Journal of Agricultural Development and Policy
Volume 25 No. 2 (2015): 14-25

Production and Marketing of Potato in Punjab

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ABSTRACT

Punjab's share in the India's potato production is about five per cent during the year 2011-12. The present study has been undertaken to examine the production and marketing scenario of potato in the state. The study revealed that potato crop alone occupied about 74 per cent of the vegetables area of the state in year 2011-12. Jalandhar district was having the maximum area and production of potato. About 35 per cent of the cold storage capacity of the state was also concentrated in this district during 2012-13. The seasonal indices of arrivals were found to be highest in the month of December i.e. 282 and the lowest in June i.e. 42. The price spread analysis brought out that net price received by the producer was about Rs 357 per qtl which was about 48 per cent of the consumer's purchase price for sale of potato in Jalandhar market during February 2012. This figure was about Rs 385 per qtl for sale in the same market in September, 2012. The study suggested that the extension agencies may advice the farmers to store potatoes in cold stores to fetch higher prices in the lean season. To encourage the small and medium farmers to take their produce in distant markets outside the state, cooperative/ group marketing may be encouraged. This will increase the income of the farmers.

Key words: Potato arrivals, Prices, Seasonal indices, Cold stores, Price spread
JEL Classification: E23, E31, M31, O13, P42, Q13

INTRODUCTION

The declining farm incomes, almost stagnant food grains productivity and growing demand for fruits and vegetables due to increase in per capita income and changes in consumption pattern calls for increase in the production of high value crops such as fruits, vegetables, etc. in the Punjab state. Under the diversification plan of the Punjab Government submitted to the Government of India in 2012, fruits and vegetable crops are suggested as the alternative crops of paddy in the overall interest of Punjab agriculture. A positive step has been recorded in this direction with area under vegetable crops in Punjab increasing from 1.20 lakh hectares in 1998-99 to 1.93 lakh hectares in 2011-12.

Potato is the principal vegetable crop of Punjab. Out of the total area under vegetables, 73.79 per cent area was under potato crop. It may be stated that area under vegetables was 1.44 per cent to the total cropped area of Punjab during the year 2011-

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12. The figure was 1.06 per cent in the case of potato. The production of potato was about 2104 thousand metric tons in the state during the year 2011-12. Punjab's share in the India's potato production is about five per cent. Empirical studies have shown that a large number of the intermediaries are involved in the movement of the horticulture produce from producer to consumer, who appropriate a large proportion of the consumer price and the share of producer becomes very low. In the case of perishables, the storage is very difficult and the share of the producer is in the range of 30 to 60 per cent and the market efficiency is low (Government of India, 2001, Anantia, 2008, Jairath, 2008 and Dastagiri *et al.*, 2009). Therefore, the present study has been undertaken to examine the production and marketing scenario of potato in the state.

DATA BASE

Potato is the main vegetable crop of the Punjab farmers. In the first stage, Jalandhar district was selected randomly from the major potato growing districts in Punjab for the study. In the second stage, three development blocks were selected randomly from Jalandhar district. In the third stage, three villages were again randomly selected from each block. Twelve farmers were selected randomly from each selected village. To make the sample design self-weighting, the number of farmers selected from each size category was in proportion to their number in that category. The farmers were categorized into small, medium and large categories on the basis of area under potato by using cube root frequency method. The ultimate sample consisted of 63 small, 27 medium and 18 large farmers (total sample of 108 farmers).The information related to price spread of potato and problems related to production and marketing of potato was also obtained from the selected farmers. A random sample of 10 wholesalers and 15 retailers were selected from Jalandhar city market. The secondary data was obtained from the reputed published and unpublished sources.

RESULTS AND DISCUSSION

Total Cropped Area vis-à-vis Area under Vegetables and Potato

The data regarding total cropped area vis-à-vis area under vegetables and potato in the state from 1981-82 to 2011-12 is given in Table 1. The total cropped area was 6929 thousand hectares in 1981-82 which increased to 7882 thousand hectares in 2011-12.The area under vegetables had increased from about 64 thousand hectares in 1981-82 to about 114 thousand hectares in 2011-12.There had been inter-year fluctuations in the area under vegetables. In percentage terms, the area under vegetables to the total cropped area varied from 0.92 per cent in 1981-82 to 1.44 per cent in 2011-12. This figure for potato varied from 0.48 per cent in 1981-82 to 1.06 per cent in 2011-12. The potato crop alone occupied about 74 per cent of the vegetables area of the state in year 2011-12.

