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Profile and problems of tomato cultivation in Bilaspur district of Himachal Pradesh

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Abstract

India is the second largest producer of vegetables with a share of nearly 11 per cent of the total world's vegetable production. Of late, vegetable growing has become main plank of agricultural development strategy in Himachal Pradesh and consequently area under vegetables (excluding potato) has increased to 76.947 thousand hectares producing 1653.506 thousand tonnes in the state. Tomato alone accounts for nearly one-third of total vegetables production in the state. Its cultivation has been extended to mid and low hill areas of Mandi, Kangra, Bilaspur, Hamirpur districts. With this background, the present study was conducted in Bilaspur district of Himachal Pradesh. In this district, tomato is the main vegetable crop which contributes about 37 per cent to the total vegetables production. The present study sought to examine the profile and problems of tomato cultivation in Bilaspur district. The study is based on secondary as well as primary data. The area under tomato cultivation in the district has been found to increase from 740 hectares in 2004-05 to 822 hectares in 2016-17. The total production of tomato crop in the district has also shown a significant increase from 25900 tonnes to 31236 tonnes during this period. Area, production and productivity of tomato in Bilaspur district witnessed a growth rate of 0.49, 2.02, and 1.52 per cent per annum, respectively whereas these were 1.68, 4.46, and 2.73 per cent for the state. Regarding problems in tomato cultivation, the non-availability of improved varieties at the time of sowing, lack of awareness about high yielding and disease resistant varieties and lack of storage facilities were the severe problems in the study area. Hence, overcoming these problems and constraints can pave way for increased tomato production in the district.

Key words: Area**,** productivity, problems of tomato cultivation.

Tomato is one of the most popular vegetables grown in India because of its high nutritive value, higher production and wide ecological amplitude. The consumption of tomato has high income elasticity of demand (Kakava *et al*. 2006). Thus, there will be more demand for tomato with population growth, economic growth and urbanization. Also, it is a rich source of vitamins and organic acid. The estimated area and production of tomato in India is about 7.97 lakh hectares and 207.08 lakh tonnes, respectively (Anonymous 2017-18).

Himachal Pradesh produces a number of vegetables like tomato, green peas, beans, cabbage, cauliflower, capsicum, cucumber, etc. But tomato and green peas together account for about 50 per cent of the total area and production of all vegetables in the state (Kumar *et al*. 2017). Tomato accounts for about 15 per cent of total area under vegetables but contributes about 30 per cent of total vegetable production in the state. Hence, it is the most important cash crop that is grown widely in the state. Of late, due to its profitability, its cultivation has been extended to mid and low hill areas of Mandi, Kangra, Bilaspur, Hamirpur districts. Since, the farmers have chosen tomato cultivation in a big way in Bilaspur district where it is cultivated on around 800 hectares with a production of about 30,000 tonnes, it was deemed appropriate to study the status and problems of this most important cash crop among vegetables in the district. The first section describes the profile of

tomato in Himachal Pradesh and Bilaspur district using the secondary data and the second section details out the problems related to tomato cultivation in the study area followed by the conclusions.

Materials and Methods

Tabular analysis was used to compute the averages and percentages. The compound annual growth rates (CAGRs) were worked out to examine the growth in area, production and productivity of tomato cultivation in Himachal Pradesh and Bilaspur district using the time series data over a period of 14 years (2004-05 to 2016-17) using exponential production function:

$$Y = ab^t$$

In logarithmic term: $\text{Log } Y = \log a + t \log (b)$

$$\text{CAGR } (\%) = [\text{antilog } (\log b) - 1] \times 100$$

where,

Y= Value of variable, **a =** Constant term,

b = Regression coefficient, **t =** Time variable in years

Further, to study the problems faced by tomato growers in Bilaspur district, primary data were collected on a well-designed pre-tested schedule, by personal interview method. Two-stage random sampling technique was used to select villages and farmers. In the first stage of sampling a list of tomato growing villages was prepared from the concerned block agriculture officials and 9 villages were chosen randomly. In the second stage, a random sample of 60 farmers was chosen based upon proportional allocation method from the selected villages. For the analysis of problems, Garrett's ranking technique was employed.

