

## Constraints in Potato Seed Production: Experiences of Organized and Unorganized Farmers of Punjab

Lakhwinder Singh<sup>1</sup>, Dharminder Singh<sup>2</sup> and R.K. Dhaliwal<sup>3</sup>

1. PG Scholar, 2. Sr. Ext. Specialist, 3. Prof., Department of Extension Education, PAU, Ludhiana

Corresponding author e-mail: lakhwinder-ee@pau.edu

Paper Received on January 19, 2020, Accepted on March 01, 2020 and Published Online on May 20, 2020

### ABSTRACT

Quality seed has been realized as important factor limiting potato productivity. Potato farmers of Punjab are meeting major demand of quality potato seed in the country. A sample of 90 organised and 90 unorganised potato seed producers were selected from three major potato growing districts of the Punjab state for analysing problems faced by the farmers in potato seed production. Data were collected by using personal interview with potato seed producers by constructing an interview schedule. It was found that most of the unorganised and organised seed producers faced the problems in marketing of potato seed crop. Price fluctuations of produce, non-availability of regulated markets and lack of demand were the major problems faced by them. It was also found that shortage of storage facilities (56.66%), high rent of cold storage (64.44%), middle man involvement (63.33%) and non-remunerative prices (56.66%) to be major constraint faced by unorganised potato seed producers. Lack of skilled labour for dehaulming (46.66%) and deficient electricity supply (48.88%), scarcity of canal water (46.66%) were the major problems faced by the organised potato seed producers. Farmers also find difficulty in availability of quality seed (22.77%) at sowing time. Study suggests better implementation of rules and regulations of contract farming, incentives for transportation of seed to distant markets and provisions of storage structures. Dearth

**Keywords:** Constraints, Potato seed producers, Organised, Unorganized, Quality seed.

Potato (*Solanum tuberosum* L.) is a third most important food crop, grown in more than 150 countries in the world. World acreage of potato is 18.2 million hectares with average productivity of 17.2 tonnes per hectare. At present, India rank 2<sup>nd</sup> after China with 48 million tonnes of potato production and average yield is 23.6 tonnes per hectare (Anonymous, 2015). Quality seed is a pre-requisite input for a productive crop. Shortage of good quality seed has been recognized as the single most important factor limiting potato productivity in the developing countries but Punjab potato farmers are the major supplier of quality potato seed. Punjab seed potato has special quality on account of niche, associated skill and technology accumulation (Luthra et al 2009). Use of healthy seed in vegetatively propagated crops like potato is very important. Much of the efforts and investment would be in fructuous if the farmer does not get quality seeds (Vashisht and Lal, 2005).

Growth and quality of potato is influenced by environmental factors such as temperature, moisture, light, soil type and nutrients. Other factors that influence growth of the crop can be managed by the grower's viz. variety of potato, size of mother seed tubers, planting operation, plant stand, stem population, moisture, nutrition, disease and insect pest management, planting date and harvest dates (Thornton and Nolte, 2005). Insect-pests and diseases also affect the quality of seed potato. Thrips (*Thrips palmi*) and whitefly (*Bemisia tabaci*) are important vectors of stem necrosis and apical leaf curl virus disease respectively in potato crop (Bhatnagar, 2007 and 2008). With the increasing temperature due to global climate change, the incidence of insect-pests and diseases is expected to increase on potato crop. October to December, earlier recommendation of seed crop was for planting from 20<sup>th</sup> October to 5<sup>th</sup> November in the central India (Anonymous, 2011).

The seed replacement ratio was 2.85 per cent in

India which is considered to be low (GoI, 1989). The production of certified seeds is far below the actual requirements for different crops in the country. In Punjab, the farmers used 90.51 per cent of self-retained seed from previous autumn crop of potato crop. Due to the high cost of purchased seed, the farmers used the self-retained seed which is usually inferior in quality (Sidhu *et al* 1997).

Punjab rank 6<sup>th</sup> in Potato production. Potato was grown on 96.6 thousand hectares during 2016-17 with total production of 2.42 million tones and average productivity around 25 tonnes per hectare (Anonymous, 2018). In Punjab, majority of the large farmers in Jalandhar district are producing potato seeds in a large scale (Kalra *et al* 2013). The present study was conducted to analyse the problems faced by the potato seed producers in Punjab.