The increase in potato area was the result of favourable factors such as the availability of good seeds locally through the seed plot technique,the expansion of the cold store industry, the relatively high profits from the potato-wheat rotation, etc. (Chatha and Sidhu, 1980). The cold storage capacity in

TABLE 1: TOTAL CROPPED AREA VIS-À-VIS AREA UNDER VEGETABLES AND POTATO IN PUNJAB, 1981-82 TO 2011-12

(Area in 000 ha)

Year	Total cropped area	Area under vegetables	Area under vegetables as %age of total cropped area	Area under potato	Area under potato as %age of total cropped area	Area under potato as %age of area under vegetables
1981-82	6929	63.8	0.92	33	0.48	51.72
1985-86	7158	74.9	1.05	34	0.6	57.41
1991-92	7518	60.9	0.81	31	0.41	50.9
1995-96	7712	63	0.82	39	0.51	61.9
2000-01	7941	110.3	1.39	60	0.75	54.4
2001-02	7941	101.7	1.28	57	0.72	56.05
2002-03	7826	111.71	1.43	67	0.86	59.98
2003-04	7905	111.28	1.41	66	0.83	59.31
2004-05	7932	113.06	1.43	68	0.86	60.15
2005-06	7868	106.94	1.36	71	0.9	66.39
2006-07	7861	109.37	1.39	76	0.97	69.49
2007-08	7870	125.32	1.59	90	1.14	71.82
2008-09	7912	115.51	1.46	82	1.04	70.99
2009-10	7876	110.41	1.4	74	0.94	67.02
2010-11	7882	102.89	1.31	64	0.81	62.2
2011-12	7882	113.83	1.44	84	1.06	73.79

Source: Statistical Abstract of Punjab, various issues

Punjab had increased from 1.41 lakh tons in 1972-73 to 17.84 lakh tons in the year 2011-12. About 60 per cent of the vegetable area of Punjab was under potato during last 10 years i.e. 2002-03 to 2011-12.

Area, yield and production of potato

The information regarding area, production and yield of potato in the state is given in Table 2. The area under potato had increased from 14 thousand hectares during 1966-67 to 84 thousand hectares in 2011-12 at an annual compound growth rate of 3.49 per cent which was significant at one per cent level of significance.

As already mentioned above, the increase in potato area was the result of favourable factors such as the availability of good seed locally through the see-plot technique, the expansion of the cold storage industry, the relatively high profits from the potato-wheat rotation etc. Due to increase in cold storage capacity along with other technological and institutional factors, the production of potato had increased from 195 thousand metric tonnes in 1966-67 to 2104 thousand metric tonnes in 2011-12 at an annual compound growth rate of 4.54 per cent which was significant at one per cent level of significance. There were inter-year fluctuations in the area and production of potato in the state. As far as yield was concerned, it increased from 13697 kg per hectares during 1966-67 to 25013 kg per hectares during 2011-12 at an annual compound growth rate of 1.01 per cent which was significant at one per cent level of significance. There were inter-year fluctuations in the potato productivity also.

As shown in the Table 2, the yield of potato was around 20 thousand kg per

TABLE 2: AREA, YIELD AND PRODUCTION OF POTATO IN PUNJAB, 1966-67 TO 2011-12

Year	Area (000 ha)	Yield (Kg per ha)	Production (000 metric ton)
1966-67	14	13697	195
1970-71	17	12752	216
1975-76	27	16648	445
1980-81	40	19287	767
1985-86	34	19493	669
1990-91	23	19863	453
1995-96	39	20042	778
2000-01	60	19563	1166
2001-02	57	20055	1147
2002-03	67	20572	1390
2003-04	66	20009	1382
2004-05	68	20555	1400
2005-06	71	16310	1138
2006-07	76	17030	1353
2007-08	90	18697	1714
2008-09	82	24680	2014
2009-10	74	25844	1918
2010-11	64	24988	1609
2011-12	84	25013	2104
CGR (1966-67 to 1980-81)	9.31^{***}	3.67^{***}	13.33^{***}
CGR (1981-82 to 1990-91)	-2.74^{*}	0.80^{NS}	-2.01^{NS}
CGR (1990-91 to 2000-01)	14.01^{***}	-0.04^{NS}	14.11^{***}
CGR (2001-02 to 2011-12)	2.47^{**}	2.93^{**}	5.33^{***}
CGR (1966-67 to 2011-12)	3.49^{***}	1.01^{***}	4.54^{***}

