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# Constraints in Adoption of Moongbean Production Technology in Sundarban, West Bengal

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**The new agricultural technologies are considered to be the prime mover to the process of agricultural development in India. Understanding farmers' perceptions of a given technology is crucial in the generation and diffusion of new technologies and farm household information dissemination. Pulses in India have long been considered as the poor man's only source of protein. Moongbean (green gram) is one of the important pulse crop in India, plays a major role in augmenting the income of small and marginal farmers of Sundarban. Constraints are the circumstances or causes, which prohibit farmer to adopt improved farm technology. This constraint study was carried out in Sundarban area of West Bengal state, to record the constraints responsible for the non adoption of moongbean production technology. The proposed study was conducted in Kakdwip and Namkhana block of South 24 Parganas district. The constraints were recorded under five broad categories namely knowledge and information, technical, socio-economic, infrastructural and managerial. Financial limitations, harvesting and disposal troubles, non availability of rhizobium inoculam, small holdings, lack of timely availability of inputs, marketing of output, lack of timely assured irrigation, high cost of inputs, security of crops, risk and uncertainty were the major constraints found in the adoption of recommended practices by the farmers cultivating moongbean in Sundarban. For effective and better adoption of new technologies these barriers should be taken care of by the researchers, state departments and the other extension agencies. If a technology is highly observable, the diffusion process via the imitation mechanism is likely to proceed more rapidly. The constraints expressed for non adoption of recommended package of practices should be taken care by the researchers, state agricultural departments personal, extension agencies and commercial firms to orient their infrastructure for higher adoption of recommended technology by moongbean growers for maximum production.**

(Key Words: Moongbean, Production technology, Constraints, Sundarban)

Pulses in India have long been considered as the poor man's only source of protein. Pulses are grown on 22-23 million hectares of area with an annual production of 13-15 million tones (mt). India accounts for 33% of the world area and 22% of the world production of pulses. The major pulse crops grown in India are chickpea, pigeonpea, lentil, moongbean, urdbean and fieldpea (Reddy, 2009).

Moongbean crop is one of the important pulse crops cultivated after the harvest of aman rice. The cultivation of moongbean has been introduced in the rice- fallow cropping system of Sundarban in the eighties. Moongbean contains 25 percent of high digestible proteins and consumed both as whole grain as well as dal. It is a soil building crop which fixes atmospheric nitrogen through symbiotic action and can also be used as green manure crop adding 34 kg N $ha^{-1}$.

Several high yielding varieties like Pusa Baishakhi, K-851 and PDM 54 (Moti) are available with the farmers but a wide gap is conspicuous in the actual potentiality of the variety (Chandra, 2010), the reasons for which need to be ascertained. Constraints are the circumstances or causes, which prohibit farmer to adopt improved farm technology. It was ascertained by asking open-end questions to the respondent farmers regarding the different factors, which were responsible for non-adoptions of, recommended cultivation practices. Since adoption pattern of moongbean cultivation is of utmost importance for increasing the production as well as productivity levels, this study was undertaken to know the constraints which are responsible for non adoption of moongbean production technology in Sundarban, West Bengal. There is a wealth of empirical evidence on the factors that influence farmers' adoption of innovations (Feder and Umali (1993), Lindner (1987) and Rogers (1995). There is a plethora of studies related to adoption of different agricultural technologies but these are crop-specific, input-specific or location-specific (Singh, 1993).

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## MATERIALS AND METHODS

The proposed study was conducted in Kakdwip and Namkhana block of South 24 Parganas districts of West Bengal. Four villages having a large number of moongbean growers were selected namely Nandabhaga, Debnibas, Belpukur and Gangadharpur from the selected blocks. Fifteen farmers belonging to marginal, small, medium and large farmer categories (five from each category) who are growing moongbean were selected randomly from each selected village thus making the total sample size of 60 respondents. Relevant information was collected with the help of questionnaire and schedule by holding personal interview with the selected respondents. Percent score was allotted for each of the constraints affecting the adoption of moongbean production technology. For the sake of convenience all the constraints were divided into five categories viz. knowledge and information, technical, socio-economic, infrastructural and managerial. Multiple responses were recorded because of the open ended nature of the questionnaire.

