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Short Communication

Prospects and Constraints of Potato Cultivation in Agra District of Uttar Pradesh

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A developing country like India needs not only the adequate quantity of food but also quality of a balanced nutritious food to enable its citizens to lead a healthy life. Burgeoning population results in greater demand and higher pressure on the limited land to produce the required quantity of food. Pressure on land for non-agricultural use is also increasing tremendously. Therefore, India should identify and practice crops, which are not only highly productive but nutritionally balanced. Potato meets both these requirements.

The total area in world under potato cultivation during 2021-22 was 18.13 million hectares with total production of 376 million tons. Whereas in India, during 2021-22 total area, production and productivity was 2.20 million ha., 53.39 million tones and 24.24 tones/ha, respectively. India is the second largest producer of potato after China contributing 14.42% of the world potato production. The contribution of U.P. alone in area and production during 2021-22 was 622.50 thousand ha. and 16161.97 thousand tones, respectively with 25.96 q/ha productivity.

Major portion of the requirement of vegetables is covered by potato crop and its production has been increasing every year. The crop has witnessed 81.82,123.20 and 22.40 percent increase in area, production and productivity during the period 2001-02 to 2021-22. Most of the farmers like to grow the potato crop because of its high profitability; as a result, the area of potato crop is increasing rapidly. The demand of potato is too much high than other vegetables. The role of potato is more significant in the total farm production of India. Potato crop gives more employment to the people in comparison to other vegetable crops and its export in big quantity also helps to increase national income.

Potato production and utilization pattern in the world including India is fast changing[4]. There is great demand for processed potato products; gourmet quality "baby potatoes," medium-large sized tubers with yellow flesh and firm cooking quality; and even organically grown potatoes. These changes certainly provide ample opportunities and varied challenges. To be nationally comfortable and globally competitive, India would have to keep pace and adapt to the new emerging trends in potato production and utilization.

In all the developing countries the most important socio-economic problem today is how to raise the income and standard of living of the farmers[2]. To open up the new yield and income possibilities on the farms, one needs detailed information on the level and distribution of farm

resources, production and income levels, prospects and constraints in the production and marketing of potato and the efforts made by the Government with respect to potato cultivation in the study area. This is essential for the identification of structural weakness needing amelioration. This study will provide the basic information covering prospects of the potato growers and constraint faced by them in the production, marketing, and storage of potato.

The study confined to Agra region of Uttar Pradesh and is based on the "descriptive" type of research design in which "Ex-post facto" planning stage and specific objectives were set for the inquiry. A multistage stratified sampling method was adopted to select ultimate respondents (potato growers). Out of 4 districts of Agra region, Agra, Firozabad and Mainpuri were selected purposively as the area under potato in these districts was comparatively more. From the list of all 33 blocks in the selected districts about one fourth (8) blocks and two villages from each block were selected randomly. 15 respondents from each village were selected randomly, hence, the final sample comprises of 240 respondents. The primary data pertaining to different characteristics were collected with the help of structural schedule and some open questions developed for the purpose. Informal interviews were made for making further probes into the questionnaire data as and where required to ascertain the facts from the respondents.

Table 1 Socio-economic characteristics of the potato growers

	Frequency	Percentage
Age group (yrs.)		
Up to 25	30	12.50
26-45 years	134	55.83
46 & above	76	31.67
Educational background		
Illiterate	72	30.00
Up to High school	122	50.83
Intermediate	24	10.00
Graduate and above	22	9.17
Family Size		
Up to 4 members	26	10.83
5-6 members	96	40.00
7 & above members	118	49.17
Type of family		
Single	106	44.17
Joint	134	55.83
Size of holdings		
Marginal (below 1.0 ha.)	56	23.33
Small (1 to 2 ha.)	150	52.50
Medium (2 to 4 ha.)	27	11.25
Large (above 4 ha.)	7	2.92
Social participation		
No participation	166	69.17
Member of one organization	48	20.00
Member of more than one organization	15	6.25
Office holder	11	4.58
Contact with extension agencies		
Yes	116	48.33
No	124	51.67

Socio-economic characteristics of the potato growers

Majority of the respondents (potato growers) belonged to the very active span of life (36-45 years) in which they may have lot of enthusiasm to do work. Overall literacy percentage among potato growing farmers was about 70 per cent. Among the overall literates, about 13, 19 and 9 per cent of the respondents were having education up to primary, high-school and graduation level or above, respectively. Table-1 reveals that majority of the respondents (49.2%) had family size of 7 or more than 7 members per household while farmers having up to 4 members in their family were only about 11 per cent. The joint family system is still prominent in the study area as about 56 per cent respondents were found living in joint family. Majority of the respondents (85.8%) were marginal and small farmers, while the medium and large farmers were only about 11 and 3 per cent, respectively. Very high majority i.e. 69.17 per cent farmers did not participate in any social organization. The meager percentage of respondents had been found who by one way or the other take part in social organization. Only about 48 percent farmers have shown their contact with extension agencies, among these KVK and Agricultural supervisors were most favourite.