Source: Statistical Abstract of Punjab, various issues
Note: CGR means compound growth rate
*significant at 10 per cent level of significance
**significant at five per cent level of significance
***significant at one per cent level of significance
NS non-significant.

hectare for most of the years after 1980-81. But it was as low as 16.31 thousand kg per hectare in year 2005-06. This happened on account of number of factors. Potato is susceptible to a number of diseases (about 90) which are classified according to the causal organisms, such as fungal, bacterial and viral diseases (Kaur, 2005).This adversely affected the yield although most of the potato growers were progressive farmers in the state. Moreover, Potato is attacked by a number of insects and root-knot nematodes. This might had reduced the yield of potato and its quality (Mavi *et al.*, 2005). However, high yield could be obtained by including plant-protection measures in the routine agronomic practices used in the cultivation of potato crop *ibid*.

District-wise Area, Yield and Production of Potato

The data regarding area, production and yield of potato during the year 2011-12 in Punjab are given in Table 3. During the year 2011-12, the maximum area (about 23 per cent) under potato was in Jalandhar district followed by Hoshiarpur (about 20 per cent), Kapurthala district (about 10 per cent), Moga district (6.90%), Ludhiana district (6.54%), Bathinda district (6.30%) and Amritsar district (about 6 per cent). The area in the other districts was less.

As far as district-wise production was concerned, the maximum production was in Jalandhar followed by Hoshiarpur, Kapurthala, Moga, Ludhiana, Bathinda and Amritsar districts.The productivity of potato was the highest in Jalandhar district (25848 kg per hectare) in the year 2011-12 followed by Amritsar district (25459 kg per hectare). It was the lowest (21844 kg per hectare) in Barnala district. The inter district variations in productivity has been due to suitability of soil type and other factors.

Cold Storage Capacity in Punjab

The number of cold stores and their capacity in Punjab is given in Table 4. There

TABLE 3: DISTRICT-WISE AREA, YIELD AND PRODUCTION OF POTATO IN PUNJAB, 2011-12

Districts	Area (000 ha)	%age share in the area of state	Yield (kg per ha)	Production (000 metric ton)	%age share in the state's production
Gurdaspur	1	1.19	23418	23.8	1.13
Amritsar	5	5.95	25459	127	6.04
Tarn Taran	1	1.19	24124	24.4	1.16
Kapurthala	8.8	10.46	25421	223.4	10.62
Jalandhar	19.6	23.31	25848	507.3	24.11
S.B.S. Nagar	2.3	2.73	24522	55.5	2.64
Hoshiarpur	16.8	19.98	24464	411.1	19.54
Rupnagar	0.9	1.07	23484	20.2	0.96
S.A.S. Nagar	1.3	1.55	24316	31	1.47
Ludhiana	5.5	6.54	25449	140.2	6.66
Firozpur	0.9	1.07	23158	20.8	0.99
Faridkot	0.2	0.24	22518	4.6	0.22
ShriMuktsar Sahib	0.1	0.12	22345	3.5	0.17
Moga	5.8	6.9	25414	147.4	7.01
Bathinda	5.3	6.3	24424	129.9	6.17
Mansa	0.2	0.24	22824	3.6	0.17
Sangrur	0.4	0.48	23864	8.8	0.42
Barnala	1.1	1.31	21844	24.3	1.15
Patiala	3.7	4.4	24748	93	4.42
Fatehgarh Sahib	4.2	4.99	24818	104.2	4.95
Punjab	84.1	100	25013	2104	100

Source: Statistical Abstract of Punjab, 2012.

were 550 cold stores in the state in 2012-13. Their storage capacity was about 18.89 lakh tons. About 31 per cent of the cold stores were in Jalandhar district. This district alone had about 35 per cent of the storage capacity. As already discussed, Jalandhar district had maximum area and production of potato.It may be mentioned here that potato seed business was mainly in the handsof the owners of cold stores and most of them were progressive seed growers (Sidhu, 1995).Such growers were also mainly concentrated in Jalandhar district. They disposed of their produce generally outside the state at higher prices (Sidhu, 1995).

It had been observed that cold store owners preferred the large farmers in their business dealings due to huge surpluses with them (Rangi and Sidhu, 2001).The small and medium farmers were not on their priority due to low volume of produce and unsound financial position. Consequently, they were not allowed to keep their produce in the cold stores (*ibid*). Therefore, the cold stores in the cooperative sector may be set up particularly for small and medium farmers. This step will also give a boost to the diversification programme of the state government.