## METHODOLOGY

The study was conducted in a cluster of three potato seed producing districts of Punjab i.e. Jalandhar, Hoshiarpur and Kapurthala which were selected purposively because these districts were having their maximum area under potato seed production. Different seed production associations or organisations operating in these districts were identified. List of potato seed producers associated with identified seed producing organizations, such as, *Confederation of Potato Seed Farmers* (POSCON), Jalandhar Potato Growers Association, Kapurthala Potato Growers Association, Pepsico in selected districts were obtained from these organisations. These farmers were termed as organised potato seed producers. List of individual potato seed producers was also taken from the Department of Horticulture and these farmers were termed as unorganised seed producers for the present study. From each selected district, 30 organised and 30 unorganised farmers were selected, randomly. Thus, a total of 180 respondents comprising 90 organised and 90 unorganised potato seed producers were selected for the study. An interview schedule was developed to collect the data from respondents. The interview schedule was pretested on 10 organised and 10 unorganised respondents to remove any ambiguities. Data were collected personally visiting the study area and interviewing the farmers. Proper precautions were taken to ensure unbiased response of the respondents

by providing them necessary instructions after explaining the objectives of study. The data were tabulated and analysed using appropriate statistical tools.

## RESULTS AND DISCUSSION

The data in Table 1 showed that respondents faced many problems related to potato seed production. Problem of high cost of potato seed was faced by 38.88 per cent of the unorganized and 17.77 per cent of organised respondents. Problem of non-availability of quality seed was felt by 21.11 per cent of the unorganized respondents. In case of organised farmers, One-fourth of respondents (24.44%) faced the problems of non-availability of quality seed and about one-fifth of the organised respondents faced the problem of high cost of seed. It was also reported that 18.88 per cent of respondents perceived that treatment of potato seed before sowing is a cumbersome process, on contrary none of the organised farmer faced this problem. Very less i.e. 8.88 per cent and 4.44 per cent of the unorganised respondents faced the problems of difficulty in getting the seed of required variety and lack of improved seed variety, respectively. Very few of organised respondents faced the problem of difficulty in getting the seed of required variety and lack of improved seed variety, respectively.

More number of unorganized respondents as compared to organised respondents faced the problems in sowing of potato seed crop at their fields. As many as 20.00 per cent of the unorganized respondents faced the problems related to high cost of planting machine. Only 17.77 per cent and 11.11 percent of the unorganized respondents faced the problems of non-availability of planting machine and uncertainty of weather, respectively. Very less (5.55 %) of the organised respondents faced the problem of uncertainty of weather at sowing time of crop.

In case of irrigation related problems, 30.00 per cent of the unorganized respondents faced the problem of non-availability of canal water where as 27.77 per cent had the problems of short supply of electricity (Table 1). About 48.88 per cent and 46.66 per cent of organised respondents faced the problems of non-availability of canal water and short electricity of water, respectively. In case of fertilizer application, half of the organised and unorganized respondents faced difficulty in procuring SSP fertilizer at optimum time of application

**Table 1. Distribution of respondents according to problems faced by potato seed producers in sowing of crop**

Problem	Unorganised (n <sub>1</sub> =90)		Organised (n <sub>2</sub> =90)	
	No.	(%)	No.	(%)
<i>Seed</i>				
Non availability	19	21.11	22	24.44
High cost of seed	35	38.88	16	17.77
Difficulty in getting	8	8.88	5	5.55
Lack of improved seed	4	4.44	1	1.11
Seed treatment	17	18.88	0	0.00
<i>Sowing</i>				
Planting machine	16	17.77	0	0.00
High cost of machine	18	20.00	0	0.00
Uncertainty of weather	10	11.11	5	5.55
<i>Irrigation</i>				
Short supply of electricity	25	27.77	44	48.88
Canal water	28	31.11	42	46.66
<i>Fertilizer application</i>				
SSP fertilizer	45	50.00	50	55.55
High cost of fertilizers	26	28.88	0	0.00
Lack of labour	19	21.11	26	28.88
<i>Manuring</i>				
Lack of time	13	14.44	18	20.00
More time (decomposition)	26	28.88	5	5.55
Difficulty (cultural practices)	8	8.88	4	4.44
Lack of Labour	4	4.44	22	24.44

