

Research Article

A study on adoption of orange production technology by the farmers in Chhindwara district of M.P.

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SUMMARY : Keeping this view, study was conducted in Chhindwara District of (M.P.) in 2011. Being major orange growing area, the study was conducted in Sausar blocks of the District. Ten villages were selected randomly. List of orange growers of selected villages was prepared. Total 120 respondents were selected with the random sampling method. Out of total 11 independent variables, all the variables namely educational qualification, size of land holding, social participation, socio-economic status, attitude towards new technologies, mass media exposure, extension participation, innovativeness market orientation and annual income were found significantly associated with both knowledge and adoption behaviour of orange growers about recommended orange production technology except age which was found non-significant. Horticulture is prominent sector among agriculture and allied activities as a means of diversification for making agriculture more profitable through efficient use of natural resources. In the horticultural development map of the world, the nature has place our country in a place of pride as it has favourable climate and soils for growing a large number of horticultural crops.

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KEY WORDS :

Analysis of orange production technology, Constraints analysis

BACKGROUND AND OBJECTIVES

Citrus is native to a large area, which extends from Himalayan foot hills of North-east India to North-Central China, Philippines in the east and Burma, Thailand, Indonesia and New Caledonia in South-east. In India, in terms of area under cultivation, citrus is the third largest fruit industry after Banana and Mango. Over the last 30 years, the area and production under citrus cultivation has increased at the rate of 11 and 9 per cent, respectively, which shows that the expansion of citrus industry was quite sustainable. The average yield of citrus fruits in India is alarmingly low (10.1 t/ha) compared to other developed countries like Brazil, USA, China, Mexico and Spain (30-40 t/ha). Among mandarins, Nagpur mandarin (Central India), Kinnow mandarin (North-West India), Coorg mandarin (South India) and Khasi mandarin (North-East India) are the commercial cultivars of India. Whereas, Mosambi (Maharashtra), Sathgudi (Andhra Pradesh) and Malta and Jaffa

(Punjab) are the sweet orange cultivars traditionally grown. Citrus cultivation in India is plagued with various problems due to limiting growing conditions, limiting water resources and high incidence of pests and diseases warranting great care from planting till the plants come to bearing in order to sustain a productive life of a minimum of 15-20 years. There is growing interest/awareness among the citrus growers for adoption of latest technologies for commercial cultivation of citrus. The National Research Centre (NRC) for Citrus (ICAR), Nagpur has come out with the package of practices for citrus cultivation in different regions of the country. In the present bankable project on citrus, recommendations of the NRC for citrus and the views of the citrus growers and their experience has been taken into consideration. Among citrus fruits orange is grown across the world in 41.96 lakh hectares with 684.75 lakh tonnes production which translates into 16.32 tonnes a hectare productivity according to FAO, 2009. It is the most commonly grown tree

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fruit in the world. Brazil is the world leader in orange production (176.18 lakh tonnes) contributing to 25.73 per cent of world tonnage followed by the US at 12.09 per cent (82.81 lakh tonnes), India at 7.60 per cent (52.01 lakh tonnes) and China at 7.10 per cent (48.65 lakh tonnes). India is the third largest producer of orange in the world. Although, India is second in area and third in production of orange in the world, the productivity/hectare is very low as compared to the US, Indonesia, Turkey and other countries where the crop is grown commercially. In terms of productivity, India ranks 64th with only 9.23 tonnes a hectare. Total export of orange from India during 2009-10 was 25.06 thousand tonnes (Rs 25.39 crore in value). In terms of value, Bangladesh is a major importer contributing 84 per cent followed by Nepal contributing 12.08 per cent of total exports from India. Other major importing countries include Kuwait, Oman, Singapore and the UK. In India, oranges are mostly grown in Maharashtra, Madhya Pradesh, Assam, Rajasthan, Mizoram, Meghalaya, Nagaland and Karnataka. The area under orange cultivation in India has increased by 125.77 per cent from 2.49 lakh hectares in 2001 to 5.63 lakh hectares in 2009 with 101.98 per cent increase in the production from 25.75 to 52.01 lakh tonnes during the same period. Maharashtra is the leading orange (Mandarin) producing State with 8.27 lakh tonnes (2009-10) accounting for 40 per cent of total production and yield of 6 tonnes a hectare. Madhya Pradesh ranks second with production of 6.78 lakh tonnes followed by Assam (1.42 lakh tonnes). Karnataka is with the highest yield at 19.20 tonnes a hectare. Despite a considerable increase in the area under orange orchard, the production and quality of fruits have been found dwindling because of various problems in adoption of recommendations. Comparative analysis of yield of orange fruit production shows that our orange fruit production per hectare is very low (9-10 tonnes/ha), with that of developed countries. The unit area production of orange depends mainly on the technical know-how possessed and the extent of its use in production by the orange growers. Also extension programme on various technologies to be transfer with the help of different department but there are gaps in production by the farmer on his farm. So as to boost up the orange production; latest technology is being continuously developed and recommended for use by the orange grower's. Despite this; the production of orange per hectare in Madhya Pradesh is still low. Therefore, there was need to study the knowledge and adoption of recommended orange production practices. Hence, the present investigation was planned to explore knowledge and adoption of recommended orange production technology with objectives : to study the social, economic, psychological and personal attributes of the orange growers and to determine the adoption behaviour of recommended orange production technology among the orange growers to find out the constraints experienced by