It was important to mention here that three – fourth of India's cold storages, with a capacity of about 21 million tonnes, was

TABLE 4: COLD STORAGE CAPACITY IN PUNJAB, 2012-13

District	No. of cold stores	Percentage share in state	Capacity (tonnes)	Percentage share in state
Gurdaspur	9	1.64	15686	0.83
Amritsar	22	4	57202	3.03
Tarn Taran	7	1.27	20928	1.11
Kapurthala	50	9.09	217223	11.49
Jalandhar	169	30.73	654274	34.62
S. B. S. Nagar	16	2.91	29400	1.56
Hoshiarpur	45	8.18	117517	6.22
Rupnagar	5	0.91	10250	0.54
S. A. S. Nagar	7	1.27	11080	0.59
Ludhiana	54	9.82	209361	11.08
Ferozepur	14	2.54	31220	1.65
Faridkot	5	0.91	12700	0.67
Muktsar	3	0.55	3900	0.2
Moga	33	6	90810	4.8
Bathinda	31	5.64	138970	7.35
Mansa	4	0.73	10850	0.57
Sangrur	18	3.27	51550	2.73
Barnala	7	1.27	19030	1.01
Patiala	29	5.27	127000	6.72
Fatehgarh Sahib	22	4	60991	3.23

Source: Department of Horticulture, Punjab, Chandigarh.

used to store potatoes only. This capacity amounted to about half, or more of the total potato crop (Celestine, 2012). The production of potato was about 45 million tons in the country during the year 2012-13.

Market Arrival of Potato

During the period of November to March, the market arrivals were the highest creating glut like situation in the market. The lean period existed from April to October in arrival. The data regarding market arrival of potato in Jalandhar city market from 1993-94 to 2012-13 has been given in Table 5. The arrival of potato had varied from 6.60 lakh qtls in 1993-94 to 2.88 lakh qtl in 2012-13. There had been inter-year fluctuations in the arrival of potato. As Jalandhar was an assembling market of potato, therefore, from this market, the produce was sent to various consuming markets within as well as outside the state by the traders. The arrival of potato was maximum in the post-harvest period. The lowest market arrival was 0.06 lakh qtls in April in the year 2005-06 and the maximum arrival was 2.75 lakh qtls in December in the year 2001-02. The seasonal indices of arrivals were found to be highest in the month of December i.e. 282 and the lowest in June i.e. 42.

The seasonal changes were mainly caused by the seasonal nature of production and arrivals of potatoes. The other reasons were high charges for cold stores and semi-perishable nature of potato crop. As already

TABLE 5: ARRIVAL OF POTATO IN JALANDHAR CITY MARKET, 1993-94 TO 2012-13

(000 qtls.)

