

CORRELATES OF KNOWLEDGE AND ADOPTION ABOUT SOIL TESTING TECHNIQUES AND ITS RECOMMENDATIONS WITH PROFILE OF ORANGE GROWERS

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ABSTRACT

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 and 64.00 per cent of the respondents had medium level of knowledge about soil testing techniques and its recommendation. Out of the 58.00 per cent orchard owners who have tested soil, out of them 72.42 per cent had adopted soil test report recommendations at medium level. That means they have not applied the fertilizer doses as per the report of soil test. Among selected variables education, land holding, annual income, occupation, area under orange orchards, extension contact and method of irrigation are positively significant with knowledge about soil testing techniques and its recommendations at 0.01 level of probability. Whereas among the selected variables education, land holding, income, occupation, area under orange orchards, employment guarantee scheme availed, soil testing agency, extension contact, method of irrigation are significantly correlated with adoption of soil testing techniques and its recommendation as per the soil test report.

KEYWORDS: Correlates, Profile, Soil Testing Techniques, Knowledge, Adoption

INTRODUCTION

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 % 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% from 1.19 lakh ha. in 1991-92 to 1.99 lakh ha. in 2001-02 and the production increased by 57% (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 lack 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 CaCO₃, 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, CaCO₃ (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 knowledge and adoption of the selected orange growers about soil testing techniques and its recommendations. The second objective was to study the relationship of selected characteristics of orange growers with knowledge and adoption about the soil testing techniques and its recommendations.

MATERIAL 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 *taluka* 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.

RESULTS AND DISCUSSION

Knowledge of Soil Testing Techniques

The knowledge possessed by the orange growers about soil testing techniques and its recommendation was ascertained and results were depicted in Table 1 as follows.

The data regarding practice wise knowledge of the respondents about soil testing techniques and its recommendations in Table 1, revealed that cent per cent (100.00%) of the respondents had knowledge about depth of soil sample, followed by 95.00 per cent of the respondents having knowledge about recommended dose of N for orange per plant, 94.00 per cent of respondent had knowledge about time of soil sampling (before and after planting of orange orchards), 93.00 per cent respondents have knowledge about recommended dose of P_2O_5 and about 77.00 per cent

Table 1: Distribution of Respondents According to Their Knowledge about the Soil Testing Techniques and its Recommendation by the Orange Growers

Sl. No.	Particular	Have Knowledge (n=100)	
		Frequency	Percentage
A)	Soil Sampling		
1	Depth of soil sample in cm. (0-30),(30-60), (60-90)	100	.00
2	Selection of sites	45	45.00
3	Procedure of Soil Sampling	65	65.00
4	Preparation of Soil Sample	56	56.00
5	Information to be attached	28	28.00
6	Time of soil sampling (Before and after planting of orange orchards)	94	94.00
7	Water quality testing	14	14.00
8	pH ,EC, organic carbon $CaCO_3$,N,P,K testing	77	77.00
9	Micronutrients testing (Zn, Fe, Mn, Cu)	72	72.00
B)	Soil Testing		
1	Meaning of Soil Testing	46	46.00
2	Objective of Soil Testing	52	52.00
3	Benefits of Soil Testing	72	72.00
C)	Knowledge about Recommended Doses N,P,K and FYM		
1	Recommended dose of N for orange 800gm/plant	95	95.00
2	Recommended dose of P_2O_5 for Orange 400gm/plant	93	93.00
3	Recommended dose of K_2O for orange 600gm/plant	29	29.00
4	Recommended dose of FYM for orange 50 Kg/plant	64	64.00
5	Complete Knowledge about soil testing report	16	16.00

Respondents have knowledge about pH, EC, organic carbon, $CaCO_3$, N, P, K testing, whereas 72.00 per cent each respondents possessed knowledge about micronutrients testing and benefits of soil testing. The 65.00 per cent of the respondents having knowledge about procedure of soil sampling, 64.00 per cent respondents have knowledge about recommended dose of FYM, 56.00 per cent respondents possess knowledge about preparation of soil sample and 52.00 per cent respondents have knowledge about objective of soil testing. The 45.00 per cent respondents possessed knowledge about selection of sites for soil sampling and 46.00 per cent respondents possess knowledge about meaning of soil testing.

