

**RESEARCH ARTICLE :**

# Extent of adoption of potato production technology by the potato growers in Sabarkantha district of Gujarat

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**SUMMARY :** Horticulture sector covering only 8.00 per cent of total cropped area in the country and it contributes 24.50 per cent to G.D.P. and 54.55 per cent to export earning in agriculture sector. Potato is an important vegetable crop of the Sabarkantha district of the Gujarat state occupying about 18.46 per cent of total potato cropped area of the state. It ranks second in area and production of potato after Banaskantha district. While it ranks fourth with average productivity 31.04 MT/ha after Gandhinagar (33.75 MT/ha), Anand (32.00 MT/ha) and Banaskantha (31.05 MT/ha). The specific objectives studied were, to study the personal, socio-economic, situational and psychological characteristics of the potato growers, to find out knowledge level of the potato growers about potato production technology, to find out the extent of adoption of potato production technology by the potato growers. The results revealed that majority (56.67 %) of the potato growers were found in the middle age group and majority (35.83%) of the potato growers were educated upto high secondary level. Nearly half (54.17%) of the respondents belonged to medium size of family, majority (60.83%) of the potato growers had membership in one organization, more than two-fifths (42.50 %) of the potato growers were semi-medium farmers having 2.01 to 4.0 ha of land, majority (67.50 %) of the potato growers were found with medium annual income and majority (71.67%) of the potato growers fell in medium category of the extension participation. Three-fifths (61.67%) of the potato growers had adopted drip as a method of irrigation and majority (63.33%) of the farmers had adopted groundnut–potato–fodder sorghum potato based cropping pattern, more than three-fourths (75.83%) of the potato growers had medium innovative proneness and nearly three- fifths (60.00%) of the potato growers had medium risk orientation. A great majority (61.67%) of the potato growers had medium level of knowledge regarding recommended practices of potato. The findings regards to the practice-wise knowledge of the respondents about recommended potato production technology are presented. It reveals that ‘sowing time and method’ and ‘irrigation management’ were the most important practices of potato cultivation and found having maximum mean knowledge score (93.33 mean score each). Majority (70.83 %) of the respondents had medium extent of adoption of recommended production technology of potato. The practice-wise adoptions of recommended production technology of potato concluded that among the different recommended potato production technologies, (86.57mean score) of the respondents had adopted irrigation management technology.

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## **BACKGROUND AND OBJECTIVES**

Agriculture as the largest private enterprise in India and will continue to be the life line of the Indian economy least in foreseeable future. It contributes nearly 22.00 per cent to national gross domestic product (G.D.P.). In food sector alone agriculture contributes about 250 thousand crores rupees annually and also provide direct employment to about 234 million people.

Horticulture sector covering only 8.00 per cent of total cropped area in the country and it contributes 24.50 per cent to G.D.P. and 54.55 per cent to export earning in agriculture sector.

Potato is world's fourth most important crop after rice, wheat and maize and its production potential is recognized throughout the world. In India potato is largely consumed as vegetable while in most of the developed world it is considered as staple food. India is an important potato producing country in the world. It ranks fourth in area after China, Russia and Ukraine and ranks third in production after China and Russia. India has highest potato productivity than three largest potato producers *viz.*, China, Russia and Ukraine. FAO identified potato as food of future as it has great potential of fighting hunger and poverty in large part of the world. In this context, year 2008-09 was celebrated as "International Potato Year" throughout the world.

Potato is an important vegetable crop of the Sabarkantha district of the Gujarat state occupying about 18.46 per cent of total potato cropped area of the state. It ranks second in area and production of potato after Banaskantha district. While it ranks fourth with average productivity 31.04 MT/ha after Gandhinagar (33.75 MT/ha), Anand (32.00 MT/ha) and Banaskantha (31.05 MT/ha). Therefore, there is a wide gap between highest productivity in the state and productivity of Sabarkantha. The low yield (productivity) of potato in Sabarkantha district could be attributed to the fact that the farmers have not still adopted the recommended production technology of the crop upto the extent. The knowledge about the new production technology plays vital role in their adoption by farmers. Further, several constraints in adoption of technology and marketing of the production also play a significant role in adoption of recommended technologies. Taking all this in view, the present study was under taken with following specific objectives.

