Technology Adoption Its Gap and Constraints in Orange Cultivation in Nagpur District

M. K. Rathod[1] and Vishal Rathod[2]

1. Asso. Prof. (Extension Education), 2. Ex-PG Student, College of Agriculture, Nagpur (M.S.)
of Extension Education, College of Agriculture, Nagpur (M.S.)
Corresponding author e-mail: milindrathod73@gmail.com

ABSTRACT

The present study was undertaken in Nagpur district where the Nagpur santra is the major fruit crop which worldwide famous. From the district 100 orange growers were selected from the core area of district with the purposive selection. After data collection and analysis of hundred samples it is revealed that highest technological gap was observed in training practice of orange crops followed by the practice of propagation, while lowest technological gap was observed in irrigation management, land preparation, harvesting and plant protection as well as medium gap was observed in spacing, planting, organic manuring etc. In all medium level of technological gap was observed in majority of orange growers (71.00%). In the relational analysis most of the selected variables were found highly and negatively correlated with the technological gap in orange cultivation practices. When studied constraints in cultivation of orange crop it was stated that great majority of respondents facing the marketing constraints, labour constraints, financial constraints and weather constraints.

Key words : *Knowledge; Adoption; Management;*

The cultivation of Nagpur mandarin orange is one of the most important fruit crops of Maharashtra State. Nagpur division in the State of Maharashtra is known for best oranges in the world. At present, the cultivation of orange is mostly concentrated in the five districts namely Nagpur, Amravati, Wardha, Yavatmal and Akola. The orange of this region is known as 'Nagpur Santra'. There is a historical background behind its name. At the end of 18th century, Maharaja Rahuji Bhosle brought few plants of loose skinned oranges from Aurangabad and planted in his garden at Nagpur. These plants under the soil and climatic condition of Nagpur grow very well and produced fruits of excellent quality. Since then orange cultivation has earned an important place in the agriculture economy of Vidharbha region. The Nagpur santra has earned fame and name in country for its exceptional quality.

The area under crop has grown rapidly in last two decades; there is continuous addition in orange production technology through the efforts of scientists. In spite of this the production and quality of fruits are fare from standard. The efforts to increase orange production have been made by central and state government by starting horticultural development programmes. The subsidy on purchase of fertilizer and plant protection chemical has also been made available to the orchardist. Despite thus, the production of orange per hectare in Vidarbha is still low. Therefore, it understood to know the knowledge and adoption of recommended management practices of orange by the farmers.

With this study, it comes to know the improved cultivation practices of orange and gaps in between improved practices of orange and its actual adoption by the orange growers. Hence, this study found useful for identifying the technological gap in cultivation of orange and constraints faced by the farmers in adoption of improved cultivation practices.

METHODOLOGY

The present study was conducted in Nagpur district of Maharashtra State where the cultivation of orange

crop is worldwide famous. The area where the cultivation of orange is comparatively more was selected for the study. To conduct the research an exploratory research design of social research was used for the present investigation. Kalmeshwar Panchayat Samiti was purposively selected for the study on the basis more orange growers. Out of the 108 villages ten villages were selected by random sampling method from the villages of maximum orange growers. From the list obtained from Taluka Agriculture Officer, 10 orange growers from each of selected village were selected randomly to constitute the sample of 100 respondents. Keeping in view the objectives of the study, structured interview schedule was designed which contains questions to collect the data of independent variable and technological gap in orange cultivation practices and lastly the constraints faced by the orange growers in adoption of recommended practices of orange cultivation. Interview schedule was suitably modified after pre-testing and data were collected through personal interview of the respondents at their convenient place.

RESULTS AND DISCUSSION

Technological gap: The practice wise distribution of respondents according to extent of technological gap about recommended orange cultivation technology was ascertained and findings with respect to them are presented in Table 1.

