STUDY REPORT ON THE SURVEY OF FARMERS ON VALUE CHAIN ANALYSIS IN BHARUCH DISTRICT OF

GUJARAT

Submitted by

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PREFACE

Bananas (Musa indica) are among the world's most commonly consumed fruits. They are primarily composed of carbohydrates and contain decent amounts of several vitamins, minerals and antioxidants, potassium, vitamin C, catechin and resistant starch are among the healthy nutrients in bananas. These may contribute to improved heart and digestive health when consumed regularly as a part of a healthy life style. The glycemic value of unripe banana is about 30, while ripe banana rank at about 60 meaning thereby that bananas may not cause major sugar spike in blood sugar in healthy individual instead unripe bananas may improve insulin sensitivity in type 2 diabetes. Also banana may likely improve kidney functions in the healthy individuals. In the muscle cramps arose due to exercise banana may help to relieve.

Gujarat is the second major banana producing state in the country and accounts for 13.4% of the total production of banana in the country. In Gujarat, during the year 2013-14 banana crop is cultivated in an area of about 66496 ha. & having production of 42.25 lakhs tons with productivity of 63.55 MT/ha., which is highest in the country. Precision farming technology has been adopted to ensure good quality and highest productivity in the country, about 34 tissue culture laboratories has been established in the state that provides good planting materials. Efficient use of water and fertilizer with drip irrigation becoming popular among the farmers of Gujarat.

Mission mode horticulture development program is being implemented in all the districts of the state. The ultimate strategy is development of crop clusters and adopts end-to-end approach. More emphases has been made on the availability of genuine planting materials, capacity building, post-harvest management and protected cultivation, post-harvest management and marketing. Integrated pack houses, cold storages, Banana ripening chambers, cold chain are the key elements of the Horticulture Development Program of the Government. Huge investment is being made for establishment of such infrastructures to enhance internal and overseas trade of horticulture commodities. Couple of good integrated pack houses, air cargo complex and Gama irradiation projects has been established by Gujarat Agro Industries Corporation. Support of Government has facilitated establishment of considerable post-harvest infrastructures for perishable fruits and vegetable crops in the state. 500+ on farm pack houses, 15 Minimal Processing units, 15 Pre cooling units, 40 Ripening Chambers, 125 Cold Storages, 90 Grading, Sorting & Packing Units, 8 refer Vans has been supported.

About 40 ripening units have been established in last 3 years in Gujarat with ripening capacity of 500 Mt/Day. Post-harvest losses were reduced considerably because of

proper ripening and handling. Handling process of Banana is completely changed, now crates are being filled up at farmers' fields than transported it to the ripening chambers, ripened and further transported to the markets as such in the crates. The products are getting premium prices because of good quality and health consciousness.

The present survey embodies an exhaustive proforma containing substantial queries from the banana growers. Major aspects are the factors affecting quantum of banana production and its quality in terms of physical likeness by the consumers and inherent quality content of the fruit. The other important aspect studied are the marketing constraints that lead to de track fruit growers from getting the reasonable price of their produce. This is hoped that Government of India would like to take up these important issues on priority in the interest of fruit growers through National Horticulture Mission (NHM) under the umbrella of the Mission for Integrated Development of Horticulture (MIDH). This is emphasized that MIDH may like to offer a greater attention for promotion of Farmer Producer Organizations (FPOs) in order to eliminate intermediaries from the marketing chain so as to enable fruit grower farmers to fetch reasonable prices of their produce leading up gradation of their income profile.

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Introduction

Banana (Musa sp.) is a large perennial herb with leaf sheaths that form trunk like pseudostem. Banana has its origin in tropical region of South East Asia. Banana is a nutritious gold mine. They are high in vitamin B6, which helps fight infection and is essential for the synthesis of heme, the iron containing part of hemoglobin. They are also rich in potassium and are a great source of fibre. Banana is a rich source of carbohydrate and is rich in vitamins particularly vitamin B. It is also a good source of potassium, phosphorus, calcium and magnesium. The fruit is easy to digest, free from fat and cholesterol. Banana powder is used as the first baby food. It helps in reducing the risk of heart diseases when used regularly and is recommended for patients suffering from high blood pressure, arthritis, ulcer, gastroenteritis and kidney disorders. Processed products, such as chips, banana puree, jam, jelly, juice, wine and halwa can be made from the fruit. The tender stem, which bears the inflorescence is extracted by removing the leaf sheaths of the harvested pseudostem and used as vegetable. Plantains or cooking bananas are rich in starch and have a chemical composition similar to that of potato. Banana fibre is used to make items like bags, pots and wall hangers. Rope and good quality paper can be prepared from banana waste. Banana leaves are used as healthy and hygienic eating plates

Bananas are the fifth largest agricultural commodity in world trade after cereals, sugar, coffee and cocoa.

Bananas are grown in more than 150 countries, producing 105 million tonnes of fruit per year of which India contributes 29.19% which is highest in the world. An extent of 99.95% of this production is consumed within the country itself and only 0.05% production is exported.

Major banana producing states in the country are Maharashtra, Gujarat, West Bengal and almost all the southern states. State-wise area, production and productivity is shown in the given Table 1.

S. No.	STATES/UTs	2014-15		2015-16		2016-17	
		Area	Productivity	Area	Productivity	Area	Productivity
1	GUJARAT	67.02	4324.36	64.69	4185.52	64.69	4185.52
2	ANDHRA PRADESH	79.36	3487.31	75.72	3570.62	86.32	4143.55
3	TAMIL NADU	95.24	4147.18	94.61	4331.65	94.99	3640.73
4	UTTAR PRADESH	42.59	1990.58	67	3061.21	67.4	3078.73
5	MAHARASHTRA	74.03	4030.58	69.55	3025.15	74.68	3072.49

6	KARNATAKA	102.89	2593.33	96.63	2370.95	101.53	2489.5
7	MADHYA PRADESH	27.8	1836	28.35	1758.05	24.31	1646.89
8	BIHAR	35	1535	34.8	1535.3	35.15	1550.65
9	KERALA	83.98	1270.57	84.56	1292.41	81.51	1224.13
10	WEST BENGAL	46.6	1124	48.07	1172.34	49	1195.6
11	ASSAM	51.28	865.67	51.1	882.71	55.42	979.34
12	CHHATISGARH	23.87	564.43	25.76	587.42	27.06	618.92
13	ODISHA	24.76	469.25	24.47	462.71	24.49	466.62
14	TRIPURA	13.99	141.31	14.62	153.62	14.47	152.08
15	TELANGANA	8.95	325.52	4.65	183.7	3.88	143.88
16	MIZORAM	10.87	141	10.91	141.03	10.94	141.04
17	NAGALAND	7.32	109.8	7.25	108.51	7.34	116.72
18	MEGHALAYA	7.06	88.7	7.11	88.71	7.24	94.32
19	MANIPUR	6.99	94.22	6.95	93.95	6.65	89.86
20	ARUNACHAL PRADESH	6.5	20	5.42	31.64	5.48	31.96
21	JHARKHAND	0.54	1.3	12.53	33.28	9.02	31.47
22	PUNJAB	0.13	7.51	0.11	6.43	0.12	6.72
23	SIKKIM	0	0	1.15	3.56	1.2	3.87
24	RAJASTHAN	0.03	0.25	0.03	0.41	0.04	0.41
25	HIMACHAL PRADESH	0.09	0.29	0.09	0.42	0.09	0.35
26	OTHERS	4.92	53.31	5.03	53.55	5.08	57.19

SOURCE: DEPARTMENT OF HORTICULTURE COOPERATION AND FARMERS WELFARE; AREA IN '000HA, PRODUCTION IN '000MT

Table1: State-wise production of Banana in India

The geography & climate of Gujarat is very unique and blessed with various natural resources. Gujarat is located on the west coast of India with longest sea coast of 1600 km of the Arabian Sea. It is situated between 20°1'& 24°7' North Latitude and 68°4'to 74°4'East Longitude covering geographical area of 196 lakh hectares, which is six percent of the country. State comprised of 33 Districts having 246 Taluka and 18569 villages.

