

Enhancing the income of orchard farmers in Uttarakhand

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Guava is a fruit which is grown in northern parts of India and down towards the south. Its commercial plantation is done in UP, Uttarakhand, Bihar, M.P., Maharashtra, Bengal and Gujarat. Guava is an important fruit crop in India. Its nutritive and high remunerative values make it a crop of commercial significance. It is the next most important fruit in area and production after mango, banana and citrus. It is called the poor man's apple, though the fruit is neither poor in its nutritive value nor in commercial value. Guava occupies an area of 0.19 million hectare with an annual production of 1.64 million tones (Anonymous, 2004). In general, it is cultivated through a traditional system under which it is difficult to achieve desired levels of production so it has low productivity (8.84 t/ha). Although there was an increase in area and production during the last decade, productivity did not show a significant increase. There were many reasons for low productivity, one of which was non-regulation of the rainy season crop which is poor in both quality and monetary return.

What is crop regulation in Guava ?

Generally, there is fruiting in guava during three seasons: spring (March-April), rainy season (July-August) and winter season (October-November). The fruit production is highest in the rainy season. The terai belt of Uttarakhand provides a relatively favorable production environment for guava cultivation. Recurring flowering and bearing twice a year, i.e., rainy and winter season are characteristic features in guava. Though the crop load is higher during the rainy season, the monetary return is low due to poor price and poor demand in the market. Winter season guava which is better in quality fetches higher prices (Singh *et al*, 1989). To promote commercial cultivation of guava, it is best to regulate the rainy crop in the

favorable season of winter, keeping in view the quality and market value.

On research farms, the technology not only led to regulation of the rainy season crop but also ensured 1.6 times more yield for the whole year including both rainy and winter season crops and secured additional income of Rs. 309.84 and Rs. 223.50 per plant.

Technology

Guava (*Psidium guajava* L) is an important fruit crop. Under Tarai condition of Uttarakhand, guava trees flower twice a year i.e. April-May and July-August and produce about 90% crop in the rainy season. The fruits are rough, insipid and poor in quality during the rainy season while in the winter season, the crop is free from diseases and pests and fetches higher prices in the market. The winter season crop can be harvested by reducing the crop load during rainy season with different techniques. The various techniques used to delay fruiting are:

- Flower bud thinning by hand twice in the months of April and May when the plant is 2-5 years old.
- Shoot-pruning lengthwise (top % shoot pruning or one leaf pair pruning retaining leaf pair at the base of the shoot) in the months of April to May. In Tarai conditions, it is done in the first week of May.
- Flower bud thinning should be done twice at an interval of 15 days.
- Two sprays of Naphthalein Acetic Acid @ 600-800 parts per million. 1st spray should be done when 50% flower buds are open.

There are a number of methods of crop regulation for guavas. Whichever method farmers find most appropriate and suitable for their crops, based on the soil and agro-climate conditions, can be used:

1. Stoppage of irrigation
2. Pruning of roots
3. Plucking of flowers
4. Spray of N.A.A
5. Pruning of new branches.

This technology of fruit regulation in guava was developed by G.B. Pant University of Agriculture & Technology, Pantnagar and has proved very effective in delaying fruiting in guava. A number of practices conducted at the Horticulture Research Centre, Patharchatta, and Pantnagar have shown that if 10 % portions of the new branches are cut in the first week of May when majority of the flowers are in bloom then the production during rainy season is lower but there is considerable increase in the production of the winter crop. This practice has been followed successfully at Pantnagar for the last 5-6 years. There is no adverse effect and the pruning of new branches only has to be done once in May.

The success of technology can be accessed only if it proves its worth on the farmers' field. Thus, the present study was conducted with the following objectives:

- (i) To discover the impact of the technology in terms of benefit cost analysis
- (ii) To assess the impact of the technology in comparison to non-adoption

of technology

Methodology:

The study was conducted in the Terai belt of U.S. Nagar and Rampur districts of Uttarakhand and Uttar Pradesh, respectively. 13 guava orchard farms were selected for in-depth investigation (Table 2). Data were collected through personal interviews with respondents with well developed schedules during 2005-06. Most of the fruit was sold in Azadpur Mandi, New Delhi in addition to local sales.

Findings:

The study revealed that the farms under study were established during the years 1994-95 except one which was established in 1998. The average area of the orchards under study was 29.05 acres with 31815 as the average number of plants (Table 2).

It is clear from Table 2 that the average production of guava was 1223.076 and 213.076 quintals in the winter and rainy season respectively. This was due to the application of the technology of plucking flowers to delay the fruiting. The average expenditure incurred on the produce (such as the cost of packaging, commission, transportation etc.) was around Rs. 19135 per acre.