A critical look at the Table 1 revealed that in case of land preparation majority of the respondents (94.00%) and (92.00%) were found in low category of technological gap with reference to recommended soil for cultivation of orange and practice necessary for land preparation, respectively. It was followed by very meagre percentage of the respondents (6.00%) and (8.00%) which were observed in medium level of technological gap in type of soil for cultivation of orange and practices necessary for land preparation, respectively. Further, it is summarized that very low technological gap observed in land preparation practices. The mean for these practices were observed up to 93.00 per cent under low level .of technological gap

With regards to recommended varieties of orange, it was observed that majority of the respondents (80.00%) were observed in low technological gap followed by 20.00 per cent of them were in medium level of technological gap. None of the respondents were observed in high technological gap with regards to recommended variety of orange. In case of quality characteristics of recommended variety, higher percentage of the respondents (59.00%) were observed in medium level of technological gap followed by 23.00 per cent of the respondents who were observed in high level of technological gap. Only 18.00 per cent of them were observed in low level of technological gap in case of quality characteristics of recommended variety.

The mean technological gap about recommended varieties leads to mention that, percentage of the respondents (49.00%) observed in low technological gap followed by 39.50 per cent in medium and 11.50 per cent of them in high technological gap, respectively.

The technological gap about propagation practices of orange, maximum percentage of respondents 61.00 per cent were observed in medium technological gap. This was followed by 28.00 per cent of the respondents comes under low technological gap and only 11.00 per cent of them observed under high technological gap about propagation. While studying the technological gap about planting in which, practice of planting time for orange 72.00 per cent of respondents comes under low technological gap, 26.00 per cent respondents comes under medium level and very less respondents 2.00 per cent comes under high level of technological gap. As pits size is concerned, more orange growers 59.00 per cent were observed in medium technological gap, followed by 28.00 per cent and 13.00 per cent of them in low and high technological gap, respectively. From average technological gap about planting leads that, majority of the orange growers (50.00%) were included in lower technological gap.

In case of spacing practices, maximum percentage of respondents were (53.00%) observed in medium level of technological gap, whereas 29.00 per cent and 18.00 per cent of the respondents were under high and low technological gap, respectively. In case of optimum population, maximum percentage of the respondents (62.00%) were observed under medium level of technological gap, followed by 13.00 per cent and 25.00 per cent of the respondents under low level and high level of technological gap, respectively. The average technological gap in spacing were (57.50%) observed in medium level of technological gap followed by (21.50%) and (21.00%) of respondents were in high level and low level of the technological gap, respectively.

Table 1: Distribution of the respondents according to their practice wise technological gap in orange (N=100)

Cultivation practices	Low	Medium	High
Land preparation (Ploughing, Harrowing, etc.)			
What type of soil is recommended for cultivation of orange crop?	92	08	00
Which practices are necessary for land preparation? (traditional, mechanical)	94	06	00
Mean	93	07	00
Variety			
Name the varieties of orange recommended for cultivation in this area?	80	20	00
What is quality characteristic of recommended variety of orange (i.e. wine, sweet juice, etc.)	18	59	23
Mean	49	39.50	11.50
Propagation			
Which propagation method generally use in this area? (Seed/ Rangpur lime rootstock, etc.)	28	61	11
Planting			
Which is suitable planting time recommended for orange crop? (July and August)	72	26	2
What should be pits size for orange crop? (75 x 75 x 75 cm)	28	59	13
Mean	50	42.50	7.50
Spacing			
What is recommended spacing for orange crop? (6x6 m, 5x5, etc.)	29	53	18
What should be the optimum population of orange crop? (277etc.)	13	62	25
Mean	21	57.50	21.50
Training			
Whether you should applied training recommendation in orange crop?	84	14	2
Pruning			
Which is suitable time for pruning in orange crop? (April,)	72	22	6
Organic manure			
What is recommended dose of FYM per hectare for orange crop? (90-100 CL)	41	46	13
Which is suitable time of FYM application in orange crop? (May)	32	64	4
Mean	36.50	55	8.50
Fertilizer application			
What is the recommended dose of fertilizer per hectare?	25	59	17
Irrigation			
What is the recommended time for irrigation of orange?	92	8	00
Which suitable method of irrigation use in this area?	96	4	00
Mean	94	6	00
Weed control			
Which method for controlling weed in orange crop? (Mechanical/ chemical/ biological control)	86	12	2
Fruit drops			
Which method for controlling fruit drops in orange crop? (2,4-D, GA3 at 15 ppm + urea 1%)	37	19	44
Plant protection			
Name the major pests of orange crop? (citrus psylla,black fly, (kolsi))	67	29	4
Name the insecticide recommended for control of pests?	65	32	3
Name the major diseases of orange crop?(gummosis, root rot and dieback)	82	18	00
Name the chemical recommended for control of above disease?	76	22	2
Mean	72.50	25.25	2.25
Harvesting			
What is appropriate stage of harvesting of orange crop? (¾ skin turn yellow)	87	13	00
Marketing			
Which size is suitable for marketing of orange? (large, etc.)	42	9	49