Gujarat has tropical & sub-tropical climate, with temperature ranging from a minimum of 13°C to 27°C in January and maximum of 45°C in May- June. The normal annual rainfall of Gujarat State is 852mm, however there is a wide annual variation in rainfall, affecting the productivity of the crops.

The climate favours for development of fresh fruits like; Kesar- alphanso mangoes, Sapota, Banana, Aonla and Dates. The vegetables like; Okra, Beans, Cucurbits, Onion, Potato, the spices like cumin, Fennel, Chilly, Coriander, Garlic and Flowers like Rose, Lily, Marigold, Jasmine and Tuberose. Grape, Cashewnut, Medicinal & Aromatic crops like Aloevera, Palmarosa are emerging as potential new crops in suitable areas of the state.

The agro-climate can be categorized as very heterogeneous as the State constitutes about 24.94 per cent of arid and 33.66 per cent of semi-arid areas of the country (Next to Rajasthan). Vast area of Saurashtra and Kutch falls under arid to semi-arid (potential evapo-transpiration 1873 mm) and rainfall is low (761 mm) and erratic (co-efficient of variation 55 per cent). Agro climate of the state divided in to eight sub regions in respect of rainfall, temperature, humidity and geographical situation. There are about 47.38 lakh operational holders operating about 99.79 lakh ha. land as per the agri-census report. According to holding classification, 34.01 lakhs are marginal (Less than 1 ha.) 28.86 lakhs are small (1 to 2 ha.) 35.67 lakhs are semi medium and medium and 1.45 lakhs are large farmers respectively.

Horticulture is a priority sector in agriculture by virtue of it's vast potential in improving the socio economic condition of the farmers. Considerable growth in area coverage and production has been observed. Area and production of horticultural crops has increased by 220 % and 330 % respectively from the year 2001-02 up to year 2013-14 after intensification of Horticulture Development program in the state. An average 20.89 % annual production growth was achieved during this period. State contributes 10.19% share in national fruit production and 6.49 % in national vegetable production (NHB data of Year 2012-13) that has been increased from 6.20 % and 3.70 % respectively in comparison to year 2001-02. State is second leading state in spice crop production, fourth leading state in the fruit production and sixth leading state in the vegetable production in the country. Production of spices is about 8.82 lakh MT/ Annum, fruit crops is about 77.63 Lakh MT/Annum and production of vegetables crops is 100.50 Lakh MT/Annum. Gujarat state is 1st in the production of Cumin, Fennel and Date palm, 2nd in production of Banana, Papaya and lime. Productivity of Onion, Potato is highest in the country where productivity of Banana, pomegranate and sapota is 2nd highest in country. About 12% area is covered under horticultural crops in the state. However horticultural crops contribute 25-30 % in the total farm income (Including Animal husbandry). Role of Horticulture sector is remarkable in the overall agriculture growth of the state. In Gujarat, during the year 2013-14 banana crop is cultivated in an area of about 66496 ha. & having production of 42.25 Lakhs tons with productivity of 63.55 MT/Ha. which is highest in the country. Precision farming technology has been adopted to ensure good quality and highest productivity in the country, about 34 tissue culture laboratories has been established in the state that provides good planting materials. Efficient use of water and fertilizer with drip irrigation, becoming popular among the farmers of Gujarat.

District Profile of Bharuch

Bharuch district is an important district in South Gujarat region and one of the major industrialized zone of the Gujarat. It is flanked by the Arabian Sea on the west, new district Narmada in East, Vadodara in North and in South Surat district of the state.

The total geographical area of the district is 6527 km2. For administrative convenience, the district has been divided into 8 talukas and 543 gram panchayats with 663 villages. Agriculture is still the main source of livelihood for the rural people of the district.

The district lies between 21.30° to 22.00° N latitude and 72.45° to 73.15° E longitudes situated at 16.5 m above sea level and bounded by Arabic sea in the west.

The district has semi-arid climate with three distinguished seasons i.e. *kharif* (June to September), winter (October to January) and summer (February to May). The district receives the rainfall through South-West monsoon which normally starts from middle of July, August and September are the months of heavy rainfall. The average rainfall varies from 900 mm to 1100 mm. however, scanty and uneven rainfall pattern is also common. The temperature varies from 8.9°C to 43.2°C. The average minimum temperature is 10.7°C and maximum temperature 41.4°C. The December and January are the coldest months while April and May are the hottest months of the year. Relative humidity is higher in coastal areas. The wind velocity varies from 5.35 km/hr to 7.28 km/hr. The summers are very hot when temperature ranges from 38° to 44°C for couple of days. Table 1 shows the weather of different taluka places of the Bharuch district, whereas Table 2 shows distribution of rainfall during monsoon, which mainly impacts kharif and rabi cropping seasons.

Physiography & Soils

Bharuch district can be divided into three regions geographically, topographically and economically as well as from the resources point of view. The three regions are as under:

(1) Eastern Region:-

This portion of the district comprise of Jhagadia (AES - III) and Valia (AES - I) talukas. The region is partly covered with forests and has also a mountain range. It is inhabited by scheduled tribes and is declared as tribal areas. The region is having good agriculture potential.

(2) Western Region:-

The western Region known as "BHARAVIBHAG" consists of Jambusar (AES - IV), Vagra (AES - V) and Amod (AES - V) talukas. This Region has 54 miles coastal line at the Gulf of Cambay.

(3) Central Region:-

The central Region of the district covers Ankleshwar (AES - III), Bharuch (Dahej as a chemical zone) (AES-V) taluka which are industrially well developed. The oil fields of Ankleshwar (AES - III) and Vagara (Gandhar) (AES-V) have put Gujarat on the oil map of India. The black soil of this region is very fertile and is conducive to cotton and pigeonpea crop production.

According to climate, topography, soil characteristics and cropping pattern Bharuch district lies in South Gujarat Agro Climatic Zone II, the zone is further classified into four Agro Ecological situations, mainly on the basis of Physiography and soil texture.

District at a Glance

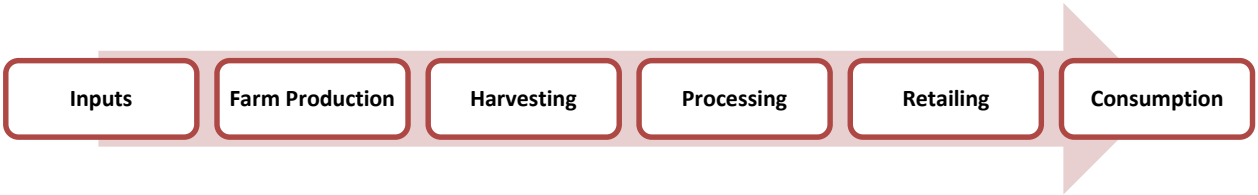
No. of blocks	08
Total villages	663
No. of gram Panchayats	543
Total Population	1370656
Male population	713676
Female population	655957
SC/ST population	505534
SC./ST male population	272431
SC/ST Female population	233103
Total literacy (%)	74.05
Male (%)	83.00
Female (%)	65.10
Total geographical area (ha)	524683
Net cultivated area (ha)	287263
Gross cropped area (ha)	301213
Cropping intensity (%)	112

No. of farm families	126053
Marginal farmers (0-1 ha)	39828
Small farmers (1-2 ha)	32475
Semi medium to Large farmers	53750

The cropping intensity of the district is 112% that appears to be less because large portion of cultivable area is under rainfed farming. Appendix 1 and 2 depict maps of wasteland and watershed activities respectively of the district. The area under forests in the district is around 4.7 % that is mostly on the western parts of the district.