### **Objectives of the study :**

- To study the personal, socio-economic, situational and psychological characteristics of the potato growers.
- To find out knowledge level of the potato growers about potato production technology.
- To find out the extent of adoption of potato production technology by the potato growers.

## **RESOURCES AND METHODS**

The present study was undertaken in Sabarkantha district of Gujarat state. Using purposive random sampling, two talukas *viz.*, Dhansura and Bayad were selected purposively as these talukas are having high area under potato production. Three villages from each taluka were selected by using simple random sampling technique. Thus, six villages were selected randomly. From each village, twenty respondents were selected randomly making a sample of 120 respondents.

The present study was confined to ex-post-facto research design, the independent variables were measured by using suitable scale and procedure adopted by various researchers in past with due modification.

The data were collected with the help of structured pre-tested interview schedule. The data collected were analyzed, tabulated and interpreted in the light of objectives for arriving at meaningful interpretation.

## **OBSERVATIONS AND ANALYSIS**

The results obtained from the present study as well as discussions have been summarized under following heads:

### **Personal characteristics :**

*Age :*

The numerical figures in Table 1 show that majority (56.67 %) of the potato growers were found in the middle age group. While (24.16 %) were of young age. Remaining 19.17 per cent of the potato growers were found in old age group. It is inferred that majority of the potato growers belonged to middle age group. The probable reason might be that the parental occupation of farming must have taken by middle age, as young age once were unable to do farming and old once were unable to involve themselves in farming. The similar findings have been reported by Dongardive (2002); Mewara and Pandya (2007); Kadu and Saiyad (2009) and Rathod

**Table 1 : Distribution of the respondents according to their age**

Sr. No.	Age group	Number	Per cent
1.	Young age (upto 35 years)	29	24.16
2.	Middle age (36 to 50 years)	68	56.67
3.	Old age (above 50 years)	23	19.17
	Total	120	100.00

(2009).

#### Education :

The data in the Table 2 reveal that 35.83 per cent of the potato growers were educated upto high secondary level, followed by 24.17 per cent, 22.50 per cent and 13.33 per cent were having education upto secondary, primary and graduation level, respectively. Only 04.17 per cent of the respondents were illiterate. It is said to note that not a single respondent was found having post-graduation. From the above discussion, it can be concluded that majority (73.33%) of the potato growers had education upto secondary level and above. The probable reasons for literacy among the potato growers were more educational facilities available in rural area

and realization about the significance of education for the overall development of the life. Due to scope to establish better economic condition through education, they might have decided to go for formal education rather than earning money right from childhood. This finding is in line with the results reported by Dongardive (2002); Patel (2005); Kadu and Saiyad (2009) and Sasane *et al.* (2011).

#### Socio-economic characteristics :

##### Size of family :

The data presented in Table 3 reveal that nearly half (54.17%) of the respondents belonged to medium size of family, followed by small size of family (28.33 %) and large size of family (17.50 %), respectively. The

**Table 2 : Distribution of the respondents according to their level of education**

Sr. No.	Level of education	Number	Per cent
1.	Illiterate	05	04.17
2.	Primary education (1 <sup>st</sup> to 7 <sup>th</sup> std.)	27	22.50
3.	Secondary education (8 <sup>th</sup> to 10 <sup>th</sup> standard)	29	24.17
4.	Higher secondary education (11 <sup>th</sup> to 12 <sup>th</sup> standard/ diploma course)	43	35.83
5.	Graduation	16	13.33
6.	Post-Graduation	00	00.00
	Total	120	100.00

