

Extent of Adoption of Improved Practices of Mango Production by Mango Growers in Muzaffarnagar District of Uttar Pradesh

K. V. Singh¹, G. P. Singh² and A. Priyadarshi³

1. Research Scholar, 2. Head, Department of Agril. Extension, J. V. College, Baraut, Baghpat, Uttar Pradesh

3. Deputy Director (Horticulture), M.C.D., New Delhi

Corresponding author e-mail: drgajendrapratap@yahoo.in

ABSTRACT

A study conducted among mango fruit growers revealed that nearly sixty per cent of fruit growers had moderate extent of adoption of mango production technology. With respect to extent of adoption of fruit growers on various components of improved mango production technology, majority of them had fully adopted land preparation, method of propagation, time, method and distance of planting, planting density, irrigation time, training and pruning, and harvesting method. Majority of farmers had partial adoption of such practices as adoption of high yielding variety, selecting good nursery, interculture practices, harvesting, packing and handling. However, majority of farmers did not adopt such practices as summer ploughing, application of manure and fertilizers (dose, time and method), inter-crops, plant growth regulators, green manuring, insect pests and diseases, physiological disorders, and marketing procedures. Among the correlates of extent of adoption of mango production technology, religion, land size, education, farm power, socio-economic status, risk taking behaviour, innovativeness, economic aspiration, scientific orientation and credit orientation were positively and significantly associated with fruit grower's extent of adoption of improved mango production technology at 0.01 level of probability. Regression analysis of extent of adoption of fruit growers on improved mango production technology revealed that level of knowledge of mango cultivation practices was found to be contributing positively and significantly in predicting the extent of adoption of mango fruit growers.

Keywords: *Extent of Adoption; Improved Practices of Mango Production; Risk taking behaviour; Innovativeness; Economic aspiration; Scientific orientation; Credit orientation;*

While shifting focus has opened up great opportunities waiting to be exploited in the horticulture sector, the ground realities present a grave picture of low yields of fruits, wide gaps in adoption of improved fruit cultivation practices, inadequate technical guidance, poor infrastructure for transport system and for value addition and enterprise development.

Uttar Pradesh ranks 5th in area under fruit trees, and 8th in fruit production. But it occupies a very dismal 18th position with respect to productivity of fruits. Among the districts of Western Plain Zone of Uttar Pradesh Muzaffarnagar district has traditional orchardists growing mango, with a great promise for productivity of fruits. Productivity of mango is very low in Uttar Pradesh compared to other fruit growing states. Hence it is imperative to analyse the actual status of mango in the cropping systems of Muzaffarnagar district and also to analyse the factors contributing to its low productivity.

It was also felt necessary to critically analyse the extent of adoption of various components of improved mango cultivation practices and its correlating factors.

Adoption of improved production practices is the key to higher production of fruits and higher incomes to farmers. The technical knowledge of farmers appears to be the key link to higher level of adoption. The scientific research being done at the fruit research stations has to be transferred to orchardists through extension education processes including on-farm training, distributing extension literature and regular field visits and demonstrations. Once farmers acquire knowledge, they begin to use and apply new techniques and improved practices in their orchards. Even among farmers, there is a great variation in their levels of knowledge, as well as their readiness to accept, try new methods and adopt improved production practices. Some need more time to grasp and get convinced and hence

need longer sustained support from extension agencies including horticulture department staff. The variation in rate and extent of adoption of improved practices in mango production and reasons there of, need to be thoroughly understood. Hence a research study was planned and conducted. The present study aims at analysing the extent of adoption of improved cultivation practices of mango in western Uttar Pradesh (Singh, 2008).

METHODOLOGY

The study was conducted in the Purkhazi, Chartawal, Morna and Muzaffarnagar blocks of Muzaffarnagar district of Uttar Pradesh. The sample size was 200 comprising of 25 farmer respondents from eight villages selected through stratified random sampling method. Level of knowledge, and extent of adoption of mango improved production practices were the dependent variables. Among the independent variables, the socio-personal variables were: age, religion, caste, land size, land under field crops, land under orchards, land use pattern, education, family type, family size, occupation, farm power, annual income, social participation, socio-economic status, risk taking behaviour, innovativeness, economic aspiration, scientific orientation, and credit orientation. Two communication variables are included in the study: extension contact, and mass media exposure. Suitable scales were used to measure the variables and an interview schedule was prepared. The data was collected through personal interviews. Data thus collected was analysed using appropriate statistical techniques.

