

**RESEARCH ARTICLE :**

# Profile and constraints of orange growers in adoption of soil testing techniques in Amravati district

■ **YOGITA WANKHEDE, N.M. KALE, P.P. BHOPLA AND N.P. JANGWAD**

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**SUMMARY :** The research study was conducted in Warud and Morshi talukas of Amravati district (Vidarbha region) of Maharashtra with exploratory design of the social research during 2015-16. Multistage sampling method was used for the study. Total 100 orange orchards owner having productive orange trees were the respondents for the study. The study revealed that 58.00 per cent orange growers have tested their orchard soil. Majority of orange growers had area under orange orchards upto 2.00 ha. Majority 67.00 per cent respondents have not availed the employment guarantee scheme of government for plantation of orange orchard; they have planted the orchard by spending their own money. Majority of respondents have to travel distance between 51 to 100 km from their villages to reach at soil testing laboratory. Maximum 63.00 per cent of orange growers have used drip as a method of irrigation. Exactly half (50.00%) of the respondents kept medium level of extension contact with extension agencies for seeking information. Majority (87.00%) orange orchards affected by dieback disease, majority of respondents have used the State department soil testing laboratories as soil testing agency for testing of orchards soil. More than half (57.00%) orange growers faced the constraints of lack of knowledge about soil testing and 47.00 per cent orange growers faced the constraints of lack of technical skill about soil testing technique, as technical constraints. As regard to situational constraints, 73.00 per cent respondents faced problem of delay in soil test report. It could be concluded that the analysis of these constraints would call for the attention of the administrators of Government, Department of Agriculture of Maharashtra and other concerned departments for planning systematic efforts to encountered these constraints will go long way for the Development of Agriculture in general and Horticulture in particular.

**KEY WORDS :**

Profile, Constrains, Soil testing Techniques, Adoption

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Author for correspondence :

**N.M. KALE**

Department of  
Extension Education,  
Post Graduate Institute,  
Dr. Panjabrao Deshmukh  
Krishi Vidyapeeth,  
AKOLA (M.S.) INDIA  
Email:nmkale1964  
@gmail.com

See end of the article for  
authors' affiliations

## **BACKGROUND AND OBJECTIVES**

Mandarin orange (*Citrus reticulata*) is most common among citrus fruits grown in India. It occupies nearly 40 per cent of the total area under citrus cultivation in India. The

most important commercial citrus species in India are the mandarin (*Citrus reticulata*), sweet orange (*Citrus sinensis*) and acid lime (*Citrus aurantifolia*) sharing 41, 23 and 23 per cent, respectively of all citrus fruits produced in the country. In India, citrus is

grown in 0.62 million ha area with the total production of 4.79 million tonnes. The area under orange cultivation in India increased by 67 per cent from 1.19 lakh ha in 1991-92 to 1.99 lakh ha in 2001-02 and the production increased by 57 per cent (*i.e.* from 10.58 to 16.60 lakh tonnes). Oranges are mostly grown in the states of Maharashtra, Madhya Pradesh, Tamil Nadu, Assam, Orissa, West Bengal, Rajasthan, Nagaland, Mizoram, Arunachal Pradesh (Anonymous, 2002).

Orange occupies the second position among all fruits cultivated in Maharashtra, which has 2.47 lakh hectares area under orange cultivation with production of 1761 metric tons with the productivity of 6.4 MT/ha (Anonymous, 2015). The Nagpur mandarin orange (*Citrus reticulata* Blanco) is one of the most important fruit crops of Maharashtra state. It is a glorious natural gift to the Vidarbha region and is famous for its exceptional quality of fruits in the world. Hence, Nagpur has created its own status as 'Orange City' in the globe. In Maharashtra, orange is cultivated in many districts like Amravati, Nagpur, Akola, Wardha and Yavatmal. The Amravati and Nagpur districts contribute about 80 per cent of the total area under orange orchards in Maharashtra State sharing 48.88 per cent and 31.45 per cent, respectively. In case of production of Orange in Vidarbha, larger production in Amravati district *i.e.* 37.36 per cent while that in Nagpur district is 23.87 per cent, thus it is seen that Amravati district possessed the largest share of oranges in the Vidarbha orange market. The largest orange cultivation and production is in Warud, Morshi, Chandur Bazar, Achalpur and Anjangaon talukas of Amravati district.