(The selected respondents were 100 numbers, hence value of percentage is same as that of value of frequency)

The technological gap about training in which, type of recommended training in orange crop, majority the respondents 84.00 per cent comes under low level followed by 14.00 per cent respondents were observed in medium level of technological gap. Negligible respondents (02.00%) were under high level of technological gap. However, technological gap about recommended pruning practice, majority orange growers (72.00%) reported to low level of technological gap, followed by 22.00 per cent of them were under medium level, respectively. While, studying the technological gap about recommended organic manure, higher percentage of respondents (46.00%) were observed in medium level of technological gap with respect to recommended dose of FYM per hectare, followed by (41.00%) of them were under low level of technological gap and 13.00 per cent were seen in high level of technological gap, respectively.

In case of time of application of FYM, near about two third of the respondents (64.00%)were under medium level of technological gap, followed by nearly, one third of them (32.00%) were observed in low level of technological gap. Only 04.00 per cent of the respondents were in high level of technological gap. From average technological gap about organic manure practices leads to conclude that, maximum percentage of the respondents (55.00%) were included in medium level of technological gap.

Technological gap in fertilizer application of orange in which recommended dose per hectare was mentioned. In this case, maximum numbers of the respondents (59.00%) were observed in medium level of technological gap. This was followed by 24.00 per cent in low level and 17.00 per cent in high level of technological gap, respectively.

As regards to technological gap for irrigation management two practices viz; recommended time for irrigation of orange and suitable method of irrigation used in study area were identified. In case of recommended time for irrigation of orange large majority of the respondents (92.00%) were observed in low gap followed by 08.00 per cent of the respondents were under medium level. As suitable method of irrigation is concerned near about cent per cent of the respondents (96.00%) were observed in low level of technological gap. Only 04.00 per cent of the respondents were observed in medium level of the technological gap with

regards to this practice. The mean technological gap of irrigation reported under low level by great majority of the respondents (94.00%).

In case of weed control, low level of the technological gap observed in weed control method used for weed eradication by the 86.00 per cent of the respondents. This was followed by the 12.00 respondents and only 2.00 per cent of them were observed in medium and high technological gap, respectively. While, studding technological gap about recommended fruit drop practices near about one half of the respondents (44.00%) were observed under high level of technological gap followed by 37.00 per cent of them under low level of technological gap and minimum percentage (19.00%) were seen in medium technological gap.

In case of technological gap about plant protection, maximum numbers of the respondents (67.00%) were found in low technological gap with reference to major pest of orange crop followed by 65.00 per cent of the respondents comes under low technological gap for insecticides recommended for control of pest. About 29.00 per cent and 32.00 per cent respondents observed in medium level of technological gap in case of major pest of orange crop and insecticide recommended for control of pest, respectively. In case of majority diseases of orange crop, higher percentage of the respondents (82.00%) were observed in low level of technological gap, followed by nearly one fifth (18.00%) of the respondents were observed in medium level of technological gap.

With regards to recommended chemical for control of major diseases of orange, in which it was observed that, majority of the respondents (76.00%) were observed in low technological gap followed by 22.00 per cent of them were in medium technological gap level. Very less number of the respondents (02.00%) were observed in high technological gap in recommended chemical for control of major diseases in orange. The mean technological gap about recommended plant protection practices leads to observed that relatively higher percentage of respondents (72.50%) comes under low technological gap followed by 25.25 per cent in medium level and 02.25 per cent in high technological gap, respectively.

In the practice of harvesting i.e. appropriate stage of harvesting, maximum number of respondents

(87.00%) comes under low level of technological gap followed by only 13.00 per cent of the respondents comes under medium level of technological gap and none of the respondents found in high technological gap. In case of marketing nearly half of the respondents (49.00%) were observed in high level of technological gap, followed by 42.00 per cent of them were in low level and 09.00 per cent respondents comes under medium level of technological gap for marketing.