There is ample scope for increase of production levels further as the adoption of scientific production technology and post harvest methodology and marketing appeared to show large gaps as evident from a study done in a sampled pocket of the country. The technology gaps showed an extent of 98.33% in the use of micronutrients, 89% in growth regulators and 80% in intercropping, The mean over gaps estimated was about 30%. Market analysis showed that domestic marketing was largely in the unorganized sector till recently. To understand these gaps in the entire process, the study and analysis of entire value chain for banana crop is required.

The value chain includes a series of activities leading from production to eventual distribution into the market. The process flow channels are shown below:



This study is based on channel mapping methodology which is a process of tracing a product flow through an entire channel from the point of product conception to the point of delivery/consumption. This process highlights the underlying patterns of inputs, constraints and competitive advantage that a producer has. It also traces the path of all value-adding and non-value adding activities associated with the production of a good involved at each stage. Whereas more traditional methods of product and market analysis isolate operational costs along various stages of production, the methodology employed here is a much more comprehensive tool, particularly as it takes into account an entire spectrum of activities and inputs associated with a product. Although the value chain analysis is usually employed at a

product level, output from the analysis provides useful indicative data on production and operational costs associated with a specific market.

National Horticulture Mission (NHM) has set forth major activities to be undertaken by itself in the interest of intensifying production and improving quality of banana fruit which includes production and distribution of planting material (modal and small nurseries, tissue culture units), area expansion (through establishment of new gardens),

rejuvenation of existing old and senile gardens, production of vegetable seeds, seed infrastructure, protected cultivation,

IPM/INM, organic farming, pollination support through bee keeping, development of marketing infrastructure (wholesale markets, rural markets and 2 functional infrastructure), Post Harvest Management (pack houses, cold storages, refrigerated vans, mobile/primary processing units) and human resource development.

A proper supply chain management in fruits and vegetable other horticulture crops is required to improve all the stages of the supply by adopting best global practices in storage packaging, handling, transportation, value added service etc to meet the country's demand of fruits and vegetable. Due to drawbacks in current supply chain, high level of wastage, quality degradation, poor infrastructural facilities and high cost. Government and private operators have to join hands to improve the physical infrastructure, information sharing and the service required for quality improvement of the supply chain.

Therefore, Govt. of India MIDH Division has directed HIL to carry out survey of various channels in the supply chain and put up the report indicating the current practices adopted by the these channels. The purpose of the study is to know the gaps between the agricultural produce till it is reaching to end consumer.

Objectives of Survey

The main objectives of the studies are as follows:-

- To understand on-farm and off-farm constraints.
- To identify the factors affecting supply chain of Fruits & Vegetables.
- Maximize growers gains/income.
- Minimize processing loses and value addition in supply chain of Fruits & Vegetables.
- Reducing the number of intermediaries in the supply chain of Fruits & Vegetables.
- To suggest mitigation strategies for the identified challenges in Supply Chain of Fruits & Vegetables.

Survey Materials and Parameters

A survey with the aforementioned objectives was under taken by us under the directives of Hindustan Insecticides Limited (HIL). The survey was based in Bharuch District of Gujarat. Banana was selected as the commodity for studying value chain analysis in Bharuch, Gujarat as it is one of the major banana producing district of the state.

A total of 3088 surveys of farmers and traders were conducted in Bharuch district of Gujarat. The distribution is given below.

State	District	Commodity	No. of Farmers Surveyed	No. of Traders Surveyed	Total Surveys
Gujarat	Bharuch	Banana	2863	125	3088

A total of 15 villages were selected in consultation with State Agriculture Department, Gujarat for conducting this survey based on the average number of banana farmers in the villages. Surveyors with marketing and agricultural background and experience were selected for this survey.

Frequency of answer to a particular question in the questionnaire was computed and the percentage of frequency out of persons interrogated was also computed in order to present the result of the survey. Calculation of frequency and percentage as mentioned above was done on all India basis and the results and conclusion are given.

Approach and Execution

Approach:

SELECTION CRITERIA ON LOCATION & ROUTE MAPPING

- Identification of the villages in consultation with state horticulture department
- Selection of villages showing substantial banana production
- To collect a survey of different farmers in a village

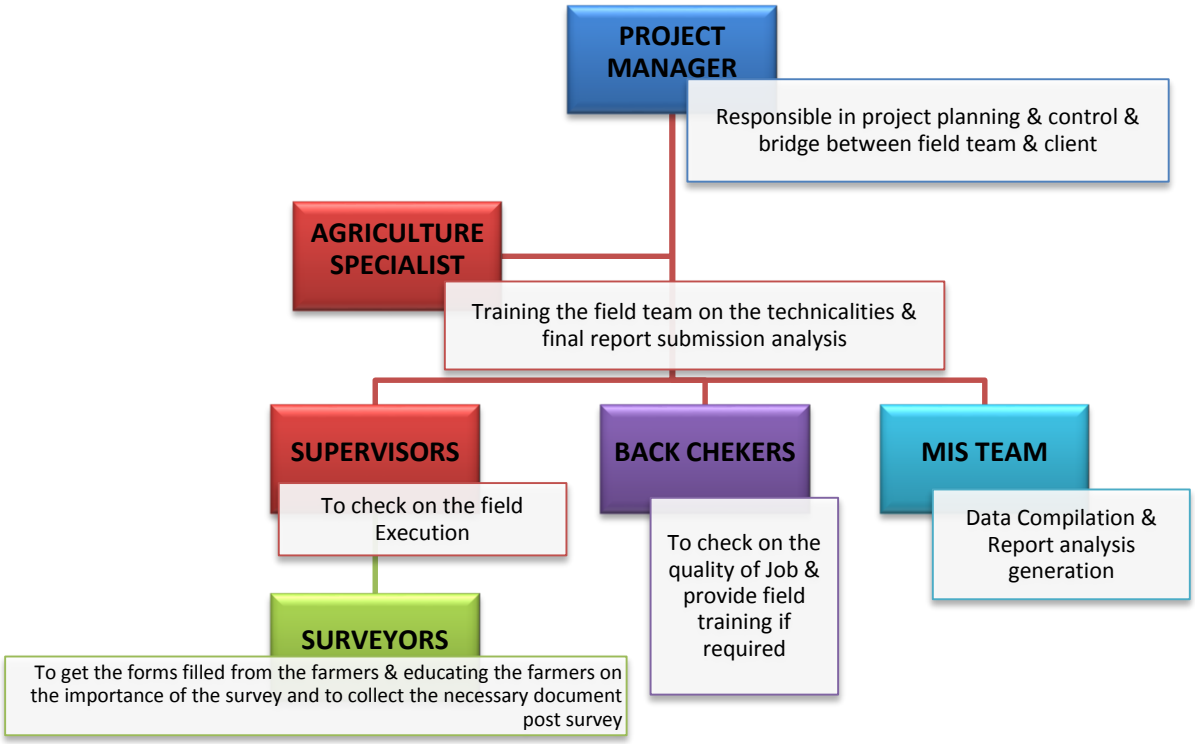
IDENTIFICATION & TRAINING

- Identification of local team
- Providing them a day training
- Educating them what is the importance of the questionnaire and how it is to be filled
- Mandates post filling up the survey(complete form filled by the farmer, attestation by the farmer(Signature /thumb impression), ID Proof, Photograph