in potato crop. One-fourth (28.88%) of the unorganized respondents and 21.11 per cent of these respondents faced the problem of high cost of fertilizer and lack of labour, respectively. Similarly, 28.88 per cent of the organised respondents faced the constraint of lack of labour. In case of manuring, 28.88 per cent of the unorganized respondents perceived manuring takes more time for decomposition followed by 14.44 per cent of the respondents faced problem of lack of time for manuring during potato seed production. Only 8.88 per cent of the unorganised respondents faced the problem from manuring for creating hindrance in following various cultural practices in their fields and shortage of labour. However, about 24.00 per cent and 20.00 per cent of the organised respondents faced the problems related to shortage of time and labor. It is interesting to note that very less number of organised seed producers felt such difficulties while manuring their fields.

As depicted in Table 2 unorganised respondents faced many problems related to earthing-up operation

in potato crop like performing various overlapping operations in potato crop at that time (13.33%), uncertainty of weather (6.66%), non-availability of implements (4.44%) and shortage of labour (4.44%), respectively. Also very less i.e. 8.88 per cent and 5.55 per cent of the organised respondents faced the constraints of shortage of labor and overlapping of operation. About 16.66 per cent of the unorganised respondents and very few of the organised respondents faced the problem of high cost of weedicides for management of weeds in potato crop. In case of insect-pest & disease management related problems, 22.22 per cent of the unorganised respondents faced problems of high cost of pesticides followed by 16.66 per cent of these respondents faced the problem in identification of insect-pests of potato crop. Very few of the unorganised respondents i.e. 6.66 per cent, 3.33 per cent and 2.22 percent faced financial problems, lack of knowledge about correct method of pesticide application and non-availability of insecticide at proper time in potato seed production, respectively. Very few of the organised respondents i.e. 3.33 per cent faced the problem of high cost of pesticides.

During the harvesting of crop, 36.66 per cent of unorganised respondents and 46.66 per cent of the organised respondents faced the problems of shortage of labour for dehaluming in potato seed production (Table 2). In case of storage related problems, majority of the unorganised respondents (64.44%) faced the problems of high rent of cold storage followed by 56.66 per cent of these respondents faced the problem of non-availability of storage facilities. About 12.22 per cent of the unorganised respondents faced the problem of difficulty in transportation of potato seed. Interestingly, very less number of the organised respondents faced the problems related to storage of potato seed. It might be attributed to the fact that majority of organised respondents owned their cold stores and might extend help to one-another being belonging to common organisation.

Regarding marketing problems, almost all the unorganised respondents i.e. 91.11 per cent, 90.00 per cent and 87.77 per cent perceived problems of price fluctuation, lack of regulated markets and lack of demand, respectively. Majority (63.33%) of the unorganized respondents faced the problem of involvement of middle man followed by 56.66 per cent

of these respondents faced the problems of non-remunerative prices. Around 47.00 per cent of the unorganized respondents faced the problem of non-availability of market information during potato seed harvesting. On the other hand, majority of the organised respondents i.e. 68.88 per cent and 61.11 per cent faced the problems related to price fluctuation and lack of regulated market, respectively. Around 40.00 per cent of the organised respondents faced the problems of involvement of middleman followed by 34.44 per cent, 31.11 per cent of these respondents faced the problems in non-remunerative price and non-availability of market information, respectively. Only eight per cent of the organised respondents had problem of adequate transport facilities during potato seed production.

In case of packaging, half of the unorganized respondents (50.00%) had problems in packaging material followed by 37.77 per cent of these respondents faced difficulty in cleaning, grading and packaging, respectively. As many as 21.11 per cent of the unorganized respondents faced problem of non-availability of skilled labor and only 7.77 per cent had faced difficulty in getting the seed certification. One-third (31.11%) of the organised respondents had problems on packaging material followed by 27.77 per cent of the organised respondents faced problems in non-availability of skilled labor and none of the organised respondents had difficulty in getting the seed certification.