Oranges require deep, uniform and well drained soil because number of feeder roots is less in citrus with pH 5.5 to 7.5. It should be free from hard pans and salty layers (salt content less than 0.1%). The highest global citrus production comes from the soils represented by the order Alfisol, Ultisol, Entisol and Inceptisol (Kohli and Srivastava, 1997; Srivastava and Singh, 2002). Balanced nutritional programme play a dominant role in producing healthy trees with maximum yield and good fruit quality. The cultivation of free lime, excessive salt, defective drainage, and presence of hard pan in the subsurface, soil texture, citrus is dependent on several factors like presence of mineralogy composition of soil, cation exchange capacity, soil fertility, etc. (Srivastava, *et al.*, 1999). The free CaCO<sub>3</sub>, powdery lime, and

massive structure in soils limit the water and nutrient absorption (Jagdish *et al.*, 2001). Among the various factors which affect the crop production of citrus, CaCO<sub>3</sub> (not more than 10.00%) plays a very important role. The basic objective of soil testing programme is to give farmers a service leading to better and more economic use of fertilizers and soil management practices for increasing agricultural production.

Orange is the one of the important fruit crop in Amravati district. In Amravati 70589.4 hectare area is under orange cultivation and out of that 55003.60 hectare is productive orchard. Productivity of orange orchards is 9-10MT/ha and if irrigation facilities are available then it is 12-14MT/ha (S.A.O. data 2015). Now-a-day consumption of fertilizer by farmer is higher than actually requirement. The orange growers are not follows the soil testing technique. The present study was undertaken with the specific objectives to study the profile of orange growers and to access the constraints/ problems faced by the orange growers to adopt the soil testing techniques and its recommendations.

## RESOURCES AND METHODS

The study was conducted in Warud and Morshi talukas of Amravati district (Vidarbha region) of Maharashtra with exploratory design of the social research. Multistage sampling method was used for the study. From each taluqa 10 villages were selected on the basis of large area under orange orchards and from each selected village five farmers were selected having productive orange orchard. Thus total 100 respondents were the sample for the study.

## OBSERVATIONS AND ANALYSIS

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

### Profile of orange growers :

Personal, socio-economic and situational profile of the respondents has been studied by considering their age, education, land holding, annual income, sources of irrigation, occupation, area under orange orchard, age of orchard, employment guarantee scheme availed, type of soil, farming experience, distance from soil testing laboratory, extension contact, major problem faced by

orange orchard, soil test agency availed and method of irrigation. The results pertaining to distribution of respondents on these variables have been presented as under.

**Age :**

Age is important factor, which determines the role of orange growers in knowledge and adoption of soil testing techniques and its recommendations. The distribution of the respondents according to age was ascertained and has been presented in Table 1 as follows.

The age wise distribution of the respondents in Table 1 shows that more than half (53.00%) of respondents were included in the middle age (36 to 50) category followed by 34.00 per cent respondents were observed in old age (Above 50 years) category and only 13.00 per cent respondents were upto 35 years *i.e.* young age category. Thus, it was concluded that majority of orange growers belonged to middle age group followed by old age group categories. Similar finding were reported by Thakare (2002) and Mankar *et al.* (2015).

**Education :**

Education has been considered as one of the most important variable with the help of which social change can be achieved. The education of the respondents was studied and the result has been presented in Table 1.

It could be noticed from Table 1 that 35.00 per cent of respondents were educated upto higher secondary school level, followed by 34.00 per cent of the respondents could reach upto college level and 19.00 per cent respondents were educated upto high school. Further, it was found that 11.00 per cent educated upto middle school. However, the remaining only 1.00 per cent of the respondents educated upto primary school. Thus, it could be concluded that higher percentage of the respondents *i.e.* 35 per cent were educated upto higher secondary school and college level (34.00%). Similar results were reported by Thakare (2000); Dhole (2006) and Deshmukh (2007).