The 29.00 per cent each of the respondents having knowledge about recommended dose of K_2O for orange orchards, 28.00 per cent respondents have knowledge about information to be attached with soil sample. Only 16.00 per cent respondents possessed complete knowledge about soil testing report and 14.00 per cent respondents possessed knowledge about water quality testing.

The overall knowledge of respondents about the soil testing techniques and its recommendation report was ascertained on the basis of knowledge level of the respondents about all selected practices, and result were depicted in Table 2.

Table 2: Distribution of the Respondents According to their Knowledge Level about Soil Testing Techniques and its Recommendations by the Orange Growers

Sl. No.	Knowledge Level	Respondents (n=100)	
		Number	Percentage
1	Low (Upto 33.33)	6	6.00
2	Medium (33.34 to 66.66)	64	64.00
3	High(Above 66.66)	30	30.00
Total		100	100.00

It was observed from the Table 2 that majority of the respondents (64.00%) had medium level of knowledge about soil testing techniques and its recommendation. Where as 30.00 percent and 06.00 per cent of the respondent farmers were having high and low level of knowledge about the soil testing techniques and its recommendation respectively. Thus, study concluded that majority of the respondent had medium level of knowledge about soil testing techniques and its recommendation. Similar finding were reported Poonia (2002), Ingle (2011), Dhotare (2014) and Mankar (2015).

Adoption Status of Soil Test Technique

The data regarding the soil testing done by the selected farmers have been collected from the selected orange orchards and has been depicted in Table 3 as follows.

Table 3: Distribution of Respondents according to the Adoption of Soil Test Technique

SI No	Status of Soil Test	Frequency	%
1	Soil test done	58	58.00
2	Not done	42	42.00

It was observed from the Table 3 that 58.00 per cent of the orange growers have tested their soil and remaining 42.00 per cent have not tested the soil. The practice wise adoption of soil testing techniques and its recommendations as per the soil test report given by the soil testing laboratory has also been studied and the results in this regards have been presented in Table 4.

The results regarding the adoption status of the soil testing reports and its recommendation revealed from table 4 that 63.79 per cent orange growers have applied nitrogen doses as per the recommendation i.e. full adoption, followed by 36.21 per cent applied nitrogen doses partially as per the soil test report. As regarding to the application of phosphorus fertilizer 91.38 per cent of orange growers applied partially the doses of phosphorus as per the recommendation of soil test report, followed by 8.62 per cent of the orange growers have applied the doses of phosphorus as per the soil test report recommendation i.e. full adoption. As the black cotton is rich in potash therefore it was observed that there is no need of potassium as per the soil test report.

Table 4: Distribution of the Respondents According to Practice Wise Adoption of Soil Testing Techniques and its Recommendations by the Orange Growers

Sl. No.	Adoption As Per Soil Test Report	Adoption (N=58)		
		FA(2)	PA(1)	NA(0)
1	Application of Nitrogen Fertilizer	37 (63.79)	21 (36.21)	00 (00.00)
2	Application of Phosphorus Fertilizer	05 (08.62)	53 (91.38)	00 (00.00)
3	Application of Potash Fertilizer	58 (100.00)	00 (00.00)	00 (00.00)
4	Application of FYM	00 (00.00)	58 (100.00)	00 (00.00)
5	Application of micronutrients	27 (46.55)	08 (13.79)	23 (39.66)

FA = Full Adoption, PA = Partial Adoption, NA = No Adoption

It was observed that from the study that all respondent (58.00%) who have tested their soil applied FYM partially as per the soil test report. The results regarding to the application of micronutrients 46.55 per cent orange growers have applied micronutrients as per the soil test report i.e. full adoption, followed by 39.66 per cent orange growers never applied micronutrients. Whereas, 13.79 per cent applied micronutrients partially as per the soil test report.