In case of institutional problems, majority (66.66%) of the unorganised respondents faced problems of non-availability of subsidies on machine like potato planter, potato digger, potato grader etc. Also, 11.11 per cent, 10.00 per cent and 4.44 per cent of these respondents faced the problems i.e. lack of credit facility, difficulty in getting clean and lack of extension services, respectively. In the same pattern, half of the organised respondents (53.33%) faced the problems of non-availability of subsidies on machine like potato planter, potato digger, potato grader etc. Very less number of the organised respondents had perceived problems like lack of credit facility and lack of extension services. None of the organised respondents faced the problem of difficulty on getting loan during potato seed production.

The data in Table 3 depicts the problems faced by organised potato seed producers in contract farming. It was found that 40.00 per cent of the organised

**Table 2. Distribution of respondents according to problems faced by potato seed producers in adopting intercultural and plant protection practices at their fields**

Problem	Unorganised (n <sub>1</sub> =90)		Organised (n <sub>2</sub> =90)	
	No.	(%)	No.	(%)
<i>Earthing-up</i>				
Uncertainty of weather	6	6.66	0	0.00
Overlapping of operation	12	13.33	5	5.55
Implements problem	4	4.44	0	0.00
Lack of Labour	4	4.44	8	8.88
<i>Weed control</i>				
High cost of weedicides	15	16.66	2	2.22
<i>IPD management</i>				
Insecticide	2	2.22	0	0.00
Identifying of insect-pest	15	16.66	0	0.00
Financial problems	6	6.66	0	0.00
Lack of knowledge	3	3.33	0	0.00
High cost of pesticides	20	22.22	3	3.33
<i>Harvesting</i>				
Shortage of Labour	33	36.66	42	46.66
<i>Storage</i>				
Storage facilities	51	56.66	8	8.88
Difficulty in transportation	11	12.22	2	2.22
High rent of cold storage	58	64.44	11	12.22
<i>Marketing</i>				
Lack of Regulated markets	81	90.00	55	61.11
Price fluctuation	82	91.11	62	68.88
Marketing information	42	46.66	28	31.11
Lack of demand	79	87.77	47	52.22
Non remunerative price	51	56.66	31	34.44
Inadequate transport	13	14.44	7	7.77
Middle man involved	57	63.33	36	40.00
<i>Packaging</i>				
Skilled labour	19	21.11	19	21.11
Difficulty in packaging	34	37.77	25	27.77
Difficulty in seed certification	7	7.77	0	0.00
Packaging material	45	50.00	28	31.11
<i>Institutional problems</i>				
Lack of credit facility	10	11.11	7	7.77
Lack of extension services		4	4.44	3 3.33
Subsidies on machine	60	66.66	48	53.33
Difficulty in getting loan	9	10.00	0	0.00

**Table 3. Problems faced by organised potato seed producers in contract farming**

Problems	No.	%
Prices fluctuations in markets	36	40.00
Difficulty in meeting quality requirement	10	11.11
Risk in contract marketing	25	27.77
Violation of contract agreement	5	5.55

respondents faced the problems of price fluctuation in market followed by 27.77 per cent of these respondents perceived risk in contract marketing system. It was observed during interaction with farmers that the contractors sometimes make faulty evaluation of the crop quality and deny purchasing at predetermined price. This is mostly in case when market price of the crop prevails lower than the contract price. Very less i.e. 11.11 per cent and 5.55 per cent of the organised respondents faced the problems in meeting quality requirement and violation of contract agreement, respectively.

*Comparison of socio-psychological characteristics of respondents:* Means of various socio-psychological characteristics of organized and unorganized potato seed producers was compared with t-test and results were presented in Table 4. For the statistical analysis, the data were analyzed using MS Excel and SPSS 20. It was observed that organized farmers with mean score of 11.33 were significantly more educated as compared to unorganized farmers with mean score of 9.63 at p value <0.01. Both groups of farmers were also significantly differ in gross annual income (with t value of 4.113, p < 0.01) as organized farmers possessed higher mean operational land holding (56.58 acres) than unorganized farmers (39.63 acres) and difference is significant at p < 0.05, with t value of 2.466.