RESULTS AND DISCUSSION

Adoption of Improved Mango Production Practices: The extent of adoption of improved mango production practices was measured on all the twenty-seven components against a two-point rating scale of 1 for adoption, and 0 for non-adoption of a few practices and against a three-point rating scale of 2 for full adoption, 1 score for partial adoption and 0 for non-adoption of a few other improved practices. The maximum obtainable score of extent of adoption was 38. Among the results, the frequency distributions of respondents on their extents of adoption of all practices, adoption of each of the components of mango production technology were

presented here. In addition, the results of correlation and regression analyses of the extent of adoption of improved mango production practices were also presented.

Extent of Adoption of Improved Mango Production Practices : The scores obtained from the twenty-seven components on their extent of adoption were analysed and the frequency distribution of respondents on their extents of adoption of improve mango production technology are given in Table 1.

Table 1. Distribution of respondents on extent of adoption of improved practices of mango (N=200)

Extent of adoption of improved mango production practices		
Mean	55.78	
Standard Deviation	21.24	
Range	16.67 – 80.56	
Category	No.	%
Low (< Mean – SD)	56	28.0
Medium (Between Mean \pm SD)	119	59.5
High (> Mean + SD)	25	12.5
Total	200	100

As can be seen from the results, the mean extent of adoption of mango production practices was 55.78. The scores ranged widely from as low as 16.67 to as high as 80.56, which were also reflected in a high measure of standard deviation of 21.24. These results indicated that the sample farmers vary greatly on their extents of adoption of improved mango production practices. With regard to frequencies, it appears that they were falling into a near normal distribution that is highly skewed towards the lower side of the extent of adoption scores. Nearly 60 per cent of farmers were adopting up to a moderate level, while 28 per cent were low adopters and only 12 per cent of them were high adopters. This indicated that there is a great scope for improvement in bridging the gap in adoption of improved mango production practices for higher fruit production among the sample of farmers.

Extent of Adoption of Components of Improved Mango Production Technology : Here an attempt was made to analyse the level of adoption of individual components of improved mango production technology by the farmer respondents. Some of the individual practices were adopted in full, or not adopted at all,

while among some practices, partial adoption was recorded. The results are presented in Table 2.

Land Preparation: Improved land preparation practices were adopted in full, by 60 per cent farmers. Nearly 40 per cent respondents did not adopt this practice at all. Majority of respondents were taking good care of land preparation in their orchards.

High Yielding Varieties: Among the sample of respondents, only 7 per cent adopted in full the high yielding varieties in their orchards. About 88 per cent of them have adopted partially. They have taken up planting HYV saplings only in a part of their old orchards. Only 5 per cent of them did not plant any high yielding variety's saplings in their mango orchards. This may be

due to non-availability of saplings of high yielding varieties, and farmers' fear of risks involved in trying out a new variety, as its benefits can be seen only after long time, as mango tree takes a few years to come to bearing fruits.

Method of Propagation: Nearly 67 per cent of orchardists have adopted improved method of propagation, while 33 per cent did not adopt at all.

Nursery Selection: Most of the farmers resort to purchasing mango saplings for their orchards from a good reputed nursery. Only 65 per cent of them could get good saplings for planting in their mango orchards, only for partial adoption. Since there is dearth of good nursery of mango saplings, farmers were planting a part

Table 2. Extent of adoption of various components of improved practices of Mango cultivation by farmers