orange growers in adoption of recommended orange production technology and suggestions to overcome the constraints.

RESOURCES AND METHODS

This study was conducted in Chhindwara district. Out of total eleven blocks under Chhindwara district, Sausar block was selected based on higher acreage under orange orchards. This block was identified as a potential one block for the production of the orange. A list of villages was prepared under the selected block (Saunsar) and ten villages were selected randomly. A comprehensive list of orange growers of selected villages was prepared. Selection of respondents was done through random sampling method. Total 120 respondents were selected randomly.

OBSERVATIONS AND ANALYSIS

The data presented in Table 1 reveal that out of the total 120 respondents most of them 39.17 per cent were of middle age group followed by old age group 32.50 per cent and young age group 28.33 per cent. Thus, it can be concluded that in the study area, most of the orange growers were in middle age group. The data show that maximum numbers 45.83 per cent of respondents were found to possess primary school level of education, 10.83 per cent were illiterates, 16.67 per cent were functionally literate, 16.67 per cent had middle school education. The high school level of education was obtained by only 10.00 per cent of respondents. Thus, it can be concluded that the majority of the respondents were literate, most of them 38.33 per cent had low social participation, followed by 33.33 per cent in medium social participation and only 28.34 per cent were found in high social participation. Thus, it can be concluded that maximum number of orange growers had low social participation. The finding was similar to the findings reported by Jha *et al.* (2004).

The data in regarding caste of respondents are presented in Table 2, depict that most of the orange growers 40.83 per cent had small size orchards (<2.5 acres) followed by 35.00 per cent had medium size (2.5-10 acres) orchards and 24.17 per cent had large size orchards (> 10 acres). Thus, it can be concluded that most of the respondents had medium size of land holdings, the majority 55.83 per cent were in the medium socio-economic status category followed by 25.00 per cent in low socio-economic group while only 19.17 per cent were in high socio-economic status group. Thus, it can be concluded that majority of the respondents were in medium category regarding socio-economic status, the majority 53.33 per cent were in the medium annual income category followed by 33.33 per cent were in the low annual income category and only 13.34 per cent were in high annual income category. Thus, it can be concluded that majority of the respondents were in

medium category regarding annual income.

Table 3 shows that out of the total 120 respondents, higher percentage of respondents were in low category of attitude towards horticultural crops followed by 33.33 per cent respondents in the medium category and 25.84 per cent in high category. Thus, it can be concluded that majority of the respondents were in low category regarding attitude towards horticultural crops. Majority of the respondents 54.17 per cent were in medium innovativeness category followed by 26.67 per cent in low category and only 19.16 per cent in high category. Thus, it can be concluded that majority of the respondents were in medium category regarding innovativeness, 40.00 per cent were in the low market orientation category, 45.00 per cent in medium category, and only 15.00 per cent in high category. Thus, it can be concluded that most of the respondents were in medium market orientation category. The finding is similar to the findings

reported by Raut(2006).

The data furnished in Table 4 show the extent of adoption by respondents of recommended package of production practices. It is evident from the Table that out of 120 respondents, most of the respondents 45.00 per cent had medium extent of adoption about recommended/improved varieties followed by 30.00 per cent in low and 25.00 per cent in high extent of adoption. The cumulative adoption of this particular practice was observed as 65.00 per cent among the total respondents. Regarding land preparation, higher percentage of the respondents 41.67 had medium extent of adoption, while 32.50 per cent had low and 25.83 per cent had high extent of adoption. The cumulative adoption of this particular practice was observed as 69.00 per cent among the total respondents. Maximum of the respondents (48.33%) had medium adoption of propagation practices whereas 26.67 and 25.00 per cent orange growers had low and high adoption of

Table 1: Distribution of respondents according to their social attributes

Sr. No.	Attributes	Categories	No. of respondents	Percentage	Mean score
1.	Age	Young	34	28.33	0.29
		Middle	47	39.17	0.78
		Old	39	32.50	0.97
		Total	120	100	2.04
2.	Educational qualification	Illiterate	13	10.83	0.10
		Primary school	55	45.83	0.91
		Middle School	20	16.67	0.5
		High school	12	10.00	0.4
		Higher Secondary	20	16.67	0.83
		College and Above	--	--	--
		Total	120	100	2.74
3.	Social participation	Low	46	38.33	0.38
		Medium	40	33.33	0.66
		High	34	28.34	0.85
		Total	120	100	1.90