Prospects of the potato growers

As the mean score depicts that majority of the potato growers have perceived that availability of numbers of cold storage in the region brighten the prospects of potato in the area. Potato is a labour extensive crop and require more labour when compare with other cereal crops. Although the improved machines have been invented for performing the cultural operations in potato but in general most of the cultural operations are performed by human labour and require large number of human labours for these operations. Hence the availability of labour in time is very important input. Mean scores enumerated in Table-2 clearly depict that majority of the farmers perceived the availability of sufficient human labour at desired time in the region and ranked it second in this respect. Climatic suitability is a prime factor which influences production possibilities of any crop in a particular area. Most of the farmers perceived that agro climatic condition of Agra region is well suitable for potato cultivation and they ranked it third with the mean score of 2.76. Any agricultural commodity has very low prospects in the absence of consumer demand and marketing infrastructure. Consumer demand insists traders to trade and forwarding the produce in the marketing channel. Therefore, easy availability of the traders within the production area creates interest in the farmers to grow crop as they will have not worry about the disposal of crop when needed. Most of the potato farmers have perception that there is easy availability of potato traders in the region at village level as well as at cold storage and market and this factor ranked fourth by the farmers. Potato is a leading cash crop in the region which gives comparatively higher return per unit area than other cereal crops. The region has well developed market infrastructure and procurement facilities. If climatic conditions are suitable, jointly these factors affect the farmer's profit which ultimately improves economic condition of the farmers. The potato growing farmers have realize this and have

clear cut perception that Potato growing improves the economic condition of farmers and also ranked fourth to this variable. Potato is a short duration crops many varieties of potato become ready in two months' time only. Depending upon the crop rotations, several varieties for early, timely and late sowing are available in the region, which are adopted by the farmers according to the crop rotation. The adjustability of potato crop in the crop rotation enhances its prospects in the region and many farmers perceived fifth rank to this factor for potato growing in the region. Among all the vegetables potato is the most consuming vegetable and the richest source of carbohydrate. Based on high food values for human being, potato has more demand in comparison with other vegetables. Besides providing high food values to the farmer's family this crop provides more employment to family labour and has good prospects among the farmers of the region. In the perception of the sample potato growers these qualities have sixth rank for the prospects of this crop in the region. Potato growing farmers gave 7th and 8th rank for the prospect of potato growing in the region to 'high adaptability of potato in agro-climatic conditions of the region' and 'easy and timely availability of farm inputs' for potato crop, having mean scores of 2.55 and 2.50, respectively. Different types of transport move potato in the region. Railways haul potato over long distances and trucks are a common mode of transport. Though, trucks on roadways are used, railroads continue to be important to transport potato from producing to consuming areas. The prospects of any crop largely depend up on the availability of transport to carry the produce to distant markets for fetching good price. The respondent farmers were aware of this and perceived tenth rank to the 'easy availability of transport facilities' in the region with respect to their prospects of potato growing in the region. Atlast, 'supporting implements and technology and 'cheap and better credit facilities available in time in the region' ranked 11th and 12th, respectively as perceived by the farmers for the prospects of potato in the study area.

Constraints of production of potato

a) **Bio-physical Constraints**

Most of the farmers facing high to medium impact of heavy infestation of Insects/pests & diseases while majority (52.08%) of them experienced medium impact of the weed infestation in potato. Although the impact of Saline, alkaline and sodic soils was not so severe in the area but about 10 per cent were also facing acute problem of salinity or alkanity. Only about 9 per cent of the farmers were facing the water logging condition up to a high extent as it is not so prominent in the region.

Table-2 Perceived prospects of potato grower in Agra region(N=240)

Prospects	Mean score	Rank
Availability of sufficient cold storage facility in Agra region	2.82	I
Suitable agro climatic condition for potato cultivation in Agra region	2.76	III
Easy availability of traders	2.67	IV
Easy availability of transport facilities in the region	2.15	X

Potato has high food values for human health	2.56	VI
Potato crop provides more employment to family labour	2.56	VI
Availability of sufficient human labour at desired time in the region	2.78	II
Potato growing improves the economic condition of farmer	2.67	IV
High adaptability of potato in agro-climatic conditions of the region	2.55	VII
Potato is short duration crop and can be well adjusted in crop rotation.	2.62	V
Supporting implements and technology are easily available in the region	1.98	XI
High future demand	2.34	IX
Easy and timely availability of farm inputs	2.50	VIII
Cheap and Better credit facilities available in time	1.92	XII

b) Socio-economic Constraints

Although, the institutional credit is available from the banks serving the area with higher concentration of potato growers providing credit through KCCs but about 25 per cent of the sample farmers perceived scarcity of credit at high extent. The significant rise in prices of inputs like fertilizer, diesel, labour, and cold storage charges are pushing up the input costs for potatoes and about 86 per cent of the farmers realized it at higher degree of impact. Besides this it is a general complaint of the farmers that inputs are not available easily within their reach in time. The problem of irregular and inadequate power supply was reported by most of the farmers to a high and medium extent. The majority of the farmers feel the medium impact of the problem of poor linkage with the extension agency and realize the problem of cheap and efficient transport facilities up to low and medium extent[5].