EXECUTION & MONITORING

- Placement of Supervisors to check the execution of the field team
- Field Monitors/ back checkers on the quality check of the filled forms
- Train the team if additional training is required

Controlling Mechanism:



Detailed Analysis Report

FARMERS' PROFILE

Farmers' Profile

Education Profile of the Farmers

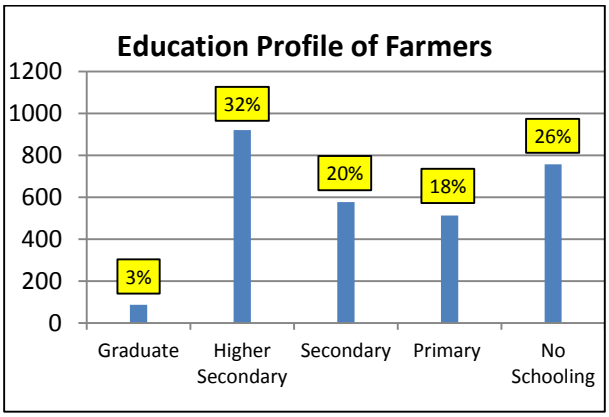


Figure 1: Education Profile of Farmers

Education	Education Profile of Farmers	%
Post Graduate	9	0
Graduate	87	3
Primary	513	18
Secondary	577	20
No Schooling	757	26
Higher Secondary	920	32
Total	2863	100

Table 3: Education Profile of Farmers

Results for education profile of the farmers engaged in banana cultivation indicated that frequency and percentage of higher secondary school qualified farmers were greater than any one standard of education. This indicated a gradual step up in education in agricultural sector since the beginning of the independent era.

Age Profile of the Farmers

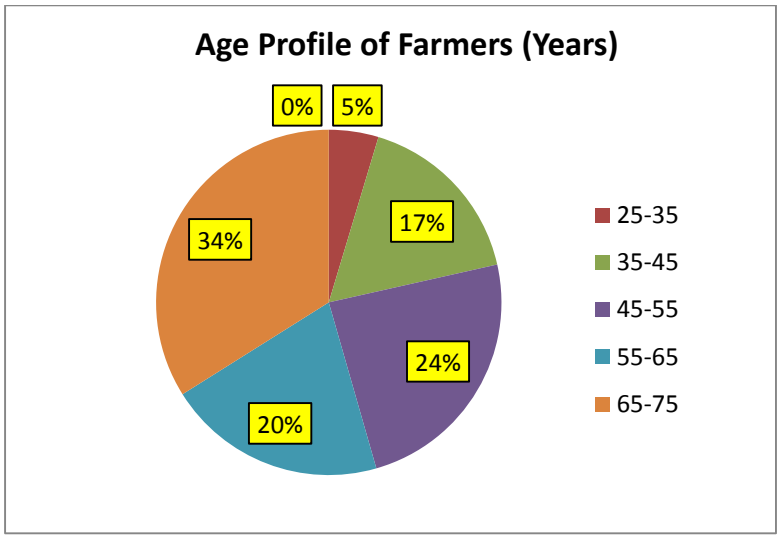


Figure 2: Age Profile of the Farmers surveyed

Age	Post Graduate	Graduate	Primary	Secondary	No Schooling	Higher Secondary	Total
25-35	0	34	123	176	150	248	731
35-45	6	21	125	165	236	248	801
45-55	1	17	133	134	196	230	711
55-65	1	11	92	75	128	141	448
65-75	1	4	40	27	47	53	172
Total	9	87	513	577	757	920	2863

Table 4: Age group – Education profile of the farmers

The results for age profile indicated that 810 farmers of the age group of 35-45 were in horticulture especially banana cultivation followed by 25-35 age group. If we club these two age groups more than half of banana growers fall in the age group of 25-45 years.

Asset Profile of the Farmers

Asset Profile - Land

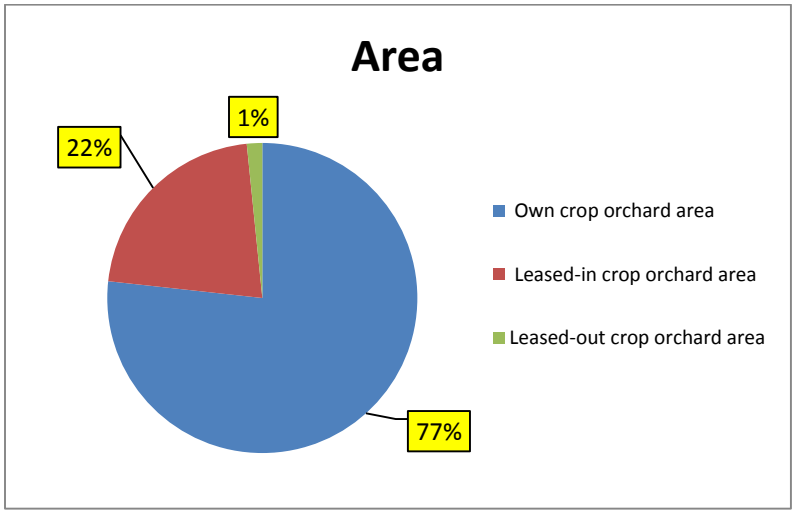


Figure 3: Area profile of surveyed farmers

Profile for land assets and physical assets indicated that 77% of the farmers maintained the orchards on their own land, 21% leased in crop orchard land and 2% leased out crop orchard.

Asset Profile - Physical

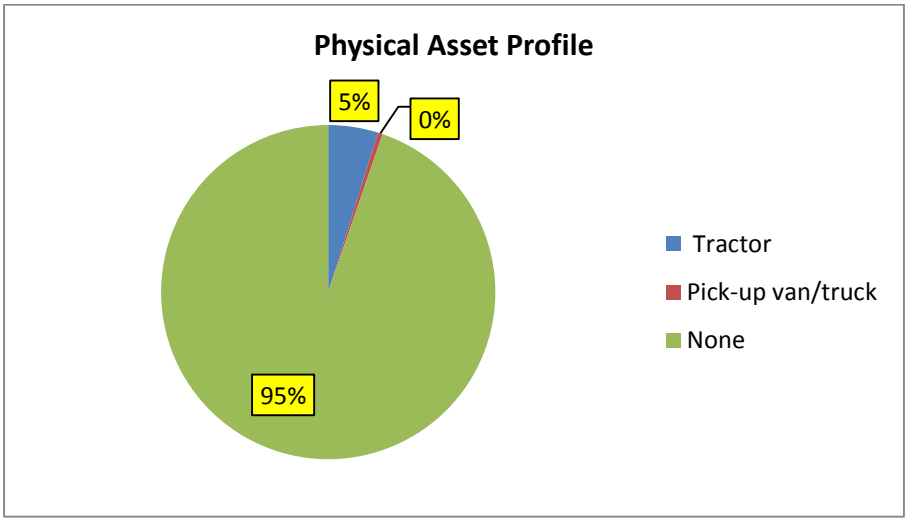


Figure 4: Asset profile of surveyed farmers

As shown in above diagram, Profile for physical assets indicated that only 5% farmers showed having pick up van with them and none of the farmers could show to have tractors for cultural operations. Reason could be insufficient affordability due to financial stress.