Table1: Cost-benefit analysis (Rs./acre)

Particulars	Amount Rs	Percentage
Operational cost		
Operational cost	Rs. 6514	34
Cost of boxes	Rs. 4657	24
Commission @ 6%	Rs. 3307	17
Transport	Rs. 4657	25
Total cost	Rs. 19135	100
Gross returns	Rs. 55112	
Returns over cash cost	Rs. 35977	

Table 1 reveals that a higher proportion of cost was incurred on the agronomic management of the crop which accounts

for about 34% of the total cost of cultivation. The operation-wise cost of guava cultivation is given in Table 3. Other items of expenditure were

transportation, boxes and commission paid to middle men in the marketing of produce. The respective figures came to 25, 24 and 17 % respectively. The net return over cash cost was quite attractive, amounting to Rs.35970 per acre. It was revealed through discussion with the farmers of the study area that, if there is

no flower plucking, the guava production rate is somewhat reversed according to the following pattern:

Average production in rainy season
= 59.50 quintals/acre.

Average production in winter season
= 11.30q/acre

Value of output:

Rainy Season	@ Rs. 275/ quintal Rs. 59.50 x 275 =Rs 16362.50
Winter Season	@ Rs. 1200/ quintal Rs. 11.30 x 1200 =Rs 13560.00
Gross Return	Rs. 16362+13560 =Rs. 29922.00

Analysis of benefits of technology

Economic gain:

1. Returns with technology Rs.35977.00/ acre
2. Returns without technology Rs.1 0787.00/acre
3. Net returns from technology adoption Rs.25190.00/acre

Social gain:

Agricultural laborers working in guava orchards were employed for more days in the winter season (120-130 days) than in rainy season crop where the corresponding figure was 30 days only.

The winter season crop was found to be more favorable for human health whereas the rainy season fruit led to harmful effects such as diarrhoea, fever, cough and cold.

Observations:

- There is a problem of scarcity of labour. In that case, N.A.A. should be used.
- Some farmers were found to using the practice of leaf rubbing leaving a pair of leaves on the top due to which there was no crop in rainy season and only 50% fruiting in winter.
- Specific target domain/area production system and the target beneficiary group/farmers orchard owners of the States of Uttar Pradesh and Uttaranchal, retailers, traders, agricultural laborers etc.
- Level of adoption of technology: year wise current/cumulative area under the new technology in the target domain till Dec 2004.
- There was a high level of adoption of the technology of crop regulation.
- Around 40 hectare area is under this technology.
- Project/technology cost (Year wise actual cost incurred)
Funds utilized (Recurring and Non-recurring separately under the selected project for impact assessment).

This technology was developed under AICRP (All India Co-ordinated Research Project), the total budget spent on it from 1999 onward is 18 lakhs.

Table 3 clearly depicts that the total operational cost per farm was Rs.145511 and Rs. 6514 on a per acre basis which included material costs such as FYM, fertilizer, pesticides and irrigation, labour cost, orchard rent etc.

Table 2: Details of surveyed orchard farms

Name of Farm	Area in Acre	Year of Establishment	Number of plants	Production in quintals
Chanden	28	1995	3080	1540
Baradari	30	1995	3300	1650
Chattarpur	35	1994	3850	1925
Dibdiba	20	1994	2200	1100
Chanden	20	1995	2200	1100
Matkota	35	1995	3850	1925
Matkota	14	1994	1400	700
Chanden	15	1995	1650	825
Baradari	4.0	1998	440	220
Baradari	8.5	1994	935	460
Agnihotri Fann	14	1994	1540	770
Baradari	12	1994	1320	660
Swarg Fann	55	1994	6050	3025
Total	290.5		31815	15900

Table 3: Operational Cost in guava cultivation

Rupees per acre			Rupees per farm	
MATERIAL		%		%
FYM	436.00	6.69	9740.24	6.69
Fertilizer	642.00	9.85	14342.28	9.85
Pesticides	270.00	4.14	6031.80	4.14
Irrigation	27.00	0.14	603.18	0.14
Subtotal	1375.00	21.10	30717.50	21.11
LABOUR				
Interculture	1212.00	18.60	27076.08	18.60
Pesticides	406.00	6.23	9070.04	6.23
Cleaning, cutting & flower plucking	327.00	5.01	7305.18	5.02
Fruit picking & packaging	533.00	8.18	11907.22	8.18
Subtotal	2478.00	38.04	55358.00	38.04
ORCHARD RENT	2410.00	36.99	53839.4	37.00
INTEREST ON WORK CAPITAL	250.00	3.38	5597.00	3.84
TOTAL	6514.00	100.00	145511.00	100.00