S. NO.	Improved Practices	Fully Adopted		Partially Adopted		Not Adopted	
		No.	%	No.	%	No.	%
1.	Land preparation	121	60.5	-	-	79	39.5
2.	Variety (HYV) *	14	7.0	176	88.0	10	5.0
3.	Method of propagation	134	67.0	-	-	66	33.0
4.	Selecting good nursery *	-	-	129	64.5	71	35.5
5.	Planting distance (line to line)	122	61.0	-	-	78	39.0
6.	Planting distance (plant to plant)	122	61.0	-	-	78	39.0
7.	Size of pits	124	62.0	-	-	76	38.0
8.	Planting time	150	75.0	-	-	50	25.0
9.	Plant density *	172	86.0	8	4.0	20	10.0
10.	Planting method	173	86.5	-	-	27	13.5
11.	Interculture practices *	-	-	127	63.5	73	36.5
12.	Summer ploughing *	33	16.5	40	20.0	127	63.5
13.	Irrigation method *	22	11.0	90	45.0	58	44.0
14.	Irrigation time	108	54.0	-	-	92	46.0
15.	Training & pruning	133	65.5	-	-	67	33.5
16.	Application of manure & fertilizer (dose)	87	43.5	-	-	113	56.5
17.	Application of manure & fertilizer (time)	92	46.0	-	-	108	44.0
18.	Application of manure & fertilizer (method)	93	76.5	-	-	107	53.5
19.	Intercrops	52	26.0	-	-	148	74.0
20.	Plant growth regulator	89	44.5	-	-	111	55.5
21.	Green manure	95	47.5	-	-	105	54.5
22.	Insect pests	96	48.0	-	-	104	52.0
23.	Diseases	94	47.0	-	-	106	53.0
24.	Physiological disorders	96	48.0	-	-	104	52.0
25.	Harvesting method	109	54.5	-	-	91	45.5
26.	Harvesting packing & handling *	85	43.5	113	56.5	02	1.0
27.	Marketing procedure *	56	28.0	59	29.5	85	42.5

* This component was rated on a three -point rating scale of adoption and rest of them were rated on a two-point rating scale of adoption.

of their orchards with good plants from a reputed nurseries. Nearly 35 per cent of them did not adopt planting saplings from a good reputed nursery.

Planting Distance: The improved practice of planting distance is 5 m x 5 m. But 39 per cent of farmer respondents were not following this practice. Sixty-one per cent of respondents adopted the recommended planting distance for both line-to-line and plant-to-plant distance.

Time of Planting: Majority (75 %) of farmers had adopted the right time for planting of mango saplings in their orchards. Only 25 per cent could not.

Planting Density: The recommended planting density is 278 plants per hectare with a planting distance of 5m x 5m. in solo mango garden and 175 plants of mango in a mixed orchard of mango. Majority (86 percent) of farmers had adopted in full the recommended planting density, while 10 per cent of them did not adopt the recommended planting density at all, and only 4 per cent did so in a part of their garden. Partial and non-adoption of recommended planting density may be due to lack of adequate space and large canopy of untrained old mango trees.

Planting Method: About 86 per cent of farmer respondents have adopted the recommended planting method in mango orchard.

Interculture Practices: Nearly 63 per cent of respondents have adopted partially the recommended interculture operations in their mango orchards, while the 36 per cent did not adopt at all any interculture practices.

Summer Ploughing: About 63 per cent of sample of respondents did not adopt any practices of summer ploughing, while only 20 per cent of them had adopted summer ploughing only partially. In some of the old orchards, due to untrained over growth of trees, it has been difficult to run the tractor for ploughing. Hence, these inter spaces between trees was usually left untilled during summer. However, sixteen per cent of farmers were ardently adopting summer ploughing in their mango orchards.

Irrigation Method: About 45 per cent of farmers practiced the improved irrigation methods only partially in their orchards, while only 11 per cent were adopting best practices of irrigation method in full. However, 44

per cent of them did not adopt improved practices of irrigation in their mango orchards.

Irrigation Time: About 54 per cent of farmers practiced the improved practice of irrigation time in their mango orchards. But the rest did not adopt the recommended irrigation time due to non-availability of water at right time.

Training and Pruning: After harvesting season, farmers adopt the practice of training and pruning. Majority (66 %) of farmer respondents were found to adopt this improved practice in mango orchards. Another 33 per cent did not adopt training and pruning in their mango orchard.