Month	April	May	June	July	August	Sept	Oct	Nov	Dec	Jan	Feb	March	Total
1993-94	36.80	35.40	24.40	20.50	31.10	31.00	34.00	58.00	214.20	78.10	33.70	61.80	659.00
	(5.58)	(5.37)	(3.70)	(3.11)	(4.72)	(4.70)	(5.16)	(8.80)	(32.50)	(11.85)	(5.11)	(9.38)	(100.00)
1994-95	36.00	55.90	28.30	25.40	23.90	24.70	29.00	76.60	164.00	52.70	43.20	104.20	663.90
	(5.42)	(8.42)	(4.26)	(3.83)	(3.60)	(3.72)	(4.37)	(11.54)	(24.70)	(7.94)	(6.51)	(15.70)	(100.00)
1995-96	76.20	40.50	18.00	17.00	22.00	24.60	27.60	74.70	169.80	61.80	51.60	74.40	658.20
	(11.58)	(6.15)	(2.73)	(2.58)	(3.34)	(3.74)	(4.19)	(11.35)	(25.80)	(9.39)	(7.84)	(11.30)	(100.00)
1996-97	39.60	44.88	18.20	16.00	24.80	25.00	23.40	109.00	97.00	33.20	27.40	51.30	509.78
	(7.77)	(8.80)	(3.57)	(3.14)	(4.86)	(4.90)	(4.59)	(21.38)	(19.03)	(6.51)	(5.37)	(10.06)	(100.00)
1997-98	51.70	65.70	31.00	22.00	27.50	31.00	42.10	117.20	160.90	89.60	NA	108.80	747.50
	(6.92)	(8.79)	(4.15)	(2.94)	(3.68)	(4.15)	(5.63)	(15.68)	(21.53)	(11.99)	0.00	(14.56)	(100.00)
1998-99	44.70	74.30	31.90	24.60	23.00	24.20	27.80	55.70	128.70	102.50	91.90	160.00	789.30
	(5.66)	(9.41)	(4.04)	(3.12)	(2.91)	(3.07)	(3.52)	(7.06)	(16.31)	(12.99)	(11.64)	(20.27)	(100.00)
1999-00	46.90	84.60	26.00	34.30	43.10	25.10	26.10	76.60	267.20	132.30	110.90	180.60	1053.70
	(4.45)	(8.03)	(2.47)	(3.26)	(4.09)	(2.38)	(2.48)	(7.27)	(25.36)	(12.56)	(10.52)	(17.14)	(100.00)
2000-01	52.80	98.20	28.20	44.66	45.50	37.60	45.90	87.10	267.20	103.00	91.20	144.60	1045.96
	(5.05)	(9.39)	(2.70)	(4.27)	(4.35)	(3.59)	(4.39)	(8.33)	(25.55)	(9.85)	(8.72)	(13.82)	(100.00)
2001-02	53.70	98.40	31.90	44.60	45.50	37.60	39.30	104.40	275.30	101.80	93.60	123.20	1049.30
	(5.12)	(9.38)	(3.04)	(4.25)	(4.34)	(3.58)	(3.75)	(9.95)	(26.24)	(9.70)	(8.92)	(11.74)	(100.00)
2002-03	58.00	81.00	36.00	28.20	27.70	18.20	28.20	95.40	177.00	84.00	63.10	147.40	844.20
	(6.87)	(9.59)	(4.26)	(3.34)	(3.28)	(2.16)	(3.34)	(11.30)	(20.97)	(9.95)	(7.47)	(17.46)	(100.00)
2003-04	50.20	58.20	38.40	34.60	40.00	46.10	27.10	105.00	191.50	72.00	60.60	122.20	845.90
	(5.93)	(6.88)	(4.54)	(4.09)	(4.73)	(5.45)	(3.20)	(12.41)	(22.64)	(8.51)	(7.16)	(14.45)	(100.00)
2004-05	48.00	41.20	15.90	18.30	22.50	19.40	19.90	90.10	191.50	111.40	51.20	69.30	698.70
	(6.87)	(5.90)	(2.28)	(2.62)	(3.22)	(2.78)	(2.85)	(12.90)	(27.41)	(15.94)	(7.33)	(9.92)	(100.00)
2005-06	6.00	93.30	32.00	29.40	32.90	34.00	42.20	64.50	144.50	91.20	57.60	59.30	686.90
	(0.87)	(13.58)	(4.66)	(4.28)	(4.79)	(4.95)	(6.14)	(9.39)	(21.04)	(13.28)	(8.39)	(8.63)	(100.00)
2006-07	39.10	34.10	25.40	24.20	34.10	20.70	26.90	79.30	66.70	41.70	31.40	39.50	463.10
	(8.44)	(7.36)	(5.48)	(5.23)	(7.36)	(4.47)	(5.81)	(17.12)	(14.40)	(9.00)	(6.78)	(8.53)	(100.00)
2007-08	41.80	18.90	11.80	11.10	14.80	14.40	15.00	71.40	119.40	59.20	32.00	50.10	459.90
	(9.09)	(4.11)	(2.57)	(2.41)	(3.22)	(3.13)	(3.26)	(15.53)	(25.96)	(12.87)	(6.96)	(10.89)	(100.00)
2008-09	35.30	35.30	21.40	28.80	15.80	22.40	24.80	47.70	132.40	21.30	29.90	48.80	463.90
	(7.61)	(7.61)	(4.61)	(6.21)	(3.41)	(4.83)	(5.35)	(10.28)	(28.54)	(4.59)	(6.45)	(10.52)	(100.00)
2009-10	41.60	21.40	8.60	15.40	15.00	20.00	14.00	70.00	80.70	33.60	32.20	44.10	396.60
	(10.49)	(5.40)	(2.17)	(3.88)	(3.78)	(5.04)	(3.53)	(17.65)	(20.35)	(8.47)	(8.12)	(11.12)	(100.00)
2010-11	22.90	22.70	11.00	13.70	16.70	11.40	13.90	28.80	61.40	41.90	22.20	40.80	307.40
	(7.46)	(7.39)	(3.59)	(4.45)	(5.43)	(3.72)	(4.52)	(9.36)	(19.97)	(13.64)	(7.23)	(13.26)	(100.00)
2011-12	23.90	24.80	12.90	12.90	14.20	15.40	18.60	36.50	76.10	34.30	42.10	41.10	352.80
	(6.78)	(7.03)	(3.66)	(3.66)	(4.03)	(4.37)	(5.28)	(10.35)	(21.55)	(9.71)	(11.94)	(11.64)	(100.00)
2012-13	15.10	13.10	9.70	9.90	12.00	12.50	14.30	41.20	71.60	41.60	20.70	26.10	287.80
	(5.23)	(4.55)	(3.37)	(3.46)	(4.18)	(4.33)	(4.97)	(14.30)	(24.88)	(14.44)	(7.20)	(9.08)	(100.00)
S.I.	75.00	93.00	42.00	44.00	49.00	46.00	50.00	139.00	282.00	130.00	93.00	156.00	1200.00