Table 2 : Distribution of respondents according to their economic attributes

Sr. No.	Attributes	Categories	No. of respondents	Percentage	Mean score
1.	Orchard size	Small	49	40.83	0.40
		Medium	42	35.00	0.71
		Large	29	24.17	0.72
		Total	120	100	1.83
2.	Socio economic status	Low	30	25.00	0.25
		Medium	67	55.83	1.11
		High	23	19.17	0.57
		Total	120	100	1.94
3.	Annual income	Low	40	33.33	0.33
		Medium	64	53.33	1.06
		High	16	13.34	0.40
		Total	120	100	1.80

Table.3 : Distribution of respondents according to psychological attributes

Sr. No.	Attributes	Categories	No. of respondents	Percentage	Mean score
1.	Attitude towards horticultural crops	Low	49	40.83	0.40
		Medium	40	33.33	0.66
		High	31	25.84	0.77
		Total	120	100	1.85
2.	Innovativeness	Low	32	26.67	0.26
		Medium	65	54.17	1.08
		High	23	19.16	0.57
		Total	120	100	1.92
3.	Market orientation	Low	48	40.00	0.40
		Medium	54	45.00	0.90
		High	18	15.00	0.45
		Total	120	100	1.75

Table 4 : Extent of adoption of the respondents about orange production technology

Sr. No.	Practices	Extent of adoption			Mean score	Cumulative percentage
		Low	Medium	High		
1	Recommended/Improved varieties	36 (30.00)	54 (45.00)	30 (25.00)	1.95	65.00
2.	Land preparation	31 (25.83)	50 (41.67)	39 (32.50)	2.07	69.00
3.	Propagation practices	32 (26.67)	58 (48.33)	30 (25.00)	1.98	66.11
4.	Manures and fertilizers application	58 (48.33)	51 (42.50)	11 (09.17)	1.61	53.67
5.	Use of growth regulators	67 (55.83)	43 (35.83)	10 (08.34)	1.52	50.83
6.	Irrigation management	53 (44.17)	60 (50.00)	07 (05.83)	1.62	54.00
7.	Weed management	71 (59.17)	38 (31.66)	11 (09.17)	1.50	50.00
8.	Plant protection measures	54 (45.00)	46 (38.33)	20 (16.67)	1.72	57.33
9.	Harvesting	26 (21.66)	44 (36.67)	50 (41.67)	2.20	73.33
Average mean score					1.79	59.89

propagation practices, respectively. The cumulative adoption of this particular practice was observed as 66.11 per cent among the total respondents. The most of the respondents 48.33 per cent had low adoption while 42.50 per cent had medium and only 09.17 per cent had high adoption of manures and fertilizers application. The cumulative adoption of this particular practice was observed as 53.67 per cent among the total respondents. Majority of the respondents (55.83%) had low adoption of use of growth regulators whereas 35.83 and 8.34 per cent orange growers had medium and high adoption of use of growth regulators, respectively. The cumulative adoption of this particular practice was observed as 66.11 per cent among the total respondents. About irrigation management, the majority 50.00 per cent respondents had medium adoption followed by 44.17 per cent in low and only 05.83 per cent in high adoption. The cumulative adoption of this particular practice was observed as 54.00 per cent among the total respondents. Regarding weed management, the majority of orange growers 59.17 per cent had low adoption followed by 31.66 per cent in medium and only 09.17 per cent in high adoption of recommended dose of fertilizers. The

cumulative adoption of this particular practice was observed as 50.00 per cent among the total respondents. The most of respondents 45.00 per cent had low adoption of plant protection measures while 38.33 per cent had medium and 16.67 per cent had high adoption. The cumulative adoption of this particular practice was observed as 57.33 per cent among the total respondents. Regarding harvesting majority of the respondents 41.67 per cent had high adoption followed by 36.67 per cent in medium adoption and 21.66 per cent in low adoption. The cumulative adoption of this particular practice was observed as 73.33 per cent among the total respondents. It revealed from the Table 4 that only two practices had higher mean score than the average mean score 1.79 *i.e.* recommended/improved varieties, land preparation, propagation practices and harvesting. It can be concluded from the above findings that the maximum respondents had high knowledge regarding these four practices. The finding was similar to the findings reported by Wakle *et al.* (1998).