**Land holding :**

Land holding was assumed as an important variable that influences adoption of the respondents. The results obtained have been presented in Table 1. It was observed from Table 1 that maximum (41.00) per cent of the respondents had semi-medium (2.01 ha to 4.00 ha) land

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

Sr. No.	Particulars	Frequency	Percentage
<b>Age</b>			
1.	Young (Upto 35)	13	13.00
2.	Middle (36 to 50)	53	53.00
3.	Old (Above 50)	34	34.00
	Total	100	100.00
<b>Education</b>			
1.	Illiterate	0	0.00
2.	Primary School	1	1.00
3.	Middle School	11	11.00
4.	High School	19	19.00
5.	Higher Secondary School	35	35.00
6.	College	34	34.00
	Total	100	100.00
<b>Land holding</b>			
1.	Marginal (Upto 1.00 ha)	02	02.00
2.	Small (1.01-2.00 ha)	36	36.00
3.	Semi-medium (2.01-4.00 ha)	41	41.00
4.	Medium (4.01-10.00)	16	16.00
5.	Big (Above 10.00 ha)	05	05.00
	Total	100	100.00
<b>Annual income</b>			
1.	Upto 2,00,000	12	12.00
2.	2,00,001 to 4,00,000	40	40.00
3.	4,00,001 to 6,00,000	27	27.00
4.	Above 6,00,001	21	21.00
	Total	100	100.00
<b>Sources of irrigation</b>			
1.	Well/tube well	100	100.00
	Total	100	100.00
<b>Subsidiary occupation</b>			
1.	Agriculture + labour	03	03.00
2.	Agriculture (Farming)	59	59.00
3.	Agriculture + Allied occupation	09	09.00
4.	Agriculture + Business	21	21.00
5.	Agriculture + Service	08	08.00
	Total	100	100.00
<b>Area under orange orchard</b>			
1.	Upto 2.00 ha	84	84.00
2.	2.01 – 4.00ha	11	11.00
3.	Above 4.01 ha	05	05.00
	Total	100	100.00
<b>Age of orchards (years)</b>			
1.	Upto 6 years	6	6.00
2.	7 to 12 years	88	88.00
3.	Above 12 years	6	6.00
	Total	100	100.00

Table 1 contd....

Table 1 contd..

<b>Employment guarantee scheme availed</b>			
1.	Yes	33	33.00
2.	No	67	67.00
	Total	100	100.00
<b>Soil use class (Status of soil)</b>			
1.	Class-I (Very deep)	40	40.00
2.	Class-II (Deep)	52	52.00
3.	Class-III (Moderately deep)	08	08.00
	Total	100	100.00
<b>Farming experience (Years)</b>			
1.	Upto 7 years	9	09.00
2.	8 – 14 years	80	80.00
3.	Above 15 years	11	11.00
	Total	100	100.00
<b>Distance of soil testing laboratory</b>			
1.	Upto 50	25	25.00
2.	51 to 100	60	60.00
3.	Above 100	15	15.00
	Total	100	100.00
<b>Method of irrigation</b>			
1.	Double ring	37	37.00
2.	Drip	63	63.00
	Total	100	100.00

holding. It was followed by 36.00 per cent farmers were possessing small (1.01 to 2.00 ha) land holding. And 16.00 per cent of the farmers were found in medium (4.01-10.00 ha) land holding group, followed by 05.00 per cent of the farmers were found to be big (above 10.00 ha) land holding and 02.00 per cent possessing marginal (upto 1.00 ha) land holding. Therefore, it could be inferred that, maximum number of the respondents were having semi medium land holding ranging from 2.01 to 4.00 ha. Similar result reported by Deshmukh (2007); Meshram (2010); Rathod (2013) and Deshmukh (2014).

#### Annual income :

Annual income provides financial capital for farming. It is assumed that annual income plays an important role for the adoption of soil testing techniques and its recommendation by the orange growers. Hence, it is considered in the present study. The results obtained have been presented in Table 1. From the distribution of the respondents according to annual income in Table 1 observed that 40.00 per cent of the respondents had annual income between Rs. 2,00,001 to 4,00,000. The respondents having annual income in the range of Rs.

4,00,001 to 6,00,000 were 27.00 per cent, followed by 21.00 per cent respondents were found to be having annual income above Rs. 6,00,001 and 12.00 per cent respondent had annual income upto Rs. 2,00,000.

Therefore, it is concluded that majority of orange growers had annual income between 2,00,001 to 4,00,000. Similar, finding were reported by Kinkhedkar (2001) and Deshmukh (2014).