Land Profile of the Farmers

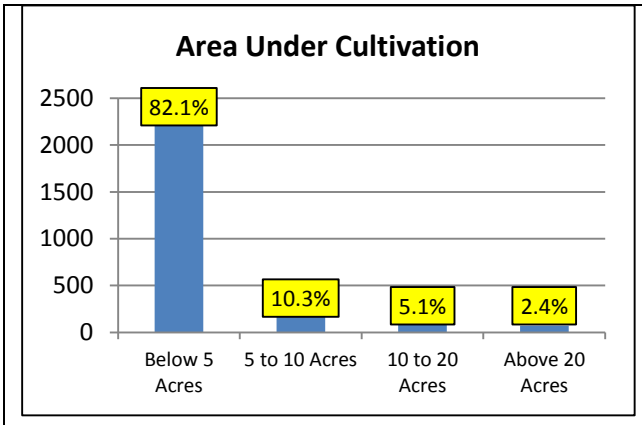


Figure 5: Distribution of farmers under different land holding groups

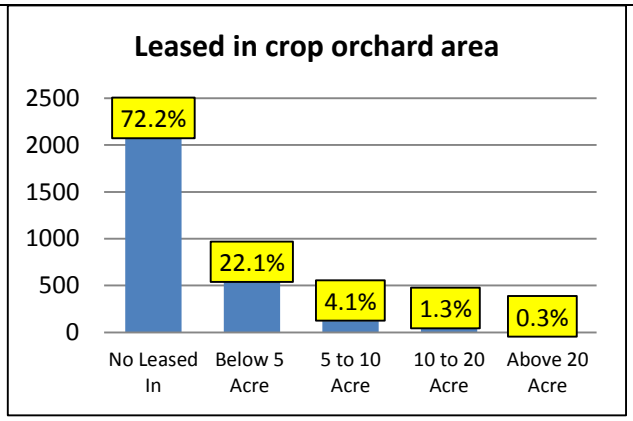


Figure 6: Farmers under different groups of leased-in orchard area

Results for area under cultivation possessed by the farmers indicated that large percentage of farmers were found to be small to marginal farmers as area under cultivation to be 0.5 to 10 acre showed by 92.5% of the growers. This was followed by 5.1% farmers holding 10 to 20 acres cultivated land.

Survey for own orchard indicated that 72.2% of the banana growers showed to have their own orchard and no leased in 22.1% banana growers showed leased in orchard with acreage between 0.5 to 10 acres and only 4.1% showed leased in orchard of area of 5 to 10 acres. The results indicated a trend of raising orchard on the own land instead of on leased in area or opting an orchard on leased in.

ORCHARD DETAILS

Orchard Details

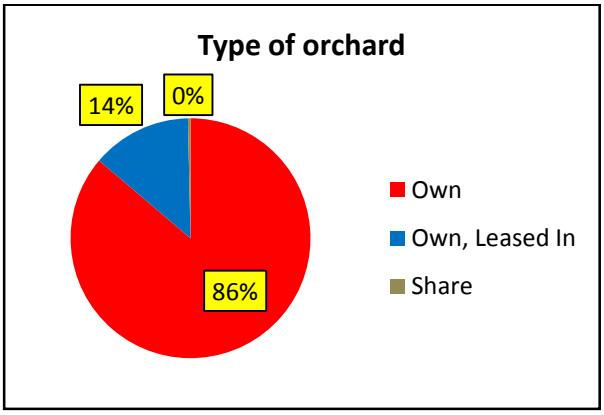


Figure 7: Type of Orchard planted by farmer

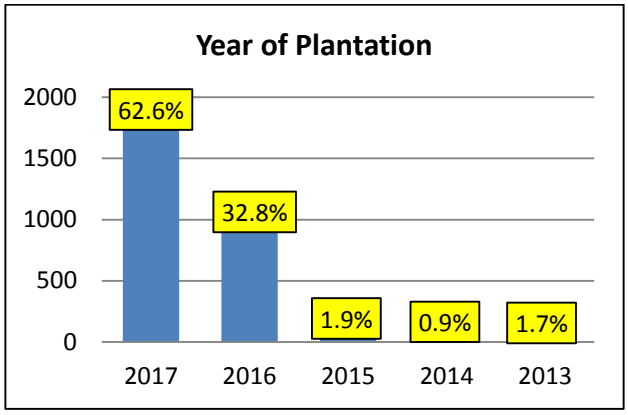


Figure 8: Year of Plantation of Orchard

Results on orchard types indicated 86% having their own, leased in orchard followed by 16% shared orchard. The trend indicated that banana growers, in general, do not like orchards in sharing. Year of orchard plantation indicated 62.6% growers planted their orchard in 2017 only, 32.8% in 2016 and 1.9% in 2015 and so on.

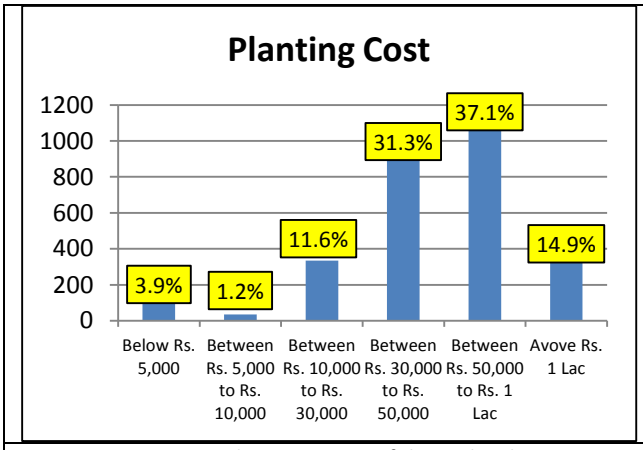


Figure 9: Plantation cost of the orchard

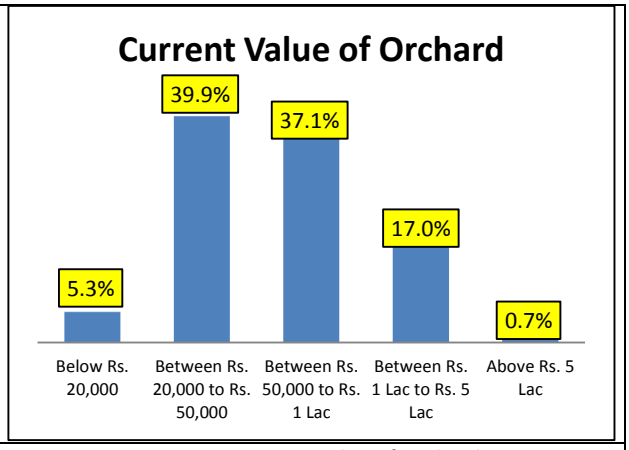


Figure 10: Current Value of Orchard

Looking into the figure is very clear that there is very good uprising trend in farmers to turn into banana growers. This is also evident by the figure 9 that 37.1% farmers spent Rs. 50,000 to Rs. 1,00,000 each to raise their orchard followed by 31.3% who spent between Rs. 30,000 to 50,000. This trend indicated that farmers were convinced that banana cultivation was a good remunerative cultivation. Current value of orchard figure 10 indicated that there were 39.9% banana growers whose orchards' value was between Rs. 20,000 to Rs. 50,000 followed by 37.1% with value of orchard Rs. 50,000 to 1 lakh. This indicated that a majority of banana growers were having small to medium valued orchard. The whole orchard details are indicative of rising prosperity of farmers.