**Table 3 : Distribution of the respondents according to their size of family**

Sr. No.	Family size	Number	Per cent
1.	Small (Upto 6 members)	34	28.33
2.	Medium (7 to 11 members)	65	54.17
3.	Large (above 11 members)	21	17.50
	Total	120	100.00
Mean = 8.60		S.D. = 2.53	

**Table 4 : Distribution of the respondents according to their social participation**

Sr. No.	Social participation	Number	Per cent
1.	No membership	20	16.67
2.	Membership in one organization	73	60.83
3.	Membership in more than one organization	19	15.83
4.	Holding position	08	06.67
	Total	120	100.00

probable reason for medium size of family might be the unawareness of family planning among the respondents. This finding has been supported by Mate (2005); Mewara and Pandya (2007) and Choudhary (2009).

*Social participation :*

It is clear from the Table 4 that 60.83 per cent of the potato growers had membership in one organization followed by 16.67 per cent had no membership in any organization. On the other hand, 15.83 per cent respondents had membership in more than one organization. Very few *i.e.* 06.67 per cent of potato growers were found holding position in social organizations. It is inferred from the data that a great majority (76.66%) of the potato growers had membership in at least one organization. This finding is in concurrence with the findings reported by Patel (2005); Parmar (2006) and Choudhary (2009).

*Size of land holding :*

It is apparent from Table 5 that 42.50 per cent of the potato growers were semi-medium farmers followed by 29.17, 15.83 and 12.50 per cent small farmers, marginal farmers and medium farmers, respectively.

None of the respondents was found in large category. Thus, it can be concluded that majority (84.17 %) of the potato growers had small to medium size of land holding. This result is in conformity with the findings of Mate (2005); Chaudhary (2009) and Kadu and Saiyad (2009).

*Annual income :*

Table 6 shows that majority (67.50 %) of the potato growers were found with medium annual income, followed by 20.00 and 12.50 per cent with low and high annual income, respectively. Thus it can be concluded that majority (67.50 %) of the potato growers had medium annual income. This might be due to semi-medium to medium size their land holding and they grow potato as cash crop led them to earn more profit. This finding is in conformity with the findings of Mate (2005) and Kadam *et al.* (2010).

*Extension participation :*

The results of the study reported in Table 7 reveal that majority (71.67%) of the potato growers fell in medium category of the extension participation. Whereas, 15.00 and 13.33 per cent of them had high and low level of extension participation, respectively. From the above

**Table 5 : Distribution of the respondents according to their size of land holding**

Sr. No.	Categories		Number	Per cent
1.	Marginal farmers	(Upto 1.00 ha)	19	15.83
2.	Small farmers	(1.01 to 2.0 ha)	35	29.17
3.	Semi-medium farmer	(2.01to 4.0 ha )	51	42.50
4.	Medium farmers	(4.01 to 10.00)	15	12.50
5.	Large farmers	(above 10.0 ha)	00	0.00
	Total		120	100.00

**Table 6 : Distribution of the respondents according to their annual income**

Sr. No.	Annual income		Number	Per cent
1.	Low	(Upto Rs. 42510/-)	24	20.00
2.	Medium	(Rs. 42510 to 1,04,224/-)	81	67.50
3.	High	(above Rs. 1,04,224/-)	15	12.50
	Total		120	100.00

Mean = 73367

S. D. = 30857

**Table 7 : Distribution of respondents according to their extension participation**

Sr. No.	Extension participation		Number	Per cent
1.	Low		16	13.33
2.	Medium		86	71.67
3.	High		18	15.00
	Total		120	100.00

Mean = 11.32

S. D. = 3.68

finding, it could be concluded that majority of the respondents had medium level of extension participation. This finding is similar to the findings of Choudhary (2009).

