



## **Constraints Faced by Guava Growers in Adoption of Guava Production Technology and Suggestions for Suitable Extension Strategies to Overcome the Problem in Bijnor District of UP**

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### **Authors' contributions**

*This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.*

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### **ABSTRACT**

Guava grown in diverse agro-climatic conditions faces differential biotic and abiotic stress that limiting the production and productivity of guava and consequently, influenced the economic condition of its growers. Keeping these facts in mind, the present study was conducted in Bijnor district of UP to find out the constraints faced by guava growers in adoption of production technology and suggest suitable extension strategies to overcome the problems. Two villages from 11 blocks were selected randomly on the basis of orchard availability. Five guava Growers was selected from

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each selected village. Thus, the total sample size for the investigation was 110 respondents who faced constraints in adoption of guava production technology. The guava respondents faced the constraints in adoption of guava production technology. Total constraints mainly divided into five groups. Among the input constraints, unavailability of quality chemicals like plant growth regulator, water soluble fertilizer and plant protection chemicals at government sale centre got first rank with 77.27 percent respondent, followed by unavailability of quality sapling of guava at Government nursery (73.64 percent). Among the technological constraints, lack of knowledge about organic farming of guava got first rank with 91.82 percent respondents followed by lack of knowledge about drip irrigation schedules (89.09 percent). Among the socio- psychological constraints, lack of coordination among the beneficiary and state/district horticulture department got the first rank with 92.73 percent respondents followed by inadequate extension activities conducted by state/district horticulture department (88.18 percent). Among the marketing constraints, exploitation of guava growers by middlemen got first rank with 92.73 percent respondents followed by lack of quality storage facility (87.27 percent). Among the financial constraints, lack of government funding of loan and granting of subsidies got first rank with 94.55 percent followed by high labour charges (92.73 percent). Lack of knowledge about organic farming of guava was identified as major constraints in qualitative guava production. It is therefore suggested the extension workers should organize guava growers in different groups of organic farming. They should plan knowledgeable programmes for the respondents so they can be motivated to what the organic farming of guava and can increase their knowledge about quality guava production practices through extension work like group discussion, training, demonstrations, exhibition, etc. The growers therefore are required to be educated to follow up all the recommended production practices for guava, use of timely inputs, nutrients and plant protection management practices which will help in increasing the production and productivity.

**Keywords:** Guava growers; constraints; production; extension strategies.

## 1. INTRODUCTION

Guava (*Psidium guajava* L.) is one of the most nutritious and high value fruit crops for the nutritional security of country. It belongs to family *Myrtaceae* and is originated in tropical America. Being a very hard crop, it can be successfully grown with very little care. Owing to its hard nature, it is grown successfully in tropical and subtropical regions in India over an area of 264.85 thousand hectares with production of 4053.51 thousand metric tons [1]. It is susceptible to frost and can tolerate drought and high temperature to some extent. Established guava orchards do not require much care after planting.

Due to its wider climatic adaptability, hardy to various biotic and abiotic stresses, precocious and prolific bearing habit, it is a quality fruit with high nutritive value, medicinal attributes, used both as fresh fruit and after processing in different value-added products and considered as multipurpose tree due to its utility as fruit, fuel, fodder and timber plant and high remunerative crops. In fact, rainy and winter season crops are very hardy as compared to spring crops and their fruit quality is better. Low quality production and productivity has adversely affected by guava wilt, bronzing, shoot and fruit borer, guava canker, etc. Guava is one of the hardest among the fruits

in productivity, adaptability with nutritional quality and hence aptly known as "poor man's Apple" and "Apple of tropics". It is a very popular fruits in Uttar Pradesh, it is available throughout the year except during the summer season.

Guava occupies 49.53 thousand hectares area with 928.44 thousand metric ton production during 2017-18 in Uttar Pradesh [1]. Guava fruit is a good source of ascorbic acid and pectin. Citric and malic are the predominant acid in guava. The physio-chemical characteristics of guava varieties with varieties, stage of maturity, management practices, agro-climatic situations, season of crop, etc. Regarding the nutritional value of guava, ripe fruits contain approximately 79.50 percent moisture, 15.25 percent dry matter content, 3.20 percent crude fibre and little amount of ash, crude protein and fat. The fruits are also a good source of vitamin A, Calcium, Phosphorus and Iron. Several volatile compounds including hydrocarbons, alcohols and carbonyls have been reported to be responsible for the characteristic flavour of guava. The decreases in astringency with the advancement of maturity are ascribed to polymerization of leuco anthocyanins.