Trees and Production

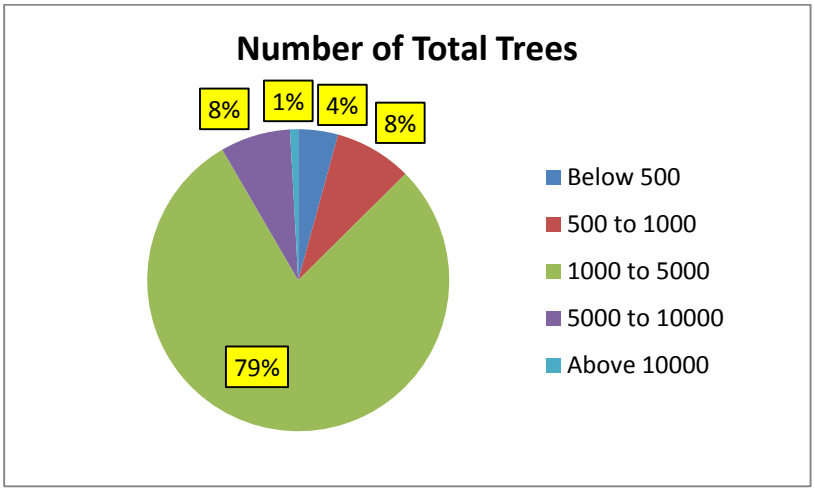


Figure 11: Number of total trees planted in orchard by the farmers

Survey on total number of trees in an orchard indicated that 4% of the papaya growers reported number of trees below 500 in their orchard. 8% responded no. of trees to be 500 to 1,000 and 79% replied 1000 to 5000 trees in their orchard. 8% of the farmers reported no. of trees to be 5,000 to 10,000 in their orchard and only 1% of the banana growers admitted that they have a substantially big orchard containing over 10,000 plants. Results in nutshell indicated that the majorly of the banana growers had a medium level orchard.

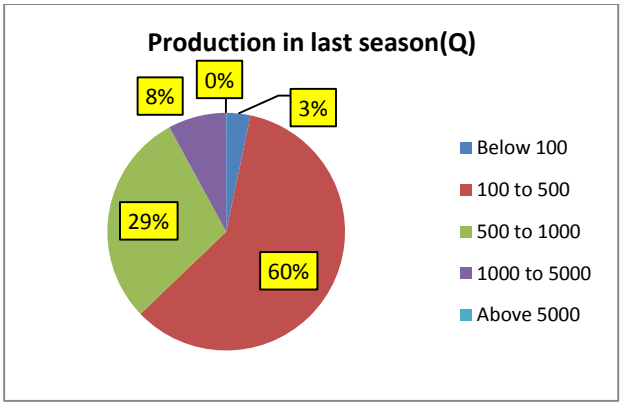


Figure 12: Average production of farmers in last season

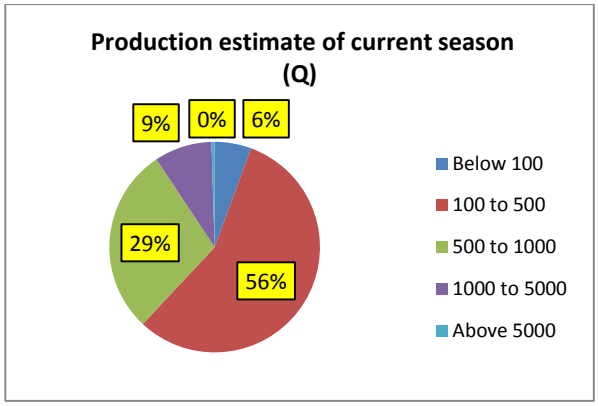


Figure 13: Average production of farmers in current season

Results indicated that production in last season was done from 100 to 500 q by each one of 60% of the growers followed by 29% from 500-1000 q. That is to say that 89% of the growers produced banana ranging from 100 to 1000 q.

Results for estimated of current season's production indicated the 56% of the growers expected between 100 to 500 q and 29% 500 – 1000q and 9% 1000 – 5000q. Expectation for production also depicted about 85% to have estimated production from 100 – 5000 q.

Orchard Maintenance

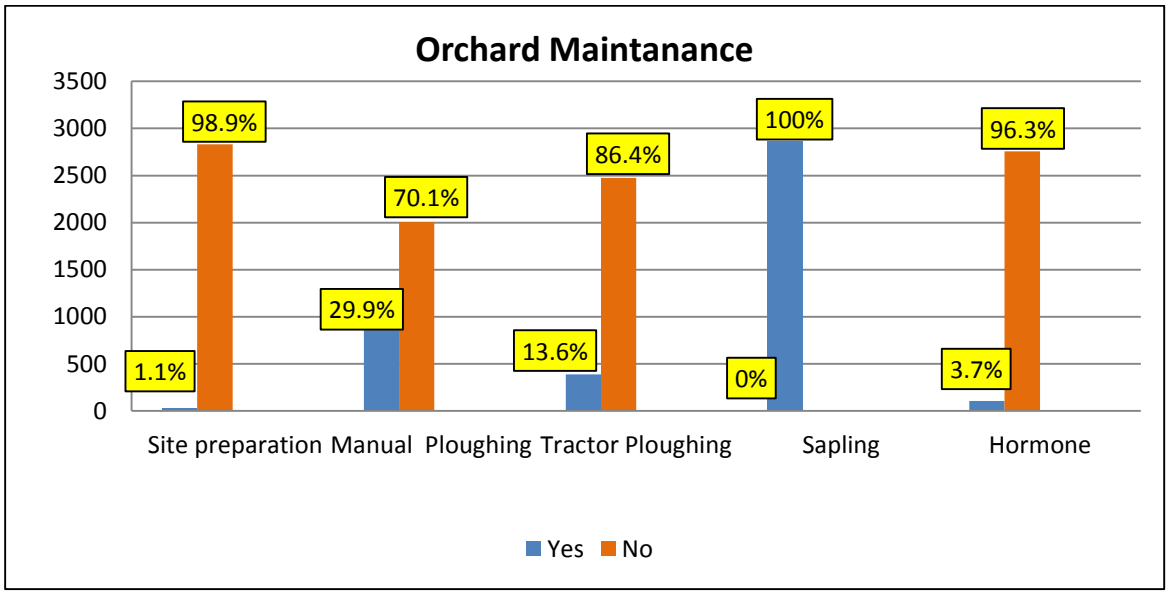


Figure 14: Various factors under orchard maintenance practiced by surveyed farmers

Orchard maintenance is a long term investment and requires good planning. Proper site preparation, planting system and planting distance along with choosing the variety and the nursery plants or saplings should to be considered carefully to ensure maximum production. The understanding of the soil and selecting the right kind of fertilizers and irrigation are also important factors in maintenance of the orchard.

Regarding orchard maintenance almost every banana grower did a site preparation and that too manual only, by and large, showing here a figure of 70.1% of the growers, only 13.6% used tractors in field operations. Low mechanization could be attributed to low income profile of the growers which do not enable them to purchase a tractor and maintain it. All the growers used sapling as the means of propagation to establish their orchard. Hormonal use could be done only by 3.7% of the total growers surveyed.