Manures and Fertilizers: Only forty-three per cent of farmers were adopting recommended doses of manures and fertilizers, while the rest did not apply manures and fertilizers. With respect to time and method of application of manures and fertilizers in their mango orchards, 46 per cent of them were adopting. Depending on the availability of manures and fertilizers, rainfall, irrigation water and labour, farmers were found to apply manures and fertilizers at varying times. More than half of them did not apply recommended manures and fertilizers in their mango orchards.

Inter-cropping: Only 26 per cent of orchardists were found to grow intercrops in their mango orchards, depending upon the interspaces available and the age of the orchard. The crops grown were usually fodder crops for their cattle: berseem, oats and barley. But majority (74 %) did not grow any intercrops.

Plant Growth Regulators: In mango, use of plant growth regulators are recommended for getting bigger fruits and uniform ripening of mango fruits, and for controlling mango malformation. Only 44 per cent of farmer respondents were found to be adopting the application of growth regulators in their mango orchards. However, majority (56 %) of the respondents did not adopt this practice in mango orchards.

Green Manuring: Green manuring is recommended for enhancing soil health and fertility in mango orchards. But only 47 per cent of respondents were adopting this practice. Majority (53 %) of the respondents did not adopt this improved practice.

Insect Pest Management: Mealy bugs, hoppers, stem borers and fruit flies are usually seen in these mango

orchards, but majority of sample farmers did not apply any pesticides. However, only 48 per cent of them were adopting plant protection measures, while 52 per cent of them were not at all adopting any plant protection measures in their mango orchards.

Disease Management: Powdery mildew, anthracnose, wilt and black tip in fruits were usually seen but only in a few plants in the orchard. Only 47 per cent farmers were adopting plant protection measures and the rest did not adopt any plant protection measures for disease control in their mango orchards.

Physiological disorders: Mango trees suffer from a series of physiological disorders like malformation, black tip, fruit drop, clustering and biennial bearing. Specific control measures are recommended to control these disorders. But only 48 per cent of orchards were adopting control measures for these physiological disorders in their mango orchards.

Harvesting Method: The recommended method of harvesting is plucking fruits by hand if the trees are small or using stick (with a knife and pouch attached to one end). But farmers usually use a stick with attached knife to detach the fruits from the tree. Later all the fallen mango fruits are collected. Thus 54 per cent of them were adopting the recommended harvesting method of using a knife and pouch or hand plucking. Forty-six per cent of the farmers did not adopt this improved practice in their mango orchards.

Packing and Handling: Mango farmers usually collect fruits in open baskets, and adopt grading and culling practices. Then they pack the good mango fruits in wooden and plastic crates and transport them to large regulated markets. The damaged and culled fruits are put in baskets and troughs and carried away to the local markets for sale. Only 42 per cent of farmers were adopting these improved practices in full, while majority (56 %) of farmers took partial care in packing and handling fruits and do not resort to any grading.

Marketing Procedure: About 28 per cent of them were found to sell the mango fruits in large regulated markets, with appropriate grading and packaging. But 42 per cent of them sell in the local markets, in and around villages and nearby rural towns. Nearly 30 per cent of sample respondents resort to both these practices depending on the grading and proportion of good and partially

damaged fruits.

Correlates of Extent of Adoption of Improved Practices of Mango : An attempt has been made to seek answer to the question: What factors are related to extent of adoption of improved production practices of mango among the respondents? A correlation analysis was done using statistical package for social sciences (SPSS) and the correlation coefficients are given in Table 3.

Table 3. Correlation coefficients of extent of adoption of mango production practices

Independent variables	Correlation coefficients
Age	-0.075
Religion	0.255**
Caste	0.130
Land size	0.573**
Education	0.498**
Family type	0.064
Family size	-0.166*
Social participation	0.168*
Secondary occupation	0.140*
Socio economic status	0.755**
Farm power	0.732**
Annual income	-0.209
Extension contact	0.111
Mass media	0.128
Risk taking behaviour	0.488**
Innovativeness	0.398**
Economic aspiration	0.381**
Scientific orientation	0.699**
Credit orientation	0.355**

* Significant at 0.05 level of probability

** Significant at 0.01 level of probability

A cursory look at the results revealed that there are four sets of independent variables included in the study: socio-personal, socio-economic, socio-psychological and communication variables. Out of the eight socio-personal variables, age, caste, and family type were not associated with the extent of adoption of improved mango production practices. But religion, education, family size, social participation, and socio-economic status were significantly related with extent of adoption of mango production practices. Among the four socio-economic variables, land size, secondary occupation and farm power were associated significantly with extent of adoption of mango production practices.