Results and Discussion

Profile of vegetable cultivation in Himachal Pradesh

Agriculture continues to be a major source of livelihood for the majority of the people in HP. The state has witnessed tremendous transformation in agriculture during the past five decades after it earned full statehood in 1971. Earlier the economy of Himachal Pradesh was fruit based but with a thrust on crop diversification, vegetable cultivation in Himachal Pradesh has gained significance due to favourable agro-climatic conditions for growing quality off-season vegetables. Vegetables fetch high prices in plain markets and thus, encourage farmers to take up vegetable cultivation as a profession which has improved the living standards of the peasantry. Moreover, with the emergence of the urban middle class market having specific kitchen needs and health security, there is a growing demand for quality vegetables. The hill grown vegetables find a special liking in the plains on account of their characteristic flavour, freshness, sweetness, etc. There is an additional advantage of comparatively low incidence of diseases and insect-pests in hills and thus, making the produce relatively pesticide residue free. The state has a great potential for producing vegetables in different seasons under varied conditions.

The area under all vegetable crops in the state increased from 46213 hectares in 2004-05 to 76947 hectares in 2016-17 (Table 1). Consequently, the production of vegetables which was 8.32 lakh tonnes in 2004-05 increased to 16.54 lakh tonnes in 2016-17, registering a hike in yield of all vegetable crops from 18.01 tonnes per hectare to 21.49 tonnes per hectare during this period. In case of tomato, the area in the state increased from 8973 hectares in 2004-05 to 11064 hectares in 2016-17 whereas the production of tomato in Himachal Pradesh increased from 3.01 lakh tonnes in 2004-05 to 4.73 lakh tonnes in 2016-17. The productivity of tomato in the state witnessed an increase from 33.54 tonnes per hectare to 42.78 tonnes per hectare during this period. The contribution of tomato to all vegetables area and production came down from 19.42 and 36.16 per cent in 2004-05 to 14.38 and 28.62 per cent in 2016-17, respectively. This indicates that despite registering a magnificent hike in productivity, other vegetable crops might have become popular with the farmers during this period in relation to tomato.

District-wise area, production and productivity of tomato in HP, 2016-17

As indicated above, total area and production of tomato in Himachal Pradesh during the year 2016-17 stood at 11064 ha and 473284 tonnes, respectively (Table 2). Solan district contributed maximum area (41.94%) followed by Sirmaur (21.63%), Mandi (8.47%) and Bilaspur (7.43%). Whereas, with respect

Table 1. Area, production and productivity of all vegetables and tomato in Himachal Pradesh, 2004-05 to 2016-17

Year	All Vegetables			Tomato		
	Area (ha)	Production (tonnes)	Yield (tonnes/ha)	Area (ha)	Production (tonnes)	Yield (tonnes/ha)
2004-05	46213	832442	18.01	8973 (19.42)	300976 (36.16)	33.54
2005-06	49858	929976	18.65	9211 (18.47)	301183 (32.39)	32.70
2006-07	52611	1006247	19.13	9388 (17.84)	316800 (31.48)	33.75
2007-08	55761	1040489	18.65	9499 (17.04)	319217 (30.68)	33.61
2008-09	58743	1090334	18.56	9555 (16.27)	336287 (30.84)	35.19
2009-10	63879	1206242	18.88	10124 (15.85)	383824 (31.82)	37.91
2010-11	65075	1268897	19.49	9944 (15.28)	388426 (30.61)	39.06
2011-12	67968	1356600	19.96	9870 (14.52)	392061 (28.90)	39.72
2012-13	68865	1398048	20.30	9930 (14.42)	413709 (29.59)	41.66
2013-14	72001	1465964	20.36	10373 (14.41)	430789 (29.39)	41.52
2014-15	156378	3625942	23.19	10800 (6.90)	475965 (13.12)	44.07
2015-16	75233	1608553	21.38	11037 (14.67)	485536 (30.18)	43.99
2016-17	76947	1653506	21.49	11064 (14.38)	473284 (28.62)	42.78

Figures in parentheses indicate percentages to the state area and production of all vegetables and tomato.
Source: Derived from data from Directorate of Agriculture, Government of HP, Shimla

to production, the share of Solan district was maximum (49.02%), followed by Sirmaur (21.02%), Bilaspur (6.60%) and Kullu (6.50%) districts. Further, Solan district recorded highest yield of tomato at 50 tonnes per hectare followed by Hamirpur (46.09 t/ha) and Shimla (41.70 t/ha) districts.