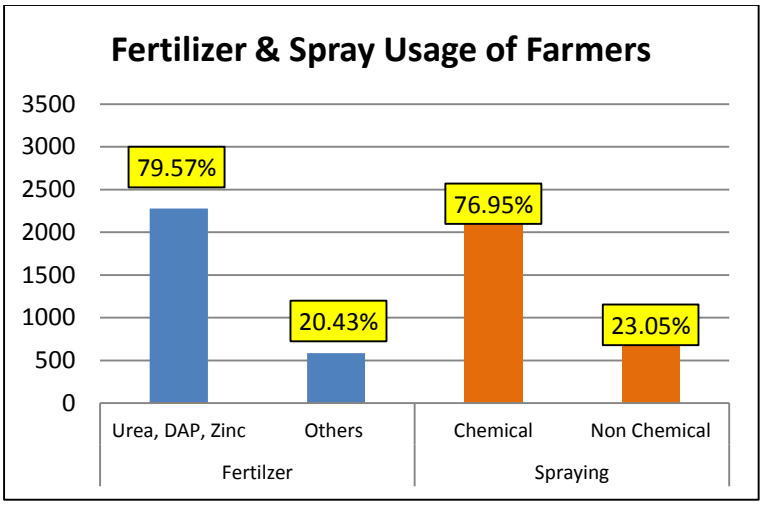


Figure 15: Different types of fertilizers and spray used by the farmers

As far as the use of fertilizers is concerned, all the surveyed farmers used fertilizers. Results for fertilizer/spray usages by the farmers indicated that about 80% of the banana growers used chemical fertilizers for example urea and DAP and non-chemical organic manures were applied by about 20% only. Chemical pesticides were used by 77% of the banana growers and only 23% did not use chemical pesticides. This is important to mention here that in general, there is a need of creating awareness in the growers regarding hazards of chemical fertilizers and pesticides and promoting INM and IPM packages.

Irrigation Methods Adopted by Farmers

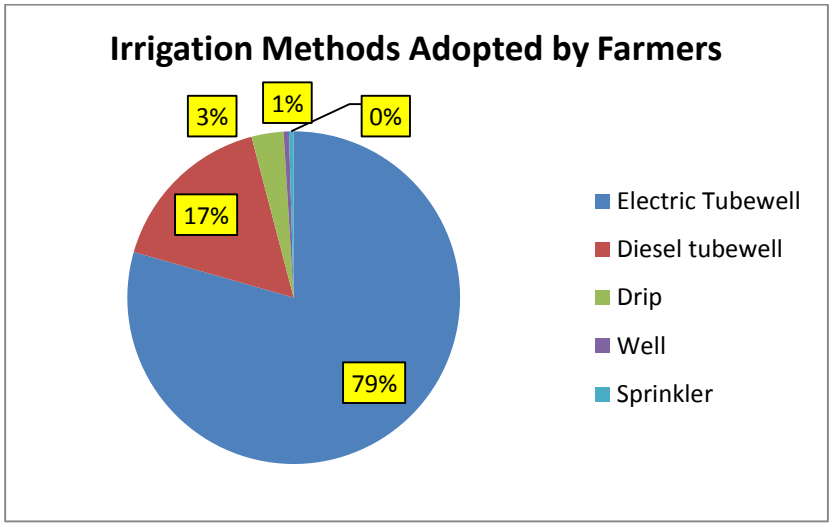


Figure 16: Different types of Irrigation method used by the surveyed farmers

The total water requirement of banana plants is about 900-1200 mm for its entire life cycle and this can be met both through natural precipitation (rainfall) as well as supplementary irrigation. Maintaining optimum moisture at all stages of growth is very critical and providing good drainage facility to drain out excess water from the root zone equally important to promote better growth and enhance the productivity.

Results for type of irrigation indicated that a large proportion of banana growers used electric tube well to an extent of 79% of the total farmers surveyed followed by diesel tube well opted by 17% then 3% by drip irrigation, 1% by well and nobody used sprinkler irrigation. This is to note in this context that electricity and diesel consumption may be much expensive as banana is a water loving fruit, requires frequent and greater quantity of water for irrigation. This is, therefore, suggested that a drip irrigation may be popularized so as to reduce quantity of water per irrigation which would economise the use of electricity/diesel and would reduce cost of production.

Usage of Labour

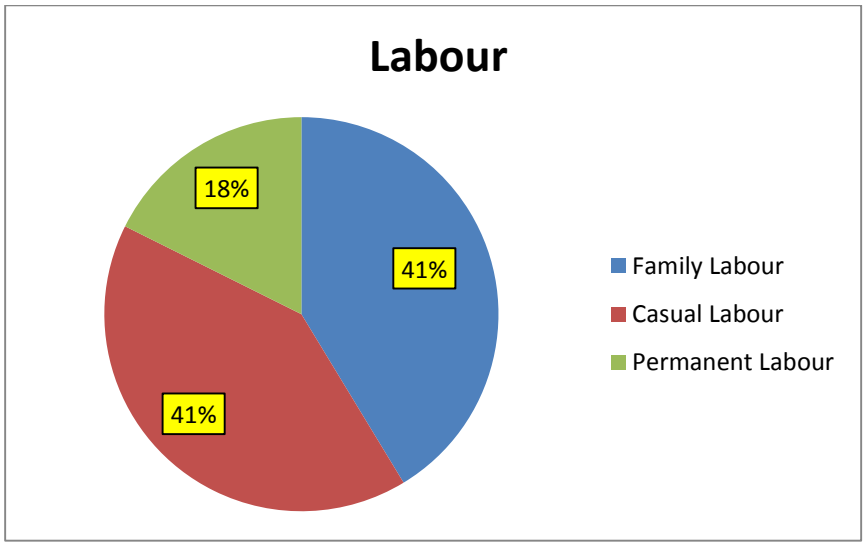


Figure 17: Different types of labour used by the farmers on their farms

Labour is an important input entering the production process. Agriculture also provides a lot of employment to labour in our country. But extensive use of labour in production process also increases the time and cost of production. Machineries such as tractor can reduce the time and cost of the production and thus improve profit margins for the farmers.

As regards use of labour permanent labours were employed by a short section (18%) of the banana growers surveyed. Casual labours and own family used as family labours contributed equally, 41% each on the cultivation and disposal of banana crop. This implies that by nature a banana grower want to economise production cost, therefore, almost all family members residing together in the village like to work in their own fields. Casual labours are employed need based fewer or more as per requirement of the crop at a particular stage.

Production & Consumption

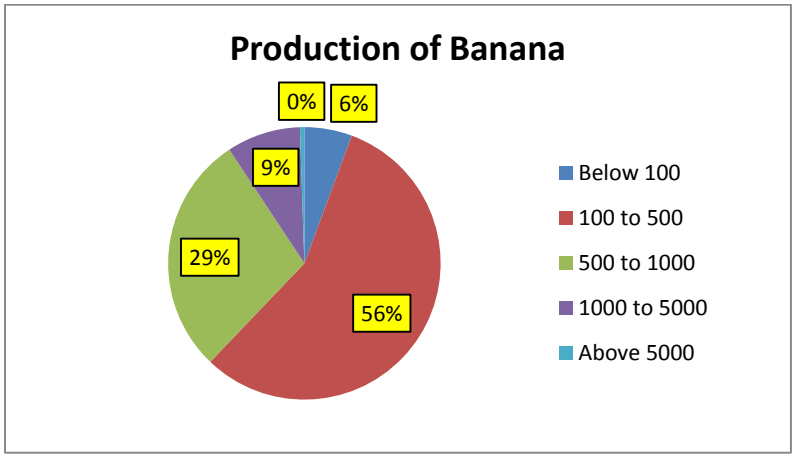


Figure 18: Production of Banana

This could be evident from the survey that 100 to 500 quintals banana producers were in greater proportion to an extent of 56% followed by 500 to 1000 quintal producers, 29%. On summing these two categories it is very much clear that 85% banana growers produced banana ranging from 100 to 1000 quintals. We may say that a large proportion of banana growers fall into lower middle class famer to upper middle class farmer as regards quantum production of banana only.