## RESULTS AND DISCUSSION

### Knowledge and information constraints

It is evident from table 1 the two constraints recorded were lack of information and lack of knowledge about Rhizobium inoculation under knowledge and information. Lack of technical knows how about the scientific moongbean production technology has been ranked first among this group by the farmers and only 31 percent of them faced this. A key to the diffusion of a new technology is providing information about its existence and properties. The lack of technical knowledge as a constraint has given a scope to train farmers about the new package of practices for better results. More over the second constraint perceived only by 10 percent of the farming population. The practical training of Rhizobium inoculation has provided the opportunity to the farmers to understand the role of Rhizobium in pulse cultivation.

Table 1. Knowledge and information constraints faced by the farmers (N=60)

| Sr. No. | Constraints | Frequency | Percentage | Rank |
|---|---|---|---|---|
| 1 | Lack of information on production technology | 19 | 31 | I |
| 2 | Lack of knowledge about Rhizobium inoculation | 10 | 16 | II |

*Multiple responses

### Technical constraints

The first important constraint as perceived by the farmers was harvesting and disposal troubles because of the shattering of moongbean pods at the time of physiological maturity, non synchronous maturity and the non availability of suitable harvester, processor and small scale milling units at the village levels. A suitable harvesting and disposal mechanism should be developed through the introduction of synchronous maturity strain.

Risk and uncertainty has been ranked as second important technical constraints affecting the adoption of moongbean production technology uncertainty and risk are major obstacles for the adoption of new technologies. Farmers to a large extent are risk averse (Bar-shira et al., 1997) meaning that they are willing to give up some average profit in order to reduce fluctuations in, or uncertainty about, profit. In many cases adoption of new technologies is gradual so farmers can experiment with them and have more reliable assessments of their impacts. One of the main activities of extension agents is to reduce farmers' uncertainties about new technologies. Effective plans that educate farmers about the properties of a new technology and reduce their uncertainty about it will likely result in higher adoption rates (Pannell and Zilberman, 2001).

The third constraints as perceived by the farmers are incompatibility with other crops and enterprise. The farmers in summer season are also cultivating watermelon and chili, the two most important cash crops in this region in the same season hence, the farmers are averse of cultivating moongbean in a large area. The other two technical constraints are complexity and not convinced of superiority (Table 2).

Table 2. Technical constraints faced by the farmers (N=60)

| Sr. No. | Constraints | Frequency | Percentage | Rank |
|---|---|---|---|---|
| 1. | Not convinced of superiority | 9 | 15 | IV |
| 2. | Harvesting and disposal trouble | 39 | 65 | I |
| 3. | Risk and uncertainty | 24 | 40 | II |
| 4. | Incompatibility | 14 | 23 | III |
| 5. | Complexity | 11 | 18 | IV |

*Multiple responses

### Socio-economic constraints

The most important constraint recorded was financial limitation, which can be ascribed to the non availability of credit at affordable interest rates. Despite the vast expansion of the formal credit system in India, the dependence of the rural poor on money lenders continues especially for meeting emergency credit requirement. Such dependence is more pronounced in resource poor areas like Sundarban and in case of poor marginal and small farmers. The expert committee on rural credit of NABARD has suggested that the rural financial institutions should adopt a holistic approach using the portfolio strategy. They were also advised to lend through a group approach through self help groups or joint liability groups (Satyasai and Patil, 2002). But the recommendation has still to take its shape in Sundarban. The Financial institutions like commercial banks, RRBs and primary cooperative society should be equipped to provide credit to the farmers at an appropriate time.

Second important socio economic constraint in the adoption of Moongbean production technology was small holdings of land. Sixty four percent lands holding of the district South 24 Parganas is of less than one hectare size and because of their small holding farmers always prefer to grow food grain and cash crops over moongbean cultivation which has been given subsidiary status.