Extension contacts of organized potato seed producers (mean score 14.03) were significantly (p<0.05) higher than unorganized counterparts (mean score 13.27). The reason may be as joining different seed producing organizations provides them more opportunities of training interaction with scientists, extension officers and other service providers, which

were lacking for those who have not joined. Mean score of risk bearing capacity also differ significantly among selected groups of potato seed producers (with t value of 2.329, p < 0.05). In case of innovativeness, organized farmers were significantly more innovative (with mean score 20.35, p<0.05) as compared to unorganized farmers (mean score 19.23, p < 0.05). Other socio psychological characteristics like age, family size and economic motivation were at par among organized and unorganized respondents, as no statistically significant difference was observed in these characteristics. It can be inferred from the results that organized and unorganized potato seed producers differ in many socio psychological characteristics and the problems faced by them also need to be resolved accordingly.

*Suggestions :* The data pertaining to Table 5 depict the various suggestions of farmers regarding potato seed production. Most of the unorganised respondents (81.11%) and organised respondents (60%) suggested that transportation of seed and storage facilities of potato seed should be incentivized. About half of the unorganized respondents (52.22%) and 24.47 per cent of organised respondents opined that small cold stores should be promoted to avoid post-harvest losses in potato seed production. Around 38.88 per cent of the unorganised respondents and 50 per cent of organised respondents suggested that export channels of potato seed should be enhanced. Both unorganised (7.77%) and organised (27.77%) of the respondents felt that contract farming should be supported and regulated by government agencies for its effective functioning. About 36.66 per cent of the organised respondents and only 5.55 per cent of the unorganized respondents suggested

**Table 4. Comparative analysis of socio-psychological characteristics of respondents.**

Socio-psychological characteristics	Unorganised (n <sub>1</sub> =90)	Organised (n <sub>2</sub> =90)	t-value	p value
Age (years)	44.61±10.92	43.07±8.54	1.049	0.296
Education (years)	9.63±4.16	11.33±1.97	3.376**	0.001
Family size (members)	6.36±1.69	6.70±1.81	1.277	0.203
Operational land holding (acres)	39.63±46.38	56.58±45.89	2.466*	0.015
Gross annual income (in lakhs)	27.42±32.09	49.87±40.65	4.113**	0.00
Extension contacts	13.27±1.93	14.03±2.63	2.228*	0.027
Risk bearing capacity	18.47±1.96	19.16±2.00	2.329*	0.021
Economic Motivation	13.24±2.36	13.86±2.69	1.646	0.102
Innovativeness	19.23±2.29	20.35±2.49	3.144**	0.002

Mean±SD, \*Significant at 5 per cent level of significance, \*\*Significant at 5 per cent level of significance

**Table 5. Distribution of suggestions regarding improvement in potato seed production (Multiple response)**

Suggestions	Unorganised	Organised
Subsidies for transportation and storage of potato seed should be provided	73(81.11)	54(60.00)
Contract farming should be supported and regulated by government agencies.	7(7.77)	25(27.77)
Export channels may be opened up for potato seed.	35(38.88)	45(50.00)
Good quality breeder seed should be made available	5(5.55)	33(36.66)
Small cold storage structures should be increased to avoid post-harvest losses.	47(52.22)	22(24.44)
Agro-machinery centres of co-operative societies should be strengthened	23(25.55)	12(13.33)

that good quality breeder seed should be made available to them at reasonable price. One-fourth (25.55%) of the unorganised respondents and 13.33 per cent of organised respondents desired that agro-machinery centers of co-operative societies should be strengthened in potato growing areas to minimize farmers investment on high cost machinery.

## CONCLUSION

Profitability of potato crop beset with many constraints faced by growers in production and marketing practices. The present study was conducted to analyse the problems faced by the potato seed producers in Punjab. Non-remunerative prices, lack of

regulated markets, price fluctuation in the markets, non-availability of subsidies on machinery were the major problems faced by the respondents. Lower availability of labor at the time of dehauling and fertilizer application was also major problem faced by the respondents. Non-availability of storage facilities and high rent of cold storage was found to be major constraint faced by the unorganised respondents. Study suggests incentives for transportation of seed to distant markets and provisions of storage structures and strengthening of agro-machinery centre in cooperative societies for curtailing farm expenses. Rules and regulations of contract farming should be strictly implemented.

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