### Situational characteristics :

#### Method of irrigation :

The results in Table 8 state that nearly half (61.67%) of the potato growers had adopted drip as a method of irrigation, followed by 20.83 per cent and 17.50 per cent potato growers who had adopted furrow irrigation method and sprinkler irrigation system as a method of irrigation, respectively. From this finding, it can be concluded that majority (72.50%) of the respondents had adopted micro irrigation system as a method of irrigation. The probable reason might be that the Government of Gujarat has been celebrating the *Krushis Mahotsav* (a month long campaign) since 2005 with prime objectives of water conservation and water management and micro irrigation system sets are given to farmers at 50 per cent subsidized rate. This may be encouraged the potato growers to adopt the micro irrigation system. The finding is in conformity with the findings of Modi *et al.* (2008).

#### Cropping pattern :

The data in Table 9 show that 63.33 per cent of the

farmers had adopted groundnut–potato–fodder sorghum potato based cropping pattern with the first rank. The potato based cropping pattern of groundnut–potato–cluster bean (54.17%) was adopted with second rank. While, cluster bean–potato–pearl millet (43.33%), pulses–potato–fallow (39.67%), groundnut–potato–watermelon (26.67%) cropping pattern were adopted by the farmers and were ranked third, fourth and fifth, respectively.

From this discussion, it can be concluded that when farmers are selecting potato based cropping pattern, they are emphasized on cash crops with cereal and edible oil crops which secure food as well as fodder requirement.

The probable reason behind this might be the farming community gave priorities for food and fodder security for their family members and animals. Secondly, majority of the farmers adopted agriculture and animal husbandry as main occupations and earned their family income. They also had given priority to cash crops to earn more money for maintaining social occasions and entertainment and there by overall development. The finding are somewhat supported with the finding of Pokar (2008).

### Psychological characteristics :

#### Innovative proneness :

The data presented in Table 10 reveal that that nearly

**Table 8 : Distribution of respondents according to their method of irrigation**

Sr. No.	Method of irrigation	Number	Per cent
1.	Furrow irrigation (Traditional method)	25	20.83
2.	Sprinkler irrigation	21	17.50
3.	Drip irrigation	74	61.67
	Total	120	100.00
Mean= 1.925		S.D. = 0.6631	

**Table 9 : Distribution of the respondents according to various potato based cropping patterns adopted by them (n=120)**

Sr. No.	Categories of potatoes based cropping pattern	Number of respondents	Per cent	Rank
1.	Groundnut–Potato–Fodder sorghum	76	63.33	I
2.	Groundnut–Potato–Cluster bean	65	54.17	II
3.	Cluster bean – Potato – Pearl millet	52	43.33	III
4.	Pulses–Potato–Fallow	47	39.67	IV
5.	Groundnut–Potato–Water melon	32	26.67	V

**Table 10 : Distribution of respondents according to their innovative proneness**

Sr. No.	Innovative proneness	Number	Per cent
1.	Low	12	10.00
2.	Medium	91	75.83
3.	High	17	14.67
	Total	120	100.00
Mean=25.21		S.D.=4.25	



(61.67%) of the potato growers had medium level of knowledge regarding recommended practices of potato, while 22.50 per cent and 15.83 per cent of the potato growers had high and low level of knowledge, respectively. Thus, it can be concluded that majority of the respondents had medium level of knowledge regarding recommended potato production technology. The probable reason might be that majority of the potato growers had good literacy status and medium level of social participation and extension participation. This finding is in the line with findings of Mate (2005); Kadu and Saiyad (2009) and Rathod (2009).

Table 13 reveals that 'sowing time and method' and 'irrigation management' were the most important practices of potato cultivation and found having maximum mean knowledge score (93.33 mean score each) and ranked first. The other practices in which respondents had higher knowledge (mean score greater than overall mean score) were land preparation (91.43 mean score), earthing up (87.17 mean score), recommended variety (86.67 mean score), harvesting (85.00 mean score), spacing (82.50 mean score), seed rate (81.67 mean score), basal application of chemical fertilizers (80.00

mean score) and were ranked second, third, fourth, fifth, sixth, seventh, eighth, respectively.