Unsustainable farming situation was ranked third as most of the lands in Sundarban delta area are saline and alkaline having its own impact on the yield of moongbean. Moreover lack of improved strains for the coastal agricultural areas is also creating a vacuum in proper agriculture diversification. High cost of inputs was considered the fourth constraints by the farmers as most of the farmers are resource poor in this region. Soaring prices of seeds, fertilizers and pesticides were a cause for great concern (Table 3).

Table 3. Socio-economic constraints perceived by the farmers (N-60)

| Sr. No. | Constraints | Frequency | Percentage | Rank |
|---|---|---|---|---|
| 1. | Small holding | 36 | 60 | II |
| 2. | Unsustainable farm situation | 32 | 53 | III |
| 3. | Financial Limitation | 45 | 75 | I |
| 4. | High cost of inputs | 29 | 48 | IV |

*Multiple responses

Understanding farmers' perceptions of a given technology is crucial in the generation and diffusion of new technologies and farm household information dissemination (Kivlin and Fliegel, 1967; Ashby and Sperling, 1992).

### Infrastructural constraints

Fifty six percent of the respondents had indicated that lack of timely availability of inputs as the first important infrastructural factor of non adoption. The supply of inputs viz. seeds, fertilizers, pesticides etc. should be maintained for greater adoption of improved technologies in Sundarban. Seed, fertilizer, Rhizobium culture and plant protection chemicals should be made available in sufficient quantity and in time. Kohli and Singh (1989) found that inputs played a large role in the rapid adoption of HYVs in the Punjab.

Fifty percent of the farmers have ranked lack of timely assured irrigation as third infrastructural constraints. Moongbean crop is grown in Sundarban on residual moisture of kharif paddy crop. Scheduling single irrigation even at the time of critical growth period of crop was very difficult. The other infrastructural problem faced by the farmers was difficulties in transport because of the difficult and remote nature of the islands in Sundarbans (Table 4).

Table 4. Infrastructural constraints perceived by the farmers (N-60)

| Sr. No. | Constraints | Frequency | Percentage | Rank |
|---|---|---|---|---|
| 1. | Marketing of output | 31 | 51 | II |
| 2. | Lack of timely availability of input | 34 | 56 | I |
| 3. | Lack of timely assured irrigation | 30 | 50 | III |
| 4. | Difficulties in transport | 18 | 30 | IV |

*Multiple responses

The economic constraint model contends that input fixity in the short run, such as access to credit, land, labor or other critical inputs limits production flexibility and conditions technology adoption decisions (Aikens et al., 1975; Smale et al., 1994; Shampine, 1998).

### Managerial Constraints

Sixty three percents of the respondents had ranked non availability of Rhizobium culture as the most important constraint. The problem of timely

availability, storage and technique of application of Rhizobium inocula is one of the causes of concern. Woomer et al., (1996) have observed that Rhizobium inocula are not being adopted because of the ignorance of small holders as well as the unstable supply mechanism. The state agricultural department and State agricultural university must be equipped to maintain the supply of Rhizobium inocula for farmers.

Forty five percents of the farmers have ranked security of crop as second managerial constraints affecting moongbean cultivation. The unfavourable weather condition like erratic and uncertain rainfall, low and high temperature at the time of various crop growth stages, cyclone and low pressure formation in the bay of Bengal were the another cause of poor productivity of moongbean in this area. Management and labour supply are the two other constraints perceived by the farmers (Table 5).

Table 5. Managerial Constraints perceived by the farmers (N-60)

| Sr. No. | Constraints | Frequency | Percentage | Rank |
|---|---|---|---|---|
| 1. | Labour Supply | 12 | 20 | V |
| 2. | Management | 13 | 21 | IV |
| 3. | Harvesting and d isposal trouble | 39 | 65 | I |
| 4. | Security of crops | 27 | 45 | III |
| 5. | Non availability of rhizobium culture | 38 | 63 | II |

*Multiple responses

Observability and trialability are closely related to the issue of uncertainty. If a technology is highly observable, the diffusion process via the imitation mechanism is likely to proceed more rapidly. Perhaps even more important is the potential to trial the innovation on a small scale, so that information can be obtained, uncertainties reduced and skills developed without the risk of large financial loss if the technology turns out to be uneconomic or fails due to inexperience (Pannell and Zilberman, 2001).