#### Sources of irrigation :

River, well/tube well, canal etc. are sources of irrigation to the orange growers. The sources of irrigation are useful to increase the productivity hence, it is included in the study. The results obtained have been presented in Table 1. From the distribution of the respondents according to the sources of irrigation observed that cent per cent (100.00%) of respondents using well/tube well as a sources of irrigation for orange orchards.

#### Occupation :

The occupation of the respondents was studied and the result has been presented in Table 1. From occupation wise distribution, it is observed that majority of the respondents 59.00 per cent had agriculture as their main occupation, it was followed by 21.00 per cent respondents having agriculture and business, 09.00 per cent respondents had agriculture plus allied occupation, 08.00 per cent respondents having agriculture plus services as a occupation and only 03.00 per cent respondents had agriculture plus labour as a occupation. Therefore, it is concluded that majority of the orange growers had only agriculture as a main occupation. Similar, finding was reported by Gavit (2013).

#### Area under orange orchards :

Actual area under orange orchards puts by the selected farmers out of his total land holding is studied and result has been presented in Table 1. From above distribution Table 1, revealed that more than three fourth (84.00%) of the respondents had area under orange orchards upto 2.00 ha. followed by 11.00 per cent growers have area between 2.01 to 4.00 ha and remaining 5.00 per cent have area above 4.01 ha under orange orchards. Thus, it is concluded that majority of orange growers had area under orange orchards upto 2.00 ha. Similar, finding was reported by Rathod (2013) and Deshmukh (2014).

**Age of orchard :**

Numbers of years completed since from plantation of the orange orchards was studied and result has been presented in Table 1. From Table 1 revealed that majority (88.00%) of the orange growers having orange trees between 7 to 12 years old followed by 6.00 per cent each orange growers having upto 6 years old orchards and above 12 years old orchards. Hence, it is concluded that majority (88.00) of the orange growers having productive orange plants in his orchards.

**Employment guarantee scheme availed :**

Whether the plantation done under the employment guarantee scheme or personally planted the orchards was studied and result has been presented in Table 1. From above distribution Table 1, it is revealed that only 33.00 per cent respondents planted orchards under the employment guarantee scheme of government of maharashtra and 67.00 per cent respondents did not avail any employment guarantee scheme for plantation of orange orchard, they have planted the orchard by spending their own money. Therefore, it is concluded that majority of respondents did not availed any employment guarantee scheme of government of Maharashtra for plantation of the orchards.

**Type of soil :**

Production of orange depends on various factors, out of which type of land is one of the important prerequisite for better yield of the orange. The data regarding the type of land of the selected respondent has been presented in Table 1. From the Table 1 revealed that the maximum 52.00 per cent of the respondents were having deep type of soil, followed by 40.00 per cent respondents having very deep type of soil. While 08.00 per cent possess moderately deep type of soil, respectively. Thus, it is concluded that majority of respondents had class-II (Deep) type soil for their orange orchards.

**Farming experience :**

Experience of orange growers in cultivation of orange orchards was studied and result has been presented in Table 1. From the Table 1 revealed that majority (88.00%) respondents were having farming experience from 8-14 years, followed by 11.00 per cent respondents were having farming experience above 15 years and 09.00

per cent respondents had farming experience upto 7 years. Thus, it revealed that majority (80.00%) of the respondents had farming experience between 8 to 14 years.

**Distance from soil testing laboratory :**

Distance of village in kilometres from soil testing laboratory is studied and result have been presented in Table 1. It is observed from Table 1 that 60.00 per cent orange growers have to travelled 51 to 100 km from their village for soil testing laboratory, followed by 25.00 per cent respondents have to travelled upto 50 km and 15.00 per cent respondent have to travelled above 100 km for soil testing laboratory. Thus, it is concluded that majority of respondents have to travel distance between 51 to 100 km from villages to reach at soil testing laboratory.

**Method of irrigation :**

In method of irrigation which type of irrigation methods have used by orange growers for his orchards have been studied and result are presented in Table 1. It is seen from Table 1 that maximum 63.00 per cent of orange growers have used drip as a method of irrigation and 37.00 per cent orange growers used double ring as a method of irrigation. Therefore, it is concluded that majority of orange growers uses drip method of irrigation for their orchards.