In the remaining cultivation practices viz., F.Y.M. (76.67 mean score), seed treatment (75.00 mean score), top dressing of chemical fertilizers (74.00 mean score), insect-pest control (72.50 mean score), weed control (68.33 mean score), disease control (66.00 mean score) and crop rotation (60.00 mean score) the knowledge mean score was below overall knowledge score (79.10 mean score) and ranked ninth, tenth, eleventh, twelfth, thirteenth, fourteenth, fifteenth, respectively. From the above discussion, it can be concluded that sowing time and method, irrigation management, land preparation, earthing up and recommended variety were the practices in which potato growers had higher knowledge.

#### Extent of adoption of recommended technology of potato crop :

It is clear from Table 14 that majority of the respondents (70.83 %) had medium extent of adoption regarding recommended production technology of potato, followed by 15.83 per cent and 13.44 per cent of the respondents who had low and high extent of overall

**Table 14 : Distribution of potato growers according to their extent of adoption regarding recommended production technology of potato crop**

Sr. No.	Extent of adoption quotient	Number	Per cent
1.	Low	19	15.83
2.	Medium	85	70.83
3.	High	16	13.44
	Total	120	100.00

Mean= 70.97

S.D. = 5.99

**Table 15 : Practice-wise adoption of recommended potato production technology by potato growers**

(n=120)

Sr. No	Recommended practices	Mean score	Rank
1.	Recommended variety	76.15	V
2.	Land preparation	69.27	X
3.	Seed rate	75.17	VII
4.	Seed treatment	72.27	IX
5.	Sowing time and method	80.17	IV
6.	Spacing	81.19	III
7.	F.Y.M.	66.24	XI
8.	Basal application of chemical fertilizers	73.15	VIII
9.	Top dressing of chemical fertilizers	64.23	XII
10.	Earthing up	85.23	II
11.	Weed management	60.10	XIV
12.	Irrigation management	86.57	I
13.	Insect -pest control	61.19	XIII
14.	Disease control	56.80	XV
15.	Crop rotation	52.19	XVI
16.	Harvesting	75.51	VI
	Overall mean score =	70.97	

adoption, respectively.

Table 15 shows that among the different recommended potato production technologies, (86.57 mean score) of the respondents had adopted irrigation management technology and ranked first. The other practices in which respondents had higher adoption (mean score greater than overall mean score) were earthing up (85.23 mean score), spacing (81.19 mean score), sowing time and method (80.17 mean score), recommended variety (76.15 mean score), harvesting (75.51 mean score), seed rate (75.17 mean score), basal fertilizers (73.15 mean score) and seed treatment (72.27 mean score) were also adopted by maximum respondents and ranked second, third, fourth, fifth, sixth, seventh, eighth, ninth, respectively.

While low extent of adoption of technology was observed in remaining practices having score below overall mean score were land preparation (69.27 mean score), F.Y.M. (66.24 mean score), top dressing of fertilizers (64.23 mean score), insect-pest control (61.19 mean score), weed management (60.19 mean score), disease control (56.80 mean score), crop rotation (52.19 mean score) the adoption mean score was below overall adoption score (70.97 mean score) in ascending order. From the above discussion, it can be concluded that considering the no-cost low cost inputs in the package of practices the extent of adoption was observed among the respondents. The recommended varieties were adopted higher due to the product choice of consumers in particular area of Sabarkantha district.

### Conclusion :

The study revealed that age, education, annual income, extension participation, method of irrigation, innovative proneness, risk orientation and level of knowledge were positively and significantly related to extent of adoption of recommended potato production technology.

The extension agencies in selecting their target group should give priority to those farmers possessing high qualities in above attributes. Such farmers can help extension agencies in convincing other farmers to know and adopt scientific technology at faster rate.

Protection of crop from damage caused by insect, pest and disease is vital for raising crop successfully. The knowledge about recommended potato production technology shall be given to farmers by organizing result

demonstration.

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