Area, production and yield of vegetables and tomato in Bilaspur district

The area under vegetable cultivation in Bilaspur district has shown a significant increase from 2005 ha to 3121 ha over the period 2004-05 to 2016-17 and the area under tomato cultivation in the district increased from 740 hectares to 822 hectares during the same period (Table 3). Like-wise tomato production in the district increased from 25900 tonnes to 31236 tonnes. Tomato accounted for about 37.00 per cent of area and production of all vegetables in the district in 2016-17. Here it is worth observing that the per cent share of tomato in total vegetable production in the district, came down substantially from nearly 53 per cent in 2004-05 to 37 per cent in 2016-17, indicating a falling production choice of tomato *vis-à-vis* other vegetable crops by the farmers. During this study period, except for the year 2015-16 when tomato productivity stood at 46.86 tonnes/ha, it hovered mostly between 35.00 - 38.00 t/ha in the district.

Table 2. District-wise area, production and yield of tomato in Himachal Pradesh, 2016-17

District	Area (ha)	Production (tonnes)	Yield (tonnes/ha)
Bilaspur	822	31236	38.00
	(7.43)	(6.60)	
Chamba	292	11218	38.42
	(2.64)	(2.37)	
Hamirpur	128	5900	46.09
	(1.16)	(1.25)	
Kangra	291	7130	24.50
	(2.63)	(1.51)	
Kinnaur	76	3420	45.00
	(0.69)	(0.72)	
Kullu	760	30781	40.50
	(6.87)	(6.50)	
Lahaul Spiti	4	71	17.75
	(0.04)	(0.02)	
Mandi	937	23358	24.93
	(8.47)	(4.94)	
Shimla	573	23892	41.70
	(5.18)	(5.05)	
Sirmaur	2393	99463	41.56
	(21.63)	(21.02)	
Solan	4640	232000	50.00
	(41.94)	(49.02)	
Una	148	4815	32.53
	(1.34)	(1.02)	
HP	11064	473284	42.78
	(100.00)	(100.00)	

Figures in parentheses indicate percentages to the total in each category.

Source: Derived from data from Directorate of Agriculture, Government of HP, Shimla

Compound growth rates in area, production and yield of tomato and all vegetables in Bilaspur and Himachal Pradesh

In order to have a summary picture of growth in area, production and productivity of all vegetables and tomato in Bilaspur district as well as HP, compound annual growth rates (CAGRs) were computed and the results are given in Table 4. As may be seen, the area, production and productivity of all vegetables in Bilaspur witnessed an annual growth rate of 3.98, 5.31 and 1.28 per cent, respectively whereas these were 6.01, 7.78 and 1.67 per cent for the state (Table 4). Similar results were observed by Kumar (2013). On the other hand, a growth rate of 0.49, 2.02, and 1.52 per cent was registered in area, production and productivity of tomato in Bilaspur district while annual growth rate of 1.68, 4.46, and 2.73 per cent was observed in Himachal Pradesh. This clearly shows that the growth rates of area, production and productivity of tomato in Bilaspur district lagged behind those for the state substantially during the study period. This stark difference was lesser in magnitude in case of all vegetables.

Table 3. Area, production and yield of all vegetables and tomato in Bilaspur district, 2004-05 to 2016-17

Year	All Vegetables			Tomato		
	Area (ha)	Production (tonnes)	Yield (tonnes/ha)	Area (ha)	Production (tonnes)	Yield (tonnes/ha)
2004-05	2005	49092	24.48	740 (36.91)	25900 (52.76)	35.00
2005-06	2050	50195	24.49	765 (37.32)	26775 (53.34)	35.00
2006-07	2050	50195	24.48	765 (37.32)	26775 (53.34)	35.00
2007-08	2105	51090	24.27	760 (36.10)	26600 (52.06)	35.00
2008-09	2300	57725	25.09	785 (34.13)	27475 (47.60)	35.00
2009-10	2310	58450	25.30	795 (34.42)	27825 (47.60)	35.00
2010-11	2430	67057	27.59	805 (33.13)	30187 (45.02)	37.50
2011-12	2535	71970	28.39	760 (29.98)	30020 (41.71)	39.50
2012-13	2565	72876	28.41	780 (30.41)	29315 (40.23)	37.58
2013-14	2693	72878	27.06	730 (27.11)	27337 (37.51)	37.45
2014-15	2932	80067	27.31	790 (26.94)	30020 (37.49)	38.00
2015-16	3040	83005	27.30	813 (36.91)	38094 (45.89)	46.86
2016-17	3121	84958	27.22	822 (37.32)	31236 (36.77)	38.00