## CONCLUSION

The findings stresses upon the need that the extension agencies should gear up its various programmes to improve the adoption level of the farmers. The constraints expressed for non adoption of recommended package of practices should be taken care by the researchers, state agricultural departments personal, extension agencies and commercial firms to orient their infrastructure for higher adoption of recommended technology by moongbean growers for maximum production. Proper guidance and awareness for the farmers should be created through practical skill oriented training, field visits, field demonstrations and through various extension literatures (printed as well as video). The maximum participation of farmers in technology generation process as well as in the production enhancements strategies are required to thwart any risk of technological failures.

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## REFERENCES

Aikens, M. T., Havens, A. E., and Flinn, W. L. (1975). The adoption of innovations: the neglected role of institutional constraints. Mimeograph. Department of Rural Sociology. The Ohio State University. Columbus, Ohio, USA.

Ashby, J. A., and Sperling, L. (1992). Institutionalizing participatory, client-driven research and development in agriculture. Paper presented at the Meeting of the CGIAR Social Scientists. The Hague. September 15-22.

Bar-Shira, Z. Just, R. and Zilberman, D. (1997). Estimation of farmers' risk attitude: an econometric approach, Agricultural Economics 17: 211-221.

Chandra, Ganesh. (2010). Evaluation of Frontline Demonstration of Greengram (Vigna radiata L.) in Sundarbans, West Bengal. Journal of Indian Society of Coastal Agricultural Research 28(1): 12-15.

Feder, G. and Umali, D. (1993). The adoption of agricultural innovations: a review. Technological Forecasting and Social Change 43: 215-239.

Kivlin, J.E., and Fliegel, F.C. (1967). Differential perceptions of innovations and rate of adoption. Rural Sociology 32(1): 78-91.

Kohli, I., and Singh, N. (1989). "Exports and Growth: Critical minimum effort and diminishing returns." Journal of Development Economics. 30(2): 391-400.

Kotler, P. (1997). Marketing Management: Analysis, Planning, Implementation, and Control,. 9th edition. Prentice Hall, Upper Saddle River, New Jersey, USA.

Lindner, R. K. (1987). Adoption and diffusion of technology: an overview, In Technological Change in Post Harvest Handling and Transportation of Grains in the Humid Tropics, B.R. Champ, E. Highley and J.V.Remenyi (eds.), ACIAR Proceeding 19:144-151.

Pannell, D.J. and Zilberman, D. (2001). Economic and sociological factors affecting growers' decision making on herbicide resistance. In: D.L. Shaner and S.B. Powles (eds.) Herbicide Resistance and World Grains, CRC Press, Boca Raton, pp. 251-277. (SEA Working Paper 00/ 07, Agricultural and Resource Economics, University of Western Australia).

Reddy, A.A. (2009). Pulses production technology: status and way forward. Economic and Political Weekly 44(52):73-80.

Rogers, E.M. (1995). Diffusion of Innovations. Free Press, New York, USA.

Satyasai, K. J. S., and Patil, A. S. (2002). Revitalizing rural credit system: view of expert committee. Economic and Political Weekly 37(31): 3235-3238.

Shampine, A. (1998). Compensating for information externalities in technology diffusion models. American Journal of Agricultural Economics 80(3): 337-346.

Singh, D. K. (1993). Technological Change and Agriculture Development. Deep and Deep Publications, New Delhi.

Smale, M., Just, R., and Leathers, H. D. (1994). Land Allocation in HYV Adoption Models: An Investigation of Alternative Explanations. American Journal of Agricultural Economics 76(3): 535-46.

Woomer, P.L, Kahindi, J.H.P., and Karanja, N. (1996). Nitrogen replenishment in the east African highlands through biological nitrogen fixation and legume inoculation. Paper presented at the 7th International Conference on the African Association for Biological nitrogen Fixation (AABNF) held at ENSA - Yamoussoukro in Côte d'Ivoire, September 4-11.