Source: Market Committee, Jalandhar city.

Note: i) Figures in the parentheses indicate the percentage to total.

ii) S.I. means seasonal indices.

discussed, the cold store owners preferred the large farmers in their business dealings due to huge surpluses with them. The actual arrival of potato may be more in the

Jalandhar district. This often happened due to unrecorded sale of the produce. The traders were always interested to avoid the market fee, rural development fund etc. An earlier study has also shown large scale evasion of market fee in the grape grown area of the state (Gill, 1990).

The study further highlighted that hardly one-fourth of the total arrival of grapes were shown in the official records and the rest 75 per cent were sold without paying any market fee and rural development funds (*ibid*). A press report had also revealed a large scale evasion of market fee and rural development fund in the fruit and vegetable market at Amritsar (Rambani, 2004). Within a week of shifting of that fruit and vegetable market from one place to another, a six fold increase in market fee, rural development fund, etc. had been registered (*ibid*). This showed the massive tax evasion on the part of fruit and vegetable traders. This phenomenon was common all over Punjab and elsewhere also.

Prices of Potato

The information regarding average prices of potato in Jalandhar city market from 1993-94 to 2012-13 is given in Table 6. The lowest price of potato was Rs 75 per qtl in December, 1999 whereas, the highest price was Rs 1000 per qtl in October, 2009. The

TABLE 6: AVERAGE PRICE OF POTATO IN JALANDHAR CITY MARKET, 1993-94 TO 2012-13

(₹/q)

Year	April	May	June	July	August	Sept	Oct	Nov	Dec	Jan	Feb	March
1993-94	130	215	230	215	235	263	280	250	155	110	150	150
1994-95	140	175	225	225	275	275	275	265	125	125	163	160
1995-96	175	275	350	285	325	350	475	250	125	190	215	250
1996-97	285	328	350	350	450	350	375	400	375	240	225	350
1997-98	160	105	115	200	275	150	150	125	90	175	NA	275
1998-99	325	450	450	550	700	700	800	600	225	150	100	100
1999-00	150	355	325	300	250	160	150	175	75	90	100	115
2000-01	100	100	150	150	125	125	100	115	90	105	125	275
2001-02	300	275	350	300	300	350	350	325	200	200	225	275
2002-03	200	300	300	350	400	225	200	200	125	150	175	200
2003-04	175	200	200	175	200	200	175	250	150	150	200	200
2004-05	225	300	275	300	400	500	450	210	150	140	225	400
2005-06	400	300	350	300	400	450	450	400	400	325	340	450
2006-07	425	650	450	525	550	650	725	375	275	250	340	365
2007-08	375	525	490	800	800	950	725	450	400	350	415	300
2008-09	290	250	340	270	250	400	400	150	145	170	175	350
2009-10	350	450	650	590	700	800	1000	800	550	650	300	175
2010-11	351	299	330	300	212	291	372	450	372	269	298	321
2011-12	299	336	409	446	314	369	347	290	212	274	244	278
2012-13	425	579	671	667	699	636	613	566	357	367	428	390
S.I.	84	104	112	116	127	129	133	105	71	68	68	84

Source: Market Committee, Jalandhar City.

Note: S.I. means seasonal indices.

prices started upward movement in the month of May and reached the highest level during the months August to October. The seasonal indices of prices were the highest in the month of October i.e. 133 and the lowest in the month of January and February i.e. 68.