Among the six socio-psychological variables, including the level of knowledge of mango production practices, there was found a strong positive relation with all of these variables with extent of adoption of mango production practices.

But none of the two communication variables viz., extension contact and mass media exposure was significantly associated with extent of adoption of improved mango production practices.

Regression Analysis of Extent of adoption of Improved Mango Production Practices by Farmers:
In order to assess the contribution of various independent variables to the variation in the extent of adoption

Table 4: Regression Coefficients of
Extent of Adoption of Mango Production Practices

Independent variables	partial 'b'	t	Sig.
Constant	1.314	.310	.757
Age	-0.002466	-.646	.519
Religion	.244	.269	.788
Caste	1.328	.548	.584
Land size	.279	.117	.907
Education	1.759	.737	.462
Family type	.354	.428	.669
Family size	1.562	2.239*	.026
Social participation	-.170	-1.324	.187
Occupation	-.206	-.912	.363
Farm power	1.295	.552	.581
Annual Income	.153	.656	.513
Socio-economic status	-1.252	-.534	.594
Extension contact	0.006897	.738	.461
Mass media exposure	-0.002633	-.243	.808
Risk taking behaviour	.225	.954	.341
Innovativeness	.2971	.069	.286
Economic aspiration	-0.008965	-1.124	.263
Scientific orientation	-.164	-1.538	.126
Credit orientation	-0.006179	-.673	.502
Level of knowledge on improved mango practices	.757	35.488**	.000

* Significant at 0.05 level of probability

** Significant at 0.01 level of probability

R = 0.982

R² = 0.960

F_{20, 179} = 240.894**

of improved mango production practices by farmer respondents, regression analysis of the dependent variable was done. A regression equation was fitted with the dependent variable of extent of adoption scores of mango production technology and twenty independent variables. The results of the analysis are presented in Table 4.

A perusal of the results presented in Table reveals that 96.0 per cent variation in the farmers' extent of adoption of improved mango production practices was explained by the independent variables included in the regression equation. F value at 20 and 179 degrees of freedom was 240.894, which is highly significant at 0.01 level of probability. This indicates that the independent variables included in the study were appropriate as they could explain more than 95 per cent of variance in the dependent variable.

A cursory look at the table reveals that only two variables could contribute significantly to the variance in farmers' extent of adoption of improved mango production practices. Out of these, level of knowledge of mango production practices and family size contributed significantly in predicting the extent of adoption of mango production technology by farmers. Thus it can be concluded that the farmer's level of knowledge on mango production technology has strongly impacted their extent of adoption. The farmers' joint family system was also found to be contributing to their extent of adoption of mango production technology. This may be due to the contribution of family labour in a joint family system.

CONCLUSION

Although the mean score of extent of adoption of improved mango cultivation practices was 55.78, nearly 60 per cent of them had moderate levels of extent of adoption, while 28 per cent of them had lower levels of extent of adoption, thereby indicating a general low level of knowledge of improved mango production practices among the sample respondents.

Majority of the mango growers had fully adopted only a few components of improved production technology such as land preparation, method of propagation, time, method and distance of planting, planting density, irrigation time, training and pruning, and

harvesting method. Majority of farmers had partial adoption of such practices as adoption of high yielding variety, selecting good nursery, interculture practices, harvesting, packing and handling. However, majority of farmers did not adopt such practices as summer ploughing, application of manure and fertilizers (dose, time and method), inter-crops, plant growth regulators, green manuring, insect pests and diseases, physiological disorders, and marketing procedures.

The results of regression analysis revealed that the level of knowledge of improved mango production technology has indeed helped in contributing to farmers' extent of adoption of improved mango production practices. This can be seen as a positive indicator for formulating an extension campaign of educating farmers and enriching their level of knowledge of improved mango production practices for ensuring higher mango production in the region.

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