**Extension contact :**

Extension contact is an important indicator for adoption of soil testing techniques and its recommendations. It is presumed that the farmers have more contacts with extension worker and other agencies may derive more benefits from development agencies and hence, it was necessary to study in the present case. The distributions of the respondents according to their extension contact have been presented in Table 2 as follows.

It is seen from the Table 2, shows that majority (76.00%) of the respondents having occasionally extension contact with Agriculture officer, 63.00 per cent with Agriculture university scientists/KVK scientist, 50.00 per cent with gram sevak, 41.00 per cent with agriculture assistant, 37.00 per cent with others such as relatives, friends, progressive farmers, NGO, etc., 35.00 per cent with agriculture extension officer and only 05.00

per cent respondents contacted occasionally with B.D.O.

The above results tends to conclusion that, the only 10.00 per cent respondents having regular extension contact with gram sevak, agriculture assistant (08.00%), agriculture officer (05.00%), B.D.O. (01.00%), Agriculture university scientists/KVK scientist (11.00%) and majority of respondents contacted regularly with other agencies like relatives, progressive farmers, friends, NGO, etc.

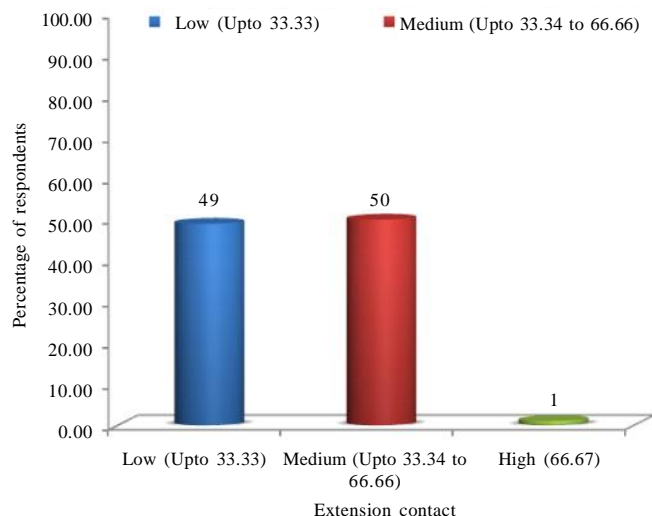
However, majority of the respondents did not having extension contact with B.D.O. (94.00%), agriculture extension officer (65.00%), agriculture assistant (51.00%), gram sevak (40.00%), agriculture university scientist/KVK scientist (24.00%) and 20.00 per cent respondents never contacted with relatives, progressive farmers, friends, NGO, etc. for getting technical information.

Result presented in the Table 3, indicated that the exactly half (50.00%) of the respondents kept medium level of extension contact with extension agencies for seeking information followed by 49.00 per cent and only 01.00 per cent of the respondents having low and high extension contact with extension agencies, respectively

**Major problem faced by orange orchards :**

Whether the orange orchards facing any major problem is studied and result has been presented in Table 4 as follows.

It is seen from Table 4 that majority 87.00 per cent orange orchards faced by dieback disease, 14.00 per cent



**Fig. 1 :** Distribution of the respondents according to their level of extension contact

orchards faced by phytopthera, 24.00 per cent orchards faced water shortage, 22.00 per cent orchards faced nutrient deficiency and 32.00 per cent orchards having gummosis disease.

Therefore it is concluded that majority of orchards faced by dieback disease and it is major reason for decline of orange orchards in study area. Similar, findings were reported by Shivankar (2011).

**Soil testing agency availed :**

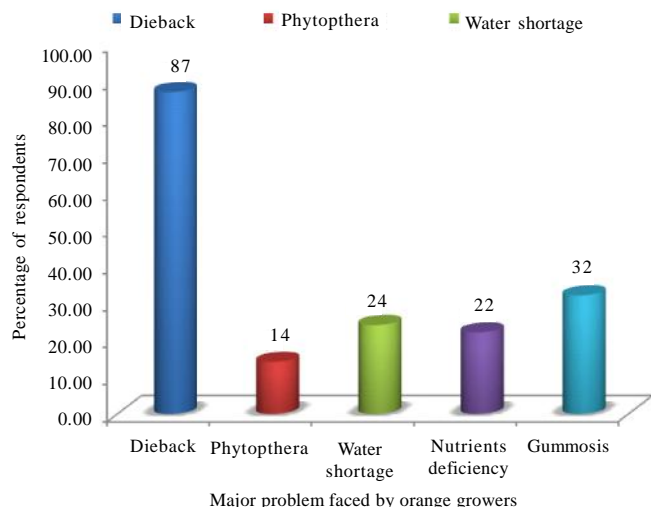
Under soil testing agency which soil testing agency have been availed by the orange growers was studied