Thus, it was important to mention here that the potato prices were the highest in the lean period when the arrivals were low. The supply of the vegetables in the cities was uneven and uncertain, which resulted into fluctuations in their prices. Potato export may be encouraged from the state to save the potato growers from such price uncertainties. In the mid-day meal scheme for the school going children all over the country, potato may also be included. Since it is a semi-perishable commodity, there will not be much transportation problem in this regard. The potato varieties suitable for processing may be developed for the Punjab farmers. Contract farming will also reduce the price risk of the farmers. It may be encouraged for this crop in the state.

It was also noticed that most of the farmers sold their produce in the post-harvest period and did not store it. Even if they stored potato, they stored very less quantity which resulted in creating a glut in the market in the peak season led to fall in prices. The farmers forced to sell their produce due to various reasons. The traders exploited the farmers by purchasing potato from them at the lowest prices during the peak season. They used to store it and afterwards sold it during the lean period at higher prices to the consumers and to the producers for seed purposes.In this way, both consumer and producer suffer; the former by paying the higher prices and later by not receiving the remunerative prices.

To save them from this situation, the prices should be stabilized throughout the year by providing more storage facilities to the farmers at cheaper rates and at the same time by increasing the retention power of the producers, so that they can store maximum of their produce during the post-harvest period and sell it during the lean period. In such a way, the producers can get better prices for their product and also the consumers can get the potato at almost constant prices throughout the year.

Price Spread of the Potato

A perusal of theTable 7 reveals that producer's sale price of potato was ₹430 per qtl in Jalandhar market which was about 57 per cent of the consumer's purchase price. The expenses borne by the producer were ₹73 per qtl which was about 10 per cent of the consumer's purchase price.The net price received by the producer was about ₹357 per qtl which was about 48 per cent of the consumer's purchase price.The expenses borne by the wholesaler (in the form of market fee, Rural Development Fund (RDF), commission to the commission agent, etc.) and retailer were about ₹50 and ₹54 per qtl, respectively which was about seven per cent for each of the wholesaler and retailer.The margin of the wholesaler (₹70 per qtl) was less on account of high volume of business as compared to retailer (₹146 per qtl) who handled low volume of the business. The consumer had to pay ₹7.50 per kg (₹750 per qtl) to the retailer in Jalandhar market during February, 2012. Most of the small and marginal farmers in particular preferred to

TABLE 7: PRICE SPREAD OF POTATO IN JALANDHAR MARKET, FEBRUARY 2012(SUPPLY CHAIN:PRODUCER-WHOLESALER-RETAILER- CONSUMER)

Sr. No.	Particulars	₹/qtl	%age share in consumer's price
1.	Producer's sale price/ wholesaler's purchase price	430	57.33
2.	Expenses borne by the producer	72.8	9.71
i.	Grading, filling, stitching etc.	20.52	2.74
ii.	Cost of gunny bag	36.7	4.89
iii.	Loading and transportation cost	13.17	1.76
iv.	Unloading charges	2.41	0.32
3.	Net price received by the farmer	357.2	47.63
4.	Expenses borne by the wholesaler	50.2	6.69
i.	Market fee @ 2%	8.6	1.15
ii.	Rural development fund @ 2%	8.6	1.15
iii.	Commission to the commission agent @ 5%	21.5	2.87
iv.	Grading expenses	4	0.53
v.	Miscellaneous expenses	7.5	1
vi.	Margin of the wholesaler	69.8	9.31
5.	Wholesaler's sale price/ retailer's purchase price	550	73.33
6.	Expenses borne by the retailer	54.2	7.23
i.	Transportation cost	12.25	1.63
ii.	Labour	3.7	0.49
iii.	Rent of the shop/rehri	2.75	0.37
iv.	Packing cost	14	1.87
v.	Loss, wastage and spoilage @ 2.50%	13.75	1.83
vi.	Miscellaneous cost	7.75	1.03
vii.	Margin of the retailer	145.8	19.44
7.	Retailer's sale price/ consumer's purchase price	750	100

set their produce in the local Jalandhar market to avoid the unnecessary inconvenience during transportation and marketing to the distant markets like Delhi, Mumbai, etc. In such markets, traders, cold store owners and large farmers generally took the produce.

As already discussed, the price of potato was generally low in the post-harvest period. The low price adversely affected the returns of the potato growing farmers.