Socio-economic condition particularly age, education, income, land holding size and extension contact greatly influenced the

knowledge level of the farmers. It is suitable time to transfer the technology developed by the agricultural Universities and research station to the farmer's field and to convert it into the increasing production and productivity of guava. The main task today it is to narrow this technological gap so that the farmers in general may get the same level of production as is obtained at the research station and can accelerate guava growers socio-economic standard.

## 2. MATERIALS AND METHODS

This study was conducted in Bijnor district during the year of 2019-20. Bijnor district comprise of 11 blocks. Two villages from each block were selected randomly on the basis of availability of guava orchard for study. Thus, a total number of 22 villages was selected for the investigation with five guava growers from each village which means a total sample size of 110 respondents. The data were collected through personal interview with the help of pre-structured schedule. Interview schedule was prepared on the basis of objective of the study. The data were analysed and with percentage, frequency and rank.

### 2.1 Percentage

The frequency of a particular cell was divided by the total number of respondents in that particular category and multiplied by hundred.

$$\text{Percentage (\%)} = \frac{\text{Actual no. of respondent}}{\text{Respondents or Score}} \times 100$$

### 2.2 Mean

It was calculated to the average value of particular score. The formula is given below

$$\text{Mean score} = \frac{\text{Total scores on particular item}}{\text{No of Respondents}}$$

### 2.3 Ranking

The various ranks were given on the basis of highest to the lowest frequency.

## 3. RESULTS AND DISCUSSION

Constraints in technological gap of the guava growers despite well expanded extension network, is an outcome of a number of negative

forces operating in the field conditions. These forces affect the attainment of desired objectives. This is evident from farmer's poor knowledge of technologies. Thus, it warranted for deep probe of such constraints which affected the attainment of desired objectives. Keeping this in view, the constraints perceived by the guava growers in using advanced production technology which scientist recommend were carefully identified and analyzed. The results of this investigation have been discussed under different practices and management issues. Uses of modern inputs technological in horticulture are undoubtedly more important in increasing orchard productivity.

In India, considerable changes have been brought about in traditional horticulture during recent year through various programmes involving use of modern inputs and new technology for guava cultivation. However, the progress is not yet up to the desired level of satisfaction. The gap of use of recommended technologies by guava growers upon various factors as well as constraints faced by them constraints refer to the item of difficulties in actual technological gap of the guava production.

In Table 1-A to 1-E, constraints are mainly divided into five groups such as input constraints, technological constraints, socio-psychological constraints, marketing constraints and financial constraints.

Among the input constraints Table 1-A, unavailability of quality chemicals like plant growth regulators, water soluble fertilizers and plant protection chemicals at Government sale centre got first rank with 77.27 percent respondents in followed by unavailability of quality sapling of guava at Government nursery (73.64 percent), supply of inferior quality sapling by private nursery (70.91 percent) and high prices of good quality sapling of guava fertilizer and plant protection chemicals (56.36 percent) [2,3].

Among the technological constraints (Table 1-B), lack of knowledge about organic farming of guava got first rank with 91.82 percent respondents followed by lack of knowledge about drip irrigation schedules (89.09 percent), lack of knowledge about plant propagation/multiplication (83.64 percent), lack of knowledge about training and pruning of guava tree (80.91 percent), poor confidence in adoption of recommended newly released production technological practices (74.55 percent), lack of knowledge about post-harvest management

practices (73.64 percent), lack of knowledge about Orchard orientation / orchard layout (73.64 percent), lack of knowledge about recommended plant protection measures (70.00 percent), lack of knowledge about crop regulation (68.18 percent), unawareness about newly developed high yielding varieties of guava (66.36 percent), unavailability of literature in simple and local

language on guava production (65.45 percent), lack of knowledge about nutrient management (63.64 percent) and lack of practical and skill oriented training (60.91 percent). Due to the lack of knowledge, unawareness and availability of input, no respondent following the recommended practices, resulting the poor production and quality of guava in study area [2,4,5].