Figures in parentheses indicate percentages to the district area and production of all vegetables.
Source: Derived from data from Directorate of Agriculture, Government of HP, Shimla

Table 4. Compound growth rate in area, production and yield of tomato and all vegetables in Bilaspur and Himachal Pradesh, 2004-05 to 2016-17

Particulars	Tomato			All Vegetables		
	Area	Production	Yield	Area	Production	Yield
Bilaspur	0.49* (0.0370)	2.02* (0.0828)	1.52* (0.0709)	3.98* (0.0293)	5.31* (0.0512)	1.28* (0.0440)
Himachal Pradesh	1.68* (0.0226)	4.46* (0.0468)	2.73* (0.0357)	6.01* (0.2590)	7.78* (0.3002)	1.67* (0.0413)

Note: * Significant at 5% level of significance. Figures in parentheses are standard errors.*

Problems and constraints in tomato cultivation

An opinion survey was conducted to identify the problems faced by the farmers in tomato production in the study area. The constraints encountered by the respondents were categorized into five categories namely; input constraints, financial constraints, technical constraints, educational constrains and marketing constraints. The responses regarding these constraints were then categorized into five categories (I, II, III IV and V) on the basis of their level of ranking (Table 5). In case of problems related to the inputs constraints, the unavailability of improved varieties at the time of sowing and the unavailability of labour and high wage rates were found to be most important and were ranked at first and second place with an average Garrett score of 74.10 and 68.27, respectively. It was also observed that most of the farmers were not able to reap the benefits of subsidy on different agricultural inputs as there was a shortage in its supply and timely availability in the respective agricultural offices and therefore, the farmers were forced to buy the inputs at higher market prices. The inability to reap the benefits of subsidy on different agricultural inputs, lack of irrigation water, unavailability of recommended chemicals for seed treatment and the unavailability of fertilizers in the local market at the time of sowing were found to be at third, fourth, fifth and sixth place, with an average Garrett score of 60.10, 54.23, 45.73 and 37.67, respectively.

In case of financial constraints, the high cost of improved varieties was found to be most important constraint and was ranked first with an average Garrett score of 66.00. Other constraints such as high cost of fertilizers and chemicals and high cost of improved implements were ranked at second and third place, with an average Garrett score of 60.47 and 53.13, respectively. The average Garrett score of higher electricity charges was 32.33 and therefore was ranked in the fourth position. In case of technical constraints, the lack of awareness regarding the high yielding and resistant varieties was the top most problem in the study area and was ranked at first place with an average Garrett score of 74.07. It was because of this problem that the farmers were facing the problems of high infestation of diseases and pests and were not able to reap high productivity of tomato crop. Moreover, lack of knowledge of seed treatment, post-harvest technologies and plant protection measures and the unavailability of technical advice were found to be at second, third, fourth and fifth place with an average Garrett score of 68.00, 62.83, 51.50 and 47.70, respectively. The problem regarding the lack of knowledge of seed rate and spacing was found to be at low level and was therefore ranked at sixth position with an average Garrett score of 32.73.

As far as educational constraints were concerned, the problem regarding the lack of confidence among the farmers for the use of HYVs was found to be high and was ranked at first place among the educational constraints with an average Garrett score of 66.97. The other problems such as the lack of knowledge about the proper application methods of chemical fertilizers and the proper method of tomato production were found to be medium level and were ranked as second and third with an average Garrett score of 60.13 and 50.67, respectively. Moreover, the problem regarding the lack of knowledge and skills about the operation of implements and equipments such as sprayers, dusters, etc. was of lower order and ranked at fourth position with an average Garrett score of 34.80. The lack of storage facility was the first and the major problem faced by the farmers and the average Garrett score of this problem was 73.67. Moreover, the problems such as the lower price at harvesting time, lack of transport facility and the absence of assured marketing at remunerative prices and insurance facilities were found to be medium level and were ranked as second, third and fourth, with an average Garrett score of 64.00, 60.33 and 40.67, respectively. The problem regarding the manipulation of the farmers by the merchants was less and was ranked at fourth place with an average Garrett score of 31.00.