Table 2: Distribution of respondents according to technological gap level (N=100)

Technological gap level	No.	%
Low	13	13.00
Medium	71	71.00
High	16	16.00
Total	100	100.00

It is evident of data from Table 2 that, 71.00 per cent of respondents were observed under medium category of technological gap of recommended orange cultivation practices followed by 16.00 per cent of respondents observed in high level of technological gap and 13.00 per cent of the respondents in the study area were observed under low technological gap. It clearly indicated that the farmers are mediocre in using the recommended management practices and need to adopt more to improve the quality and production of oranges in the region. These findings were supported by findings of *Kadam et al. (2010), Maraddi et al. (2012)* and *Rathod and Jayabhaye (2014).*

Table 3. Coefficient of correlation of selected characteristics of the orange growers with their technological gap

Variables	'r' value
Age	0.1402
Education	-0.3935**
Land holding	-0.2815 **
Socio-economic status	-0.3950**
Source of information	-0.4349**
Scientific orientation	-0.4737**
Economic motivation	-0.3746**
Knowledge	-0.7329**
Irrigation facilities	-0.6527 **
Size of orchard	-0.5924**
Innovativeness	-0.5532**
Management orientation	-0.5837**
Source of budgraft	0.1734

** - Significant at 0.01 level of probability

Correlates of technological gap: The correlation coefficient of technological gap with personal, socio-economic, situational, communicational and psychological characteristics of respondents has been depicted in Table 3.

It could be seen from Table 3, that among selected variables education, land holding, scientific orientation, source of information, socio-economic status, economic motivation, knowledge, irrigation facilities, size of orchard, innovativeness and management orientation were negatively but significantly correlated with the technological gap at 0.01 level of probability. It clearly indicates that increase in the level of variables decreases the technological gap in recommended orange cultivation practices. for these characteristics shows that there exists significant relation with technological gap of recommended orange cultivation practices, however the variable age and source of budgraft were found non significantly correlated with technological gap.

The above results indicate that most of characteristics of the respondents have influence on technological gap levels. It quite logical that the respondents with higher level of education, higher land holding, good management orientation, having good economic motivation, more source of information, socio-economic status, scientific orientation, irrigation facilities size of orchard and knowledge about technologies recommended for orange cultivation keeping medium technological gap.

The above findings regarding age, education and landholding was similar as the findings of *Chanu et al. (2014).*

Constraints faced by the orange growers : To get more yields of oranges it is necessary to know the various constraints face by the orange growers which will help the orange growers for further planning in cultivation of orange. The relevant data in this regard has been presented in Table 4.

The data presented in Table 4 revealed that one of the main reason for technological gap at some extent and less production in studied area that,   weather and soil constraints. In case of weather and soil constraints majority of the respondents (88.00%) and (80.00%) were expressed adverse climatic condition and erratic and untimely rainfall, respectively. Very less number of respondents (17.00%) faced constraint of saline soil and drought in the hot tropical area.

Table 4. Distribution of respondents according to their constraints faced during orange cultivation (N=100)

Constraints	No.	%
Weather and soil constraints		
Adverse climatic condition	88	88.00
Erratic and untimely rainfall	80	80.00
Saline soil in Maharashtra and drought in the hot tropical area.	17	17.00
Manures and fertilizers constraints		
Non-availability of good quality FYM	31	31.00
High cost of FYM	24	24.00
Inadequate and timely non availability of fertilizers	37	37.00
High cost of inorganic fertilizers and micronutrients	44	44.00
Non-availability of good quality FYM	31	31.00
Irrigation constraints		
Shortage of irrigation water during summer	76	76.00
High cost of water supplied by tanker	73	73.00
Plant protection		
Problems in identification of disease and pest affected sample	35	35.00
High cost of pesticides and fungicides	57	57.00
Conflicts in selecting pesticides and fungicides	49	49.00
Technical constraints		
Lack of knowledge about latest technology	38	38.00
Lack of knowledge about fertilizer management	36	36.00
Lack of knowledge about use of different plant growth regulators	25	25.00
Financial constraints		
Inadequate sources of finance	87	87.00
Non-availability of money in time	56	56.00
Marketing constraints		
Low rates of orange fruit	93	93.00
Fluctuation in market rates	91	91.00
Late auction sale of raisins in the market	64	64.00
No guarantee of payment from merchants	53	53.00
Labour constraints		
Non-availability of labours at the time of pruning, thinning and dipping of orange bunches in GA	90	90.00
High wages of labour	95	95.00