Table 5: Distribution of the Respondents According to Their Level of Adoption of Soil Testing Recommendations by the Orange Growers

Sr. No.	Adoption Level	Respondents (N=58)	
		Number	Percentage
1.	Low (Up to 33.33)	11	18.96
2.	Medium (33.34 to 66.66)	42	72.42
3.	High (Above 66.66)	05	08.62
	Total	100	100.00

It was observed from Table 5, that 58.00 per cent orange growers have tested their soil. Out of them 72.42 per cent of the respondents had medium level of adoption of soil testing recommendations. The percentage of respondents having low level of adoption was 18.96 per cent, whereas 08.62 percent respondents were having high level of adoption.

Thus, study concluded that majority of the respondent had medium level of adoption about soil testing recommendations. Similar finding were reported by Meshram (2010), Patil (2013), Dhotare (2014) and Mankar (2015).

Relational Analysis

The correlation coefficients of knowledge and adoption with personal, situational, communicational and psychological characteristics of the orange growers have been studied and results are depicted in Table 6 and 7 as follows. It could be seen from table 6 that among selected variables education, land holding, annual income, occupation, area under orange orchards, extension contact and method of irrigation are positively significant with knowledge about soil testing techniques and its recommendations at 0.01 level of probability. This indicate that if education, land holding, annual income, occupation, area under orange orchards, extension contact and adoption of improved method of irrigation increases the knowledge about soil testing techniques and its recommendation of orange growers have also been increased. Similar, findings were reported by Kadu (2007) about education and knowledge is highly significant with awareness about soil testing.

Whereas, age of respondents, age of orchards, employment guarantee scheme availed, farming experience, type of soil, distance from soil testing laboratory and major problem faced by orange orchards were not significantly correlated with knowledge about soil testing techniques and its recommendation.

Table 6: Coefficient of Correlation between Selected Characteristics of the Respondents with their Knowledge

Sl. No	Variables	“R” Values
1	Age	-0.1657
2	Education	0.4455**
3	Land holding	0.3952**
4	Income	0.4494**
5	Occupation	0.3059**
6	Area under orange orchards	0.3610**
7	Age of orchards	-0.1298
8	Employment guarantee Scheme availed	-0.1136
9	Farming Experience	-0.0449

10	Type of Soil	-0.0811
11	Distance from soil testing laboratory	-0.1651
12	Soil testing agency	0.1202
13	Extension Contact	0.2897**
14	Method of irrigation	0.2979**
15	Major problem faced by orchards	-0.0634

**Significant at 0.01 level of probability.

It could be seen from table 7 that among the selected variables education, land holding, income, occupation, area under orange orchards, employment guarantee scheme availed, soil testing agency, extension contact, method of irrigation are significantly correlated with adoption of soil testing techniques and its recommendation as per the soil test report. This indicate that if education, land holding, income, occupation, area under orange orchards, employment guarantee scheme availed, soil testing agency, extension contact, use of improved method of irrigation increases the adoption of soil testing techniques and its recommendation. Meshram (2010) were reported same findings about annual income and extension contact were significantly correlated with level of adoption of soil testing recommendation.

Table 7: Coefficient of Correlation between Selected Profiles of the Respondents with their Adoption of Soil Testing Techniques as Per the Soil Test Report

Sl. No	Variables	“R” Values
1	Age	-0.2665**
2	Education	0.5470**
3	Land holding	0.3467**
4	Annual income	0.3024**
5	Occupation	0.4263**
6	Area under orange orchards	0.2467**
7	Age of orchards	-0.2218**
8	Employment guarantee Scheme availed	0.44022 **
9	Farming Experience	-0.07169
10	Type of Soil	-0.2291 **
11	Distance from soil testing laboratory	0.13792
12	Soil testing agency	0.6986**
13	Extension contact	0.2897**
14	Methods of irrigation	0.2979**
15	Major problem faced by orchards	-0.0634

**Significant at 0.01 level of probability

Whereas, from the table 7 it is seen that age of respondents and age of orchards are negatively significant with adoption of soil testing techniques and its recommendation as per the soil test report. This indicted that if age of respondents is increases the adoption was decreases. Whereas, farming experience, distance from soil testing laboratory and major problem faced by orange orchards are non significantly correlated with adoption of soil testing techniques and its recommendation as per the soil test report.

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