Conclusions

Though tomato continues to be an important cash crop in the state, yet its contribution to all vegetables area and production witnessed a slump during the period 2004-05 to 2016-17. This indicates that other vegetable crops might have become more popular with the farmers during this period in relation to tomato, not withstanding a magnificent hike in tomato

Table 5. Problems and constraints in tomato cultivation

(Garrett score)

Sr. No.	Problems/constraints	Sum of score	Mean	Rank
A.	**Input constraints**			
1	Unavailability of improved varieties at the time of sowing	4446.00	74.10	I
2	Unavailability of labour and high wage rates	4096.20	68.27	II
3	Inability to reap the benefits of subsidy on different agricultural inputs	3606.00	60.10	III
4	Lack of irrigation water	3253.80	54.23	IV
5	Unavailability of recommended chemicals for seed treatment	2743.80	45.73	V
6	Unavailability of fertilizer in the local market at the time of sowing	2260.20	37.67	VI
7	Non availability of recommended weedicides	1732.20	28.87	VII
B.	**Financial constraints**			
1	High cost of improved varieties	3960.00	66.00	I
2	High cost of fertilizers and chemicals	3628.20	60.47	II
3	High cost of improved implements	3187.80	53.13	III
4	Higher electricity charges	1939.80	32.33	IV
C.	**Technical constraints**			
1	Lack of awareness of the high yielding and resistant varieties	4444.20	74.07	I
2	Lack of knowledge about seed treatment	4080.00	68.00	II
3	Lack of knowledge about post-harvest technologies	3769.80	62.83	III
4	Lack of proper knowledge about plant protection measures	3090.00	51.50	IV
5	Unavailability of technical advice	2862.00	47.70	V
6	Lack of knowledge of seed rate and spacing	1963.80	32.73	VI
D.	**Educational constraints**			
1	Lack of confidence of using the HYVs	4018.20	66.97	I
2	Lack of knowledge about proper application methods of chemical fertilizers	3607.80	60.13	II
3	Lack of knowledge and skills about proper method of tomato production	3040.20	50.67	III
4	Lack of knowledge and skills about operation of implements and equipment such as sprayers, dusters etc.	2088.00	34.80	IV
E.	**Marketing constraints**			
1	Lack of storage facility	4420.20	73.67	I
2	Lower price at harvesting time	3840.00	64.00	II
3	Lack of transport facility	3619.80	60.33	III
4	Absence of assured marketing at remunerative price and insurance facility	2440.20	40.67	IV
5	Manipulation by merchant	1860.00	31.00	V

productivity. Bilaspur with an area share of 7.43 per cent and production contribution of 6.60 per cent to state area and production, respectively, remains an important tomato growing district after Solan and Sirmaur. Further given that tomato productivity in Bilaspur stood lower than the state average, offers scope of enhancing the same to higher levels. The growth rates of area, production and productivity of tomato in Bilaspur district lagged behind those for the state substantially during the study period. The glaring difference between the growth rates achieved in Bilaspur and HP was lesser in magnitude in case of all vegetables *vis-a-vis* tomato. The constraints reported by tomato growers in the study area necessitate an efficient system to ensure timely supply of quality seed to the farmers besides creating proper contact with the government agencies and institutions regarding the proper technical advice. Further, since the crop is highly perishable in nature and farmers face huge losses after harvests, therefore, efforts are required for creating cold storage facility, giving a boost to the tomato economy of the state in general and of the study area in particular. These measures can go a long way in boosting tomato production in the district.

References

Kakava E, Khah EM, Mavromatis A, Chachalis D and Goulas C. 2006. Effect of grafting on growth and yield of tomato. Journal of Applied Horticulture **8** (1): 3-7.

Anonymous 2017-18. Area, Production and Productivity of Tomato in India. www.indiastat.com

Virender Kumar, Divya Sharma and Harbans Lal 2017. Economy of growing vegetables and farm incomes in Himachal Pradesh. Agricultural Situation in India **73** (10): 23-29.

Kumar V 2013. Estimation of cost of cultivation of commercial crops in Himachal Pradesh. Abridged Report (Research Report 64). Department of Agricultural Economics, Extension Education and Rural Sociology, CSK Himachal Pradesh Krishi Vishvavidyalaya, Palampur (HP): 1-40.