While studying the technological gap constraints of manures and fertilizer application in orange were, non-availability of good quality FYM (31.00%) and problem of high cost of FYM (24.00%), inadequate and timely non availability of fertilizers (37.00%) and high cost of inorganic fertilizers and micronutrients (44.00%) were encountered the reason perceived by respondents for existence of gap in recommended technologies for fertilizer application. With regards to irrigation constraints majority of the respondents (76.00%) and (73.00%) expressed constraints as shortage of irrigation water during summer season and high cost of water supply by tankers respectively.   In connection with plant protection constraints percentage of the respondents (57.00%), (49.00%) and (35.00%) were observed in facing problems of high cost of pesticides and fungicides, conflicts in selecting pesticide and fungicide and problems in identification of diseases and pests, respectively. It is further summarized that the orange growers were facing these problems because private consultancies were involved to overcome these problems without knowledge of orange growers himself.

As concerned to technical problems 38.00 per cent, 36.00 per cent and 25.00 per cent of respondents were encountered constraints as lack of knowledge about latest technology, lack of knowledge about fertilizer management and about use of different plant growth regulators. As far as financial constraints are concerned, majority of the respondents (87.00%) and (56.00%) were expressed inadequate sources of finance and non-availability of money in time, respectively. As regards the problem of marketing of oranges, the most occurring problems were low rate of orange fruit (93.00%), fluctuation in market rates (91.00%), late auction sale of raisins in the market (64.00%) and no guarantee of payment received from merchants (53.00%) expressed by the orange growers. In concerned to the labour constraints, great majority of respondents were reported main reason such as high wages of labours (95.00%) and non-availability of labours at the time of intercultural operations (90.00%) reported by the respondents at the time of orange cultivation.

These findings were in conformity with the findings of *Kavaskar and Santha (2003)* and *Kaid et al. (2005).*

CONCLUSION

It is concluded that majority of orange growers were observed in medium level of technological gap about orange cultivation practices. It may be due to that, the services provided by extension personal or NHM personnel, agro service centres and other private consultancy because orange is the major and popular crop of the area. But, it needs to increase the efforts of

extension agencies to improve the knowledge and adoption of farmers regarding training of crop, propagation, planting methods, spacing and manuring that helps in reducing the technological gap in orange cultivation and getting more productivity and ultimately more profit. Most of the orange growers were facing constraints as fluctuation in market rate and lack of source of finance where Government should provide the loan facilities particularly to the orange growers at low interest rate as it requires intensive cultivation practices in which initial investment is high. It will help to motivate the other interested farmers. Also it is necessary to fix the optimum market rate for getting assured profit to the orange growers.

REFERENCES

Chanu T. Matouleibi, David. J. Baite, M. Kunjaraj Singh and D.U.M.Rao, 2014. Adoption of Pineapple Cultivation Practices by the Farmers in Manipur State. *Indian Res. J. Ext. Edu.* **14** (1), 17-20.

Kavaskar M. and Santha Govind, 2003. Constraint in the adoption of recommended technologies in Banana, *Mah. J. Ext. Educ.* **XXII** (I): 110-112

Kaid, S. V., Prajapati M. R. and Prajapati R. R. 2005. Technological gaps in kharif funnel cultivation by funnel growers of Banaskanth district of Gujarat state, *GAU Res. J,* **30**(1-2), 82-85.

Kadam, S. S., Thombre, B. M. and Mande, J. V. 2010. Technological gap in sugarcane. *J. of Maha. Agril. Univ.* **35** (3), 424-427.

Maraddi, G. N., Patil S. L. and Angadi J. G. 2012. A critical analysis of factor in relation to technological gap of sustainable cultivation practices among sugarcane growers. *Plant Archives.* **12** (2), 993-996.

Rathod M. K. and Jayabhaye J. M. 2014. Technological gap in adoption of recommended practices of maize cultivation among the farmers od Buldana district in Vidarbha. *J. Agril. Ext. Management.* **25** (2), 81-92.

● ● ● ● ●