.00 Kg./ha SSP in moth bean for higher yield.

Table-1 *Yield Gap between Existing and Potential Yields of Moth bean in Nagaur district of Rajasthan.*

Particulars	Potential Yield		Existing Yield	
	Qty.	Value	Qty.	Value
Preparatory tillage (No.)	2.00	6500.00	1.00	3250.00
Seed (Kg.)	18.00	1440.00	15.50	1085.00
Variety (RMO 257, RMO 225 etc.)	Hybrid	_	Local	_
Seed treatment (g./kg) (Rhizobium culture and vitavex)	2.5	76.50	0.00	0.00
Irrigation (No.)	1.00	195.18	0.00	0.00
F.Y.M. (Tonnes/ha)	25.00	1250.00	13.64	682.00
Weeding (No.)	1.00	2100.00	1.00	2100.00
Weedicide (g./ha) (Pendimethalline)	600.00	1020.00	0.00	0.00
Plant protection (kg./ha) (Chlorophayriphos)	10.00	1500.00	0.00	0.00
Fertilizers (Kg./ha)(i) Urea	15.00	82.83	7.86	43.40
(ii) SSP	20.00	105.03	0.00	0.00
Total variable cost		14269.54		7160.40
Yield (Qtl.) Main product	10.00	55000.00	4.47	24585.00
By product	20.00	3000.00	8.58	1287.00
Gross return	_	58000.00	_	25872.00
Returns over variable cost	_	43730.46	_	18711.60

Source: Package of Practices of Kharif Crops. Directorate of Publication, SKRAU, Bikaner

- Potential yield is the yield mentioned in Package of Practices achievable with HYVs.

Moth bean is mostly grown on relatively less fertile land under rainfed conditions by the farmers. Local varieties of the moth bean grown by the farmers are quite susceptible to insect, pests and diseases and their control measures are very costly. Most of the farmers do not use costly inputs and avoid cumbersome control measures of the diseases and pests of this crop. This results in widening the gap between the actually realized and potential yield of moth bean. The yield gap in moth bean is depicted in [Fig-1].

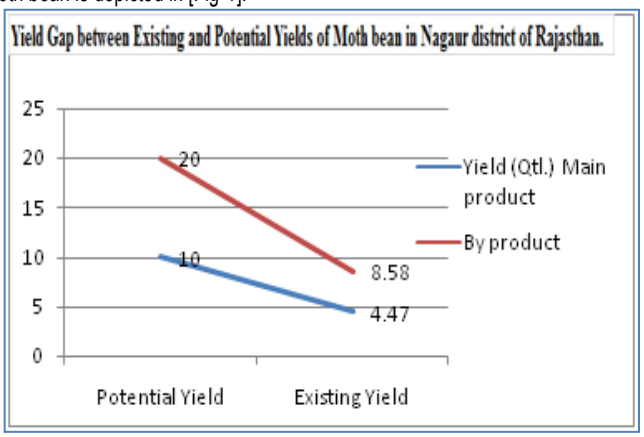

Fig-1: Yield gap between existing and potential yields of moth bean in Nagaur district of Rajasthan

Constraints inhibiting the attainment of higher yield of Moth bean

Pulse crops occupy a very significant place in the cropping pattern of the dry farming regions. The pulses are grown by all the farmers irrespective of their land size groups. The pulse crops receive low priority in the allocation of land and other farm resources [11, 12]. They are allotted land after satisfying land requirement for growing cereals and other important cash crops and in this process land with relatively low fertility status is allocated for growing pulse crops. They are generally grown on unirrigated land and on the area where water supply is not assured. Therefore, fluctuations in the yield of moth bean are very high. The constraints inhibiting moth bean cultivation in Rajasthan have been discussed. These constraints can broadly be classified as agro-climatic, technological and economic constraints. Although several studies have been done on constraints inhibiting the attainment of higher yield [3-8].

Agro-climatic Constraints

The moth beans are generally grown on unirrigated or less assured irrigated lands with low soil fertility. Therefore, climatic conditions prevailing during its period of growth affect its production significantly. [Table-2] shows these of constraints affecting moth bean crop. The lack of moisture in soil at the time of sowing adversely affects its planting. At the time of sowing, about 38 per cent of sample farmers reported that there was lack of moisture in their fields. 64 per cent farmers reported low rainfall during crop cultivation. About 90 per cent farmers reported the problem of weeds in their crop field. Weeds affected the production of moth bean adversely as the weeds compete with the crops for nutrients, moisture and space. 65 per cent farmers were facing the problem of brackish ground water.