c) Constraints to potato cultivation

Most of the farmers faced the problem of non-availability of suitable variety in the study area in time and Complication in sowing at high to medium extend. Most of the farmers felt medium impact of the uneasiness in the application of plant protection measures. About 33, 32 and 35 percent of farmers perceived high, medium, and low impact of the problem of paucity of labour particularly during peak period, respectively. Most of the farmers perceived medium and low impact of the problem of scanty, inadequate, and untimely rainfall and considered inter culture as a problem with low impact. More than 90 percent of the farmers experienced the problem of water logging with low to medium degree of impact.

d) Constraints to sequential potato based production system.

Non-availability of seed material in time adversely affects the cost and returns from the crops included in crop sequence. More than 85 per cent of the sample farmers perceived medium to high impact of this constraint. The problem of poor germination and less time available for land preparation was complained with medium and low impact by most of the farmers. Labour paucity was realized by many of the farmers with medium to low impact during the peak periods of potato cultivation as well as other crops included in the cropping system.

Marketing constraints

There are a large number of intermediaries in this trade between the producer and consumer, which has resulted in a wide gap in the producer, and consumer price of potato. Prices crash drastically during harvesting months leading to panic sale by the farmers, and in turn leading to heavy monetary losses. Several cold storages are used for potato storage in the study area and nearby districts but still; there is a need for more storage facilities in the region[3]. The majority of potato producers cannot avail themselves of the advantages of exporting potato due to lack of sufficient infrastructural facilities in the movement of potato. There is no long term policy of the Govt. in this regard. In India, the agricultural marketing is mainly in the hands of private enterprise, with governmental intervention, mainly limited to protecting the interests of producers and consumers and to promoting organized marketing of agricultural commodities[1].

Table 3 Constraints of production of potato as perceived by the respondents (N=240)

Constraints	Degree of impact			Mean score	Rank
	High impact	Medium impact	Low impact		
A. Bio-physical Constraints					
Weed infestation is more	49 (20.42)	125 (52.08)	66 (27.50)	1.93	II
Problem due to salinity/alkanity	25 (10.42)	88 (36.67)	127 (52.92)	1.58	III
Heavy infestation of Insects/pests & diseases	119 (49.58)	97 (40.42)	24 (10.00)	2.40	I
Water logging conditions	22 (9.17)	70 (29.17)	148 (61.67)	1.48	IV
B. Socio-economic Constraints					
Lack of credit facility	60 (25.00)	116 (48.33)	64 (26.67)	1.98	IV
High cost of inputs	207 (86.25)	30 (12.50)	3 (1.25)	2.85	I
Non-availability of Inputs locally at appropriate time	38 (15.83)	109 (45.42)	93 (38.75)	1.77	V
Inadequate power supply	147 (61.25)	81 (33.75)	12 (5.00)	2.56	II
Lack of appropriate transport	10 (4.17)	94 (39.17)	136 (56.67)	1.48	VI
Poor linkage with extension agency	65 (27.08)	115 (47.92)	60 (25.00)	2.02	III
C. Constraints to potato cultivation					
Un -availability of suitable variety for sowing in time	103 (42.92)	90 (37.50)	47 (19.58)	2.23	I
Complication in sowing	35 (14.58)	79 (32.92)	126 (52.50)	1.62	V
Water logging during sowing season	20 (8.33)	64 (26.67)	156 (65.00)	1.43	VII
Rainfall	22 (9.17)	113 (47.08)	105 (43.75)	1.65	IV
Paucity of labour	80 (33.33)	77 (32.08)	83 (34.58)	1.99	III
Complications in intercultural operations	34 (14.17)	76 (31.67)	130 (54.17)	1.60	VI
Uneasiness in application of plant	50	140	50	2.00	II

protection measures	(20.83)	(58.33)	(20.83)		
D. Constraints to sequential potato based production system					
Less time available for land preparation	36 (15.00)	117 (48.75)	87 (36.25)	1.79	III
Non -availability of suitable seed material	98 (40.83)	108 (45.00)	34 (14.17)	2.27	I
Paucity of labour	20 (8.33)	57 (23.75)	163 (67.92)	1.40	V
Inadequate irrigation facility	38 (15.83)	78 (32.50)	124 (51.67)	1.64	IV
Poor germination	68 (28.33)	93 (38.75)	79 (32.92)	1.95	II

(Figures in parentheses indicate percentage)

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