**Table 1. Major constraints face by guava growers in adoption of production technology**

SN	Constraints as perceived by Guava growers	Frequency	Percentage	Rank
<b>A Input constraints</b>				
1	Unavailability of quality sapling of guava at Govt. nursery	81	73.64	2 <sup>nd</sup>
2	Supply of inferior quality sapling by private nursery	78	70.91	3 <sup>rd</sup>
3	High prices of good quality sapling of guava fertilizer and plant protection chemicals	62	56.36	4 <sup>th</sup>
4	Unavailability of quality chemicals like plant growth regulators, water soluble fertilizers and plant protection chemicals at Government sale centre	85	77.27	1 <sup>st</sup>
<b>B Technological constraints</b>				
1	Lack of knowledge about Orchard orientation / orchard layout	81	73.64	6 <sup>th</sup>
2	Unawareness about newly developed high yielding varieties of guava	73	66.36	10 <sup>th</sup>
3	Lack of knowledge about plant propagation/ multiplication	92	83.64	3 <sup>rd</sup>
4	Lack of knowledge about nutrient management	70	63.64	12 <sup>th</sup>
5	Lack of knowledge about drip irrigation schedules	98	89.09	2 <sup>nd</sup>
6	Lack of knowledge about training and pruning of guava tree	89	80.91	4 <sup>th</sup>
7	Lack of knowledge about recommended plant protection measures	77	70.00	8 <sup>th</sup>
8	Lack of knowledge about organic farming of guava	101	91.82	1 <sup>st</sup>
9	Poor confidence in adoption of recommended newly released production technological practices	82	74.55	5 <sup>th</sup>
10	Lack of knowledge about crop regulation	75	68.18	9 <sup>th</sup>
11	Lack of practical and skill oriented training	67	60.91	13 <sup>th</sup>
12	Lack of knowledge about post-harvest management practices	81	73.64	7 <sup>th</sup>
13	Unavailability of literature in simple and local language on guava production	72	65.45	11 <sup>th</sup>
<b>C Socio-psychological constraints</b>				
1	Lack of motivation and education regarding orchard/ fruit crops	94	85.45	3 <sup>rd</sup>
2	Lack of coordination among the beneficiary and state/ district horticulture departments	102	92.73	1 <sup>st</sup>
3	Inadequate extension activities were conducted by State/ district horticulture department	97	88.18	2 <sup>nd</sup>
<b>D Marketing constraints</b>				
1	Lack of knowledge about regular market	63	57.27	6 <sup>th</sup>
2	Poor transportation facility	74	67.27	5 <sup>th</sup>
3	Unawareness about grading and packing facility	88	80.00	3 <sup>rd</sup>
4	Lack of quality storage facility	96	87.27	2 <sup>nd</sup>
5	Short shelf life of guava	87	79.09	4 <sup>th</sup>
6	Exploitation of guava growers by middle men	102	92.73	1 <sup>st</sup>
<b>E Financial constraints</b>				
1	High labour charges	102	92.73	2 <sup>nd</sup>
2	Untimely availability of electricity	66	60.00	4 <sup>th</sup>
3	Delayed payment from orchard contractors	25	22.73	5 <sup>th</sup>
4	Difficulty in borrowing loans	68	61.82	3 <sup>rd</sup>
5	Lack of government initiative in funding of loan and guaranteeing of subsidies	104	94.55	1 <sup>st</sup>

Among socio-psychological constraints, Table 1-C revealed that lack of coordination among the beneficiary and state/district horticulture departments got first rank with 92.73 percent respondents followed by inadequate extension activities conducted by State/district horticulture department (88.18 percent) and lack of motivation and education regarding orchard/ fruit crops (85.45 percent) [2].

Among marketing constraints in Table 1-D, exploitation of guava growers by middlemen got first rank with 92.73 percent respondents followed by lack of quality storage facility (87.27 percent), unawareness about grading and packing facility (80.00 percent), short shelf life of guava (79.09 percent), poor transportation facility (67.27 percent) and lack of knowledge about regular market (57.27 percent) [6,7].

Among the financial constraints, Table 1-E indicated that lack of government initiative in funding of loan and guaranteeing of subsidies got first rank with 94.55 percent followed by high labour charges (92.73 percent), difficulty in borrowing loans (61.82 percent), untimely availability of electricity (60.00 percent) and delayed payment from orchard contractors (22.73 percent) [2].