Technological Constraints

75 per cent farmers were facing the problem of non-availability of inputs. 50 per cent farmers reported non- availability of HYV seeds of pulse crops. 92 per cent farmers reported lack of knowledge on seed treatment. The pulse seeds should be inoculated with rhizobium culture to ensure good yields. Even though, rhizobium culture is available at a very nominal price, still most of the farmers were not using it due to lack of knowledge. 67 per cent farmers reported shortage of labour and 83 per cent farmers did not have adequate storage facilities for pulses.

Economic Constraints

88 per cent farmers reported the problem of high cost of labour. 33 per cent farmers reported the problem of non-availability of adequate credit. 58 per cent farmers were facing the problem of untimely disbursement of loan. 89 per cent

farmers reported the non-availability of subsidy and 45 per cent farmers reported lack of marketing facilities. Lack of marketing facilities amongst the farmers is one of the important reasons for low marketable surplus of pulse crops.

Table-2 *Constraints inhibiting higher yields of Moth bean*.

(a) Agro-climatic Constraints	Number	Farmer's response pattern (in percent)
1.Lack of Moisture at the time of sowing	46	38
2. Low Rainfall during crop cultivation	77	64
3. Weed problem in crop	108	90
4. Problem of Brackish Ground Water	78	65
(b)Technological Constraints		
1.Non availability of inputs	90	75
2. Non availability of HYV Seed	60	50
3. Lack of knowledge of seed treatment	110	92
4.Shortage of labour	80	67
5.Problem of storage	100	83
(c) Economic Constraints		
1.High cost of labour	105	88
2.Non availability of adequate credit	40	33
3.Problem of un timely disbursement of loan	70	58
4. Non availability of subsidy	107	89
5.Lack of Marketing facilities	54	45

Conclusions

There is a wide yield gap between research station technology and farmers' technology, which has resulted in lower yields. The research station technology has the potential of doubling production at national level without increasing area under moth bean if farmers adopt the recommended package of practices. The extension agencies should demonstrate effects of new technology in pulses production and motivate farmers for adoption of new technology to bridge this wide yield gap. Farmers' awareness on improved technology and seed availability of improved varieties are the key factors in increasing productivity of pulses. The television will be the most popular media for increasing awareness; FLD trials and farmers' fairs/field days will also be helpful. The identified yield enhancing technology needs to be subsidized for wider adoption. Improvement in the current fertilizer subsidy structure.

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References

[1] Bhatia M. S. (1991) *Agricultural Situation in India,* 46 (4), 279-284.
[2] Bruinsma J., ed. (2003) *World Agriculture: Towards 2015/2030: An FAO Perspective. Rome: Earthscan*.
[3] Choudhary A.K. (2013) *Indian Journal of Soil Conservation*, 41(1),88-97.
[4] Choudhary A.K. and Suri V.K. (2014) *Communications in Soil Science and Plant Analysis*. 45(14), 1934-1948.
[5] Dutta A. (2011) *SATSA Mukhaptra Annual Technical Issue.* 15(3),101-105.
[6] Gajja B.L. (2000) *Current Agriculture*. 24(1/2),57-64.
[7] Gupta S.K. (2001) *Economics of pulses production and identification of constraints in raising their production (a consolidated report of AERC studies). Ad-hoc Study - Agro- Economic Research Centre for Madhya Pradesh, Jawaharlal Nehru Krishi Vishwa Vidyalaya*, 79-177.
[8] Jat B.L., Gupta J.K., Dhakar M.R. and Sharma R.N. (2013) *Environment and Ecology*, 31(4A),1906-1910.
[9] Sanjay Kumar, Ravinder Singh and Akhilesh Singh (2014) *Indian Research Journal of Extension Education*, 14(2), 20-24.
[10] Singh S.K., Burman R.R., Chaudhary R.G., Singh K.K., and Ansari M.S. (2005) *Indian Journal of Pulses Research*, 18(1),60-63.
[11] Shivamurthy M., Rao L.R., Shailaja Hittalamani and Lakshminarayan M.T. (2008) *Mysore Journal of Agricultural Sciences*, 42(1), 163-165.
[12] Subhash Katare and Shrivastava M.K. (2010) *Agriculture Update*, 5(1/2), 52-53.
[13] Yadav S.S., Kumar Sheopij Singh and Yadav S.K. (1997) *Intensive Agriculture*, 7(3), 41-45.
[14] Usha Tuteja (2000) *Research study - Agricultural Economics Research Centre, University of Delhi*, 5(1), 99-103.