**Table 2 : Distribution of respondents according to their extension contact**

Sr. No.	Source of information	Frequency of contact		
		Regular (2)	Occasionally (1)	Never (0)
1.	Gram sevak	10 (10.00)	50 (50.00)	40 (40.00)
2.	Agriculture Assistant	8 (8.00)	41 (41.00)	51 (51.00)
3.	Agriculture Extension officer	00 (00.00)	35 (35.00)	65 (65.00)
4.	Agriculture officer	05 (05.00)	76 (76.00)	19 (19.00)
5.	B.D.O.	01 (01.00)	5 (05.00)	94 (94.00)
6.	Agriculture university scientists/KVK scientist	11 (11.00)	63 (63.00)	24 (24.00)
7.	Any other (Relatives, progressive farmers, friends)	43 (43.00)	37 (37.00)	20 (20.00)

**Table 3 : Distribution of the respondents according to their level of extension contact**

Sr. No.	Extension contact level	Respondents	
		Frequency	Percentage
1.	Low (Upto 33.33)	49	49.00
2.	Medium (33.34 to 66.66)	50	50.00
3.	High (Above 66.66)	01	01.00
	Total	100	100.00



**Fig. 2 :** Distribution of the respondents according to major problem faced by orange growers

and the result have been presented in Table 5 as follows

From the Table 5, it is seen that 33.00 per cent orange growers have used soil testing laboratories of state department for soil testing, followed by 09.00 per cent respondent uses agriculture university, 08.00 per cent respondents uses the KVK’s soil testing laboratories, 05.00 per cent respondents uses NGO and 03.00 per cent respondents uses private fertilizer company as a soil testing agency. Whereas, 42.00 per cent orange growers have not tested their soil till date.

Therefore, it is revealed that majority of respondents have used the State department soil testing laboratories as soil testing agency for testing of orchards soil.

**Constraints :**

The constraints generally restrict the attitude of new farm technology. The problems faced by the orange growers about adoption of soil testing techniques and its recommendations were collected and depicted in Table 6 as follows.

It is observed from Table 6, that 57.00 per cent orange growers faced the constraints of lack of knowledge about soil testing and 47.00 per cent orange growers faced the constraints of lack of technical skill about soil testing technique, as technical constraints. The 40.00 per cent orange growers have information constraints *i.e.* no demonstration about soil testing. As regard to situational constraints, 73.00 per cent respondents faced problem of delay in soil test report and 62.00 per cent respondents about high cost of fertilizer.

As regarding to other constraints 77.00 per cent of respondents have difficulty to understand the soil test report and 79.00 per cent have problem about the distance of soil testing laboratory too long from their village. About the orange fruits 66.00 per cent respondents faced unavailability of proper market, whereas 47.00 per cent respondents have problem about low market value of orange and 46.000 per cent orange growers have constraints about inadequate storage problem.

It could be concluded that the analysis of these constraints would call for the attention of the administrator of Government, Department of Agriculture of Maharashtra and other concerned departments for

Sr. No.	Problem faced	Frequency
1.	Dieback	87 (87.00)
2.	Phytopthera	14 (14.00)
3.	Water shortage	24 (24.00)
4.	Nutrient deficiency	22 (22.00)
5.	Gummosis	32 (32.00)

Sr. No.	Agency	Frequency
1.	State department	33 (33.00)
2.	KVK	08 (08.00)
3.	Agriculture university	09 (09.00)
4.	NGO	05 (05.00)
5.	Private fertilizer company	03 (03.00)
6.	Not tested the soil	42 (42.00)
	Total	100.00

**Table 6 : Constraint expressed by the selected orange growers in adoption of soil testing techniques and its recommendation (n=100)**