It revealed from the Table 5 that majority of the respondents, 50.83 per cent expressed non availability of credit in time, ranked as first followed by planting material not

Table 5: Constraints experienced by the orange growers in adoption of recommended orange production technology

Sr. No.	Constraints	Frequency	Percentage	Rank
1.	Non availability of improved varieties	49	40.83	VI
2.	Planting material not available in time	58	48.33	II
3.	Non availability of credit in time	61	50.83	I
4.	Lack of information in right time	39	32.50	VIII
5.	Lack of fertilizers in time	54	45.00	IV
6.	Lack of knowledge about plant protection	57	47.50	III
7.	Lack of trainings programmes based on horticultural crops	41	34.17	VII
8.	Lack of irrigation facilities	53	44.17	V
9.	Lack of field visits of agriculture officers time to time	35	29.17	IX

Table 6 : Suggestions as given by the orange growers to overcome the constraints

Sr. No.	Suggestions	Frequency	Percentage	Rank
1.	Improved varieties should be available in time	47	39.17	V
2.	Credit should be available at low interest	58	48.33	I
3.	Fertilizer be available in time	50	41.67	IV
4.	Training camps for providing technological knowledge should be organized time to time	40	33.33	VI
5.	Information about plant protection should be provided in time	56	46.67	II
6.	Timely visits should be done by RHEOs / Agriculture Officers	35	29.17	VII
7.	Irrigation facilities be available in time	51	42.50	III

available in time 48.33 per cent as second, lack of knowledge about plant protection 47.50 per cent as third, lack of fertilizers in time 45.00 per cent as fourth, Lack of irrigation facilities 44.17 per cent as fifth, non availability of improved varieties 40.83 per cent as sixth, lack of trainings programmes based on horticultural crops 34.17 per cent as seventh, lack of information in right time 32.50 per cent as eighth and lack of field visits of agriculture officers time to time 29.17 per cent as ninth.

It is evident from Table-6 that maximum 48.33 per cent farmers suggested credit should be available at low interest followed by Information about plant protection should be provided in time 46.67 per cent, Irrigation facilities be available in time 42.50 per cent, fertilizer be available in time 41.67 per cent, improved varieties should be available in time 39.17 per cent, training camps for providing technological knowledge should be organized time to time 33.33 per cent, timely visits should be done by RHEOs / Agriculture Officers 29.17 per cent.

Conclusion:

The respondents (39.17%) belonged to middle age group (36 to 50 years). it may be stated that majority of respondents were middle (36 to 50 years) to young (20 to 35 years) in respect to age group whereas 32.50 per cent of orange growers were of old age group. Maximum of the orange growers (45.83%) were educated up to Primary school level. it can be concluded that overall majority of the maize growers were literates and

maximum of the orange growers were higher secondary passed. Maximum numbers of the orange growers (29.17 per cent) were found to have marginal size of land holding it also concluded that overall majority of the orange growers having marginal to medium size of land holding. Maximum numbers of the orange growers (28.34%) with those whose participation was high in social activities. Most of the orange growers (40.83%) had neutral attitude towards new technologies. Majority of the orange growers (54.17%) were found to had medium innovativeness. A higher percentage of the orange growers, 55.33 per cent had medium annual income. A higher percentage of the orange growers, 45.00 per cent had market orientation. The higher percentage of orange growers found to have high knowledge of seed and sowing practices in 3 activities *viz.*, improved varieties and right time of sowing while had medium knowledge in optimum seed rate, seed treatment, seed treatment methods and methods of sowing whereas low knowledge found in quantity of seed treatment materials. The higher percentage of orange growers possessed high knowledge in case of farm yard manure/compost whereas medium knowledge in case of green manure, optimum quantity of FYM per hectare, methods of application of FYM, time of application of FYM, chemical fertilizers, methods of application for chemical fertilizer and time of application for chemical fertilizer while low knowledge possessed in case of micro nutrients and recommended dose of chemical fertilizers. Maximum numbers of orange growers had high knowledge in case of time of irrigation whereas had medium knowledge in

methods of irrigation, critical stages for irrigation in orange and numbers of irrigation in orange while low knowledge was not observed in any practice. Highest numbers of orange growers had high knowledge in case of time of weeding and methods of weeding whereas had medium knowledge in use of weedicide, quantity of weedicide and methods of application while low knowledge was not observed in any practice. The orange growers were found to have low knowledge about stages of infestation and use of fungicides. It was noticed that similar numbers of orange growers had low and medium knowledge in case of quantity of fungicides. Orange growers possessed medium knowledge in methods of disease control and methods of application of fungicides. Majority of orange growers had high knowledge about right time of harvesting and higher percentage had medium knowledge about methods of harvesting. Horticulture is prominent sector among agriculture and allied activities as a means of diversification for making agriculture more profitable through efficient use of natural resources. In the horticultural development map of the world, the nature has placed our country in a place of pride as it has favourable climate and soils for growing a large number of horticultural crops.

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