#### 4. CONCLUSION

In the present study, constraints faced by guava growers in adoption of guava production technology and suggestions for suitable extension strategies to overcome the problem them. Constraints divided into five groups. Among the input constraints, it is concluded that unavailability of quality chemicals like plant growth regulator, water soluble fertilizers and plant protection chemicals at Government sale centre got first rank with 77.27 percent followed by bhair followed by unavailability of quality sapling of guava at Government nursery (73.64 percent). Among the technological constraints, lack of knowledge about organic farming of guava got first rank with 91.82 percent respondents followed by lack of knowledge about drip irrigation schedules (89.09 percent). The highest percentage of respondent (92.73 percent) found by the lack of coordination among the beneficiary and state/district horticulture department followed by inadequate extension activity were conducted by state/district horticulture department (88.18 percent) among the socio- psychological constraints. Among the market constraints, exploitation of guava growers

by middle man got first rank with 92.73 percent respondent followed by lack of quality storage facility (87.27 percent). Among the financial constraints, lack of government initiative in funding of loan and granting of subsidies got first rank with 94.55 percent followed by high labour charges (92.73 percent).

#### 4.1 Suitable Extension Strategies for Promotion of Guava Production Technology in Bijnor District (U.P.)

On the basis of the results in present investigation, following suggestions may be made to increase knowledge and adoption level of guava growers for increasing production and productivity in the study areas.

Keeping the observations and analysis of collected data in mind, it becomes necessary to develop some extension strategies for the promotion of higher production and productivity of guava. In this direction, an attempt was made by the investigator to systematically prepare a schedule of information which can be given to guava growers through various extension agencies and teaching aids.

Lack of knowledge about organic farming of guava was identified as major constraints in qualitative guava production. It is therefore suggested the extension workers should organize guava growers in different groups of organic farming. They should plan knowledgeable program for the respondents so they can be motivated to what the organic farming of guava and can increase their knowledge about quality guava production practices through extension work, like group discussion, training, demonstration, exhibition etc.

The information and knowledge regarding improved tools and techniques can be provided by the training and demonstration to guava growers. At the time of demonstration, respondents should also be encouraged to participate in it. This will make them to understand that the technology is also suitable for them.

On the basis of result of this study, the following suggestions may be made to increase knowledge and adoption level of guava Growers for better production of quality guava in the study area.

- Government should provide quality chemicals and good quality of sapling of guava on reasonable price at government centre;
- Create knowledge and awareness about improved organic guava production technology, drip irrigation schedules, plant propagation, training and pruning of young guava tree, post harvest management practices, Orchard orientation/layout, recommended plant protection measures, crop regulation, newly develop high yielding varieties, nutrients management and skill oriented training to the organic guava growers through trainings, meetings, demonstrations and media exposure on different aspects of organic guava production in the study area;
- Conduct the training and demonstrations on organic farming of guava for motivation and education of guava growers in the study area;
- Create coordination and confidence among the guava Growers and state/district horticulture department through conducting meeting, training and demonstration at guava grower's field;
- Government should provide transportation, grading and packing, good quality storage facility to guava grower's in the district;
- Government should provide insure market and price to guava growers;
- Loan should be provided at cheaper rates to the farmers to install their assets and to purchase agriculture inputs and equipments;
- Crop insurance against all calamities, incidence of pest and disease, etc. should be introduced at nominal premium;
- Timely provide fertilizer, plant protection chemicals and bio insecticide and pesticide which should be made available within easy reach convenient pack and at cheaper prices.
- State horticulture department, government zonal research station, State Agriculture University, Krishi Vigyan Kendra and NGO should be conducted training to the guava growers on all the aspects of guava production technology;
- Conduct training and demonstration programmes for the identification of harmful and beneficial insect pest and disease in the study area of guava growers;
- Government should provide sufficient facilities and tools of technology for field study and e-choupal for quick transfer of improved guava production technology for guava growers;
- Government should provide regular electricity in rural areas for proper storage of plant protection chemicals like bio-agents and bio-fertilizer etc. and for timely irrigation in guava orchards;
- Increase the educational facilities in the villages to improve the educational status of farmers;
- Increase number of information/training centre/ guava research unit for sufficient quality guava production and quick transfer of guava production technology information in the study area.

## CONSENT

As per international standard or university standard, participant's written consent has been collected and preserved by the author(s).

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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