Sr. No.	Constraints	Respondents	
		Number	Percentage
1.	<b>Technical constraints</b>		
	Lack of detail knowledge about soil testing.	57	57.00
	Lack of technical skill about soil testing technique	47	47.00
2.	<b>Information constraints</b>		
	No demonstration about soil testing	40	40.00
3.	<b>Situational constraints</b>		
	Delay in soil test report	73	73.00
	High cost of fertilizer	62	62.00
4.	<b>Other constraints</b>		
	Difficulty to understand soil test report	77	77.00
	Distance of soil testing laboratory too long from village	79	79.00
	Unavailability of proper market	66	66.00
	Low market value of orange	47	47.00
	Inadequate storage problem	46	46.00

planning systematic efforts to encountered these constraints will go long way for the Development of Agriculture in general and Horticulture in particular.

Authors' affiliations :

**YOGITA WANKHEDE, P.P. BHOPLE AND N.P. JANGWAD**,  
Department of Extension Education, Post Graduate Institute, Dr.  
Panjabrao Deshmukh Krishi Vidyapeeth, AKOLA (M.S.) INDIA

## REFERENCES

- Deshmukh, A.** (2007). Reason of declining of orange orchards in Amravati district M.Sc. Thesis, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola, M.S. (INDIA).
- Deshmukh, A.S.** (2014). Information behaviour about production and marketing of orange growers. Ph.D Thesis. Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola, M.S. (INDIA).
- Dhole, M. B.** (2006). Adoption behaviour of orange growers under employment guarantee scheme. M.Sc. Thesis, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola, M.S. (INDIA).
- Gavit, D.V.** (2013). Utilization of information sources by orange growers. M.Sc. (Ag.). Thesis, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola, M.S. (INDIA).
- Jagdish, P.N.,** Rajeev, S., Ray, S.K. and Chandran, P. (2001). Characteristics and classification of some orange growing soils in Nagpur district of Maharashtra. *J. Indian Soc. Soil Sci.*, **49**(4):735-739.
- Kinkhedkar, A.K.** (2001). Resource management behaviour of orange growers. M.Sc. (Ag.) Thesis, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola, M.S. (INDIA).
- Kohli, R.R.** and Srivastava, A.K. (1997). Nutritional requirement of Nagpur mandarin in clay soils of Central India. *Indian Farm.*, **47** : 25-27.
- Mankar, D.M.,** Kale, N.M., Wankhade, P.P., Bhople, P.P., Waghmare, R.S. and Katkar, R.N. (2015). Soil testing status of the farmers in Distress Prone district of Vidarbha. Research review committee report. Department of Extension Education, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola, M.S. (INDIA).
- Meshram, P.P.** (2010). Follow up study of recommendation of soil testing by the Farmers. M.Sc. (Ag.) Thesis, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola, M.S. (INDIA).
- Rathod, V.D.** (2013). Technological gap in orange production practices. M.Sc.(Ag.) Thesis, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola, M.S. (INDIA).
- Srivastava, A.K.,** Kohli, R.R., Dass, H.C., Huchche, A.D. and Lallan, R. (1999). Evaluation of the nutritional status of Nagpur mandarin (*Citrus reticulata* Blanco) by foliar sampling. *Trop. Agric.*, **72** (6) : 93-98.
- Srivastava, A.K.** and Singh, S. (2002). Soil analysis based diagnostic norms for Indian citrus cultivar. *Comm. Soil Sci. Plant Analy.*, **33** (11-12) : 1689-1706.
- Thakare, R.R.** (2002). Information seeking behaviour of orange growers. M.Sc. Thesis, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola, M.S. (INDIA).
- Thakare, U.G.** (2000). Adoption behaviour of farmers about soil testing recommendations and its impact on productivity. M.Sc. Thesis, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola, M.S. (INDIA).



■ **WEBLIOGRAPHY**

Anonymous (2002). Database of National Horticulture Board, Ministry of Agriculture, Govt. of India. Available at <http://>

[nhb.gov.in/report\\_files/orange/ORANGE.htm](http://nhb.gov.in/report_files/orange/ORANGE.htm).

**Shivankar, V.J.** (2011). NRCC Vision 2030. Available at [www.nrccitrus.nic.in](http://www.nrccitrus.nic.in)

12<sup>th</sup>  
Year  
★★★★★ of Excellence ★★★★★