The price spread of potato in Jalandhar market in September, 2012 has been shown in Table 8. The farmer's sale price was ₹650 per qtl. The expenses borne by the producer were about 26 per cent of the consumer's purchase price which included grading, filling, stitching, cold store charges, transportation cost and interest etc. Thus, the net price received by the farmer was about ₹385 per qtl. The marketing cost under taken by wholesaler and retailer were ₹67 and ₹81 per qtl, respectively. The consumer had to pay ₹1000 per qtl for purchase of potato in Jalandhar market. As already stated, potato is a semi-perishable commodity. It can be stored in cold stores only. In the lean period, consumers can buy it at reasonable prices. The extension agencies may advice the

TABLE 8: PRICE SPREAD OF POTATO IN JALANDHAR MARKET, SEPTEMBER 2012 (SUPPLY CHAIN: PRODUCER - WHOLESALER- RETAILER -CONSUMER)

Sr. No.	Particulars	₹ per q	%age share in consumer's price
1.	Producer's sale price/ wholesaler's purchase price	650	65
2.	Expenses borne by the producer	264.68	26.47
i.	Grading, filling, stitching, etc.	20.52	2.05
ii.	Cost of gunny bag	36.7	3.67
iii.	Transportation cost to cold store	9.75	0.98
iv.	Cold storage charges	120	12
v.	Shortage @ 2.5%	16.25	1.63
vi.	Labour charges after storage	18.25	1.83
vii.	Interest @ 8.5% per annum for six months*	27.63	2.76
viii.	Transportation charges to market	13.17	1.32
ix	Unloading charges	2.41	0.24
3.	Net price received by the farmer	385.33	38.53
4.	Expenses borne by the wholesaler	67.5	6.75
i.	Market fee @ 2%	13	1.3
ii.	Rural development fund @ 2%	13	1.3
iii.	Commission to the commission agent @ 5%	32.5	3.25
iv.	Grading expenses	3.5	0.35
v.	Miscellaneous expenses	5.5	0.55
vi.	Margin of the wholesaler	72.5	7.25
5.	Wholesaler's sale price/ retailer's purchase price	790	79
6.	Expenses borne by the retailer	81.2	8.12
i.	Transportation cost	12.25	1.23
ii.	Labour	3.7	0.37
iii.	Rent of the shop/rehri	4	0.4
iv.	Packing cost	14	1.4
v.	Loss, wastage and spoilage @ 5%	39.5	3.95
vi.	Miscellaneous cost	7.75	0.78
vii.	Margin of the retailer	128.8	12.88
7.	Retailer's sale price/ consumer's purchase price	1000	100

**The interest has been worked out at the producer's sale price i.e. ₹430.00 per qtl at Jalandhar market during February, 2012.*

farmers to store potatoes in cold stores to fetch higher prices in the lean season.

CONCLUSION

Potato is one of the most important crops. This is next only to wheat, rice and maize. Next to cereals, potato is the only crop which could supplement the need of the food of the country. Punjab ranks fifth as far as potato production in the country is concerned during the year 2011-12. The area under potato had increased from 14 thousand hectares during 1966-67 to 84 thousand hectares in 2011-12. This crop alone occupied about 74 per cent of the total vegetable of the state. During the year 2011-12, the potato production in Punjab was 2104 thousand metric tons and productivity was to the extent 25013 kgs per hectare. There was a regular fluctuation in the area and production of potato mainly on account of price instability. Jalandhar district alone was having the maximum area and production of potato. About 35 per cent of the cold storage capacity of the state was also concentrated in this district. The arrival of potato had varied from 6.60 lakh qtls in 1993-94 to 2.88 lakh qtls.in 2012-13. There had been inter-year fluctuations in the arrival of potato. The arrival of potato was maximum in the post-harvest period. The lowest market arrival was 0.06 lakh qtls in April in the year 2005-06 and the maximum arrival was 2.75 lakh qtls in December in the year 2001-02. The seasonal indices of arrivals were found to be highest in the month of December i.e. 282 and the lowest in June i.e. 42. The net price received by the producer was about ₹357 per qtl which was about 48 per cent of the consumer's purchase price for sale of potato in Jalandhar market during February 2012. This figure was about ₹385 per qtl for sale in the same market in September, 2012. The addition net gain to the farmer was of ₹28 per qtl for sale in September, 2012 as compared to February 2012. The extension agencies may advice the farmers to store potatoes in cold stores to fetch higher prices in the lean season. To encourage the small and medium farmers to take their produce to distant markets outside the state, cooperative/group marketing may be encouraged. This will increase the income of the farmers.

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Received: August 12, 2015
Accepted: October 3, 2015