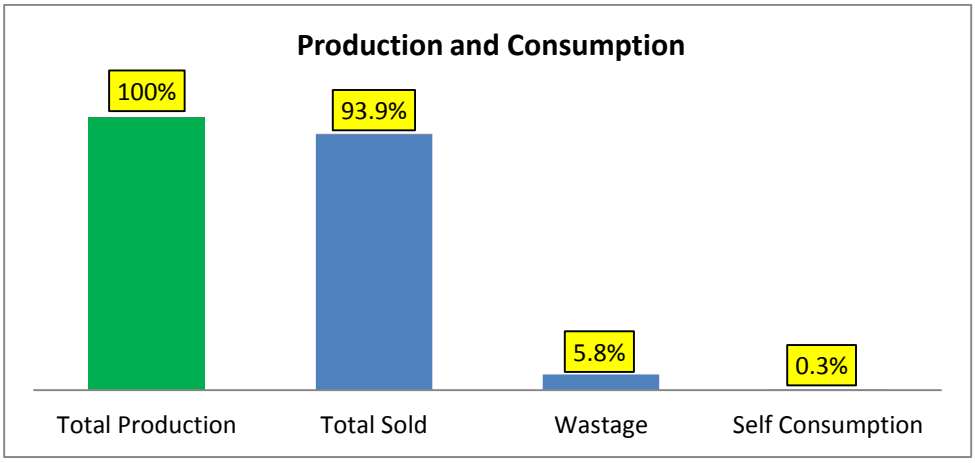


Figure 19: Production Statistics

Results for production statistics indicated that 93.9% of the total production is sold, meaning thereby, they use it as cash crop. Since, banana production is localized in some parts of the country and self consumption is very less by the growers as 0.3% only in Gujarat, the production, therefore, is available well for distributive sale in different parts of the country for consumption. The protection of the produce, therefore, is very much important issue in order to save it from decay due to fungal/bacterial infection.

CROP MARKETING

Crop Marketing

Buyer Category & Farmers Sales

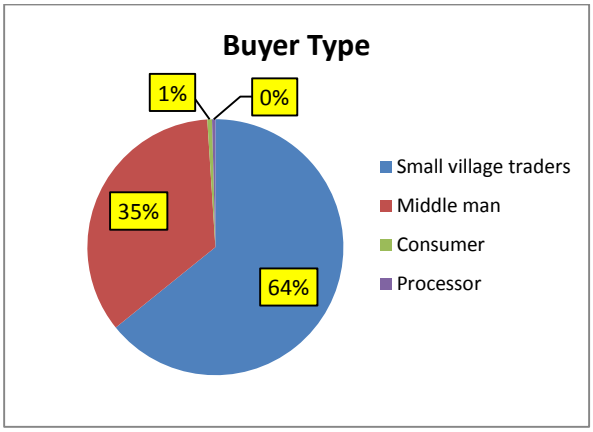


Figure 20: Different types of crop buyers

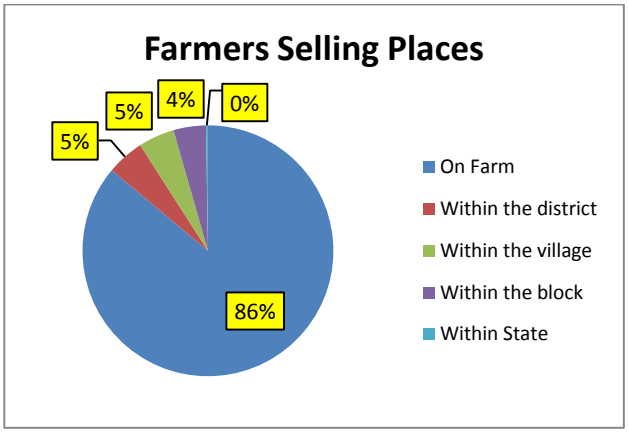


Figure 21: Farmers selling area

In India, there are mainly 4 categories of buyers who purchase crops from the farmers namely Processors, Middle-man, Small traders and consumers.

Results for crop marketing indicated that there was a paucity of processing units in the Bharuch district which required a greater attention to get a better price of banana. A large proportion of produce is purchased by small traders as reported by 64% of the banana growers followed 35% middlemen purchasers. Consumer's purchase could be noticed to be only 1%. In case if we may reduce / eliminate the middle men farmers would be getting better and reasonable prices of their produce.

As regards markets for selling of banana produce it could be evident that 86% of the farmers sell their produce on farm itself in order to avoid inconvenience from hiring a transport to the nearby mandi or mandi situated at District HQ level and also to save his time. Only 9% is sold our side at the block and district level mandies. 5% is sold within the own village level mandies. In order to mitigate transport problem and time constraint with the farmers formation of Farmer Producer Organizations (FPOs) are must. Govt. may like to look into it.

Transportation

Survey regarding mode of transportation indicated 86.3% transport on foot only, 6.6% by private pickup and 6.3% by tractor. With the objective of economise the cost of production farmers, by and large, use himself / casual labour as a means of transportation. Consequently, farmers avoid long distance markets. Govt. may like to look into it as the formation of FPOs is the best out of the promising answers.

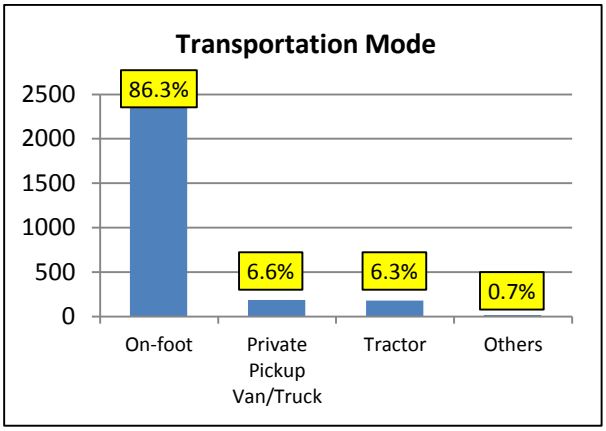


Figure 22: Different modes of transportation used by farmers

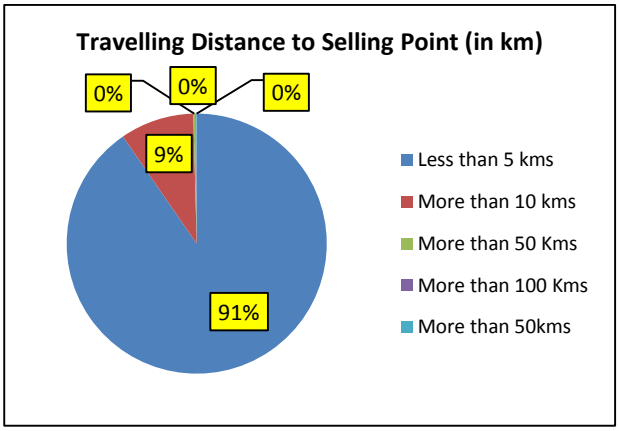


Figure 23: Farmer's travelling distance to selling point

Results regarding travelling distance to selling point indicated that 91% of the banana producers like to sell their produce within 5 km of distance on account of primitive means of transport ie. his own feet and or at the most by hiring local van. Only 9% of the farmers sell somehow in the markets situated within 10 km distance. Govt's help in purchase of vans may be rendered to farmers.

Packaging

Packaging is defined as a mean or system by which a fresh produce travel between buyers in a safe and sound condition minimizing the wastage and damages and the quality of the products. Packaging of fresh fruits is one of the most important step in the long and complicated journey from grower to consumer. Various bags, baskets and other packaging materials are used for handling, transporting and marketing fresh produce.

The use of properly designed containers for transporting and marketing of vegetables can significantly reduce their losses and maintain their freshness succulence and quality for longer period. Packaging also provides protection from mechanical damage and undesirable

physiological changes and pathological deterioration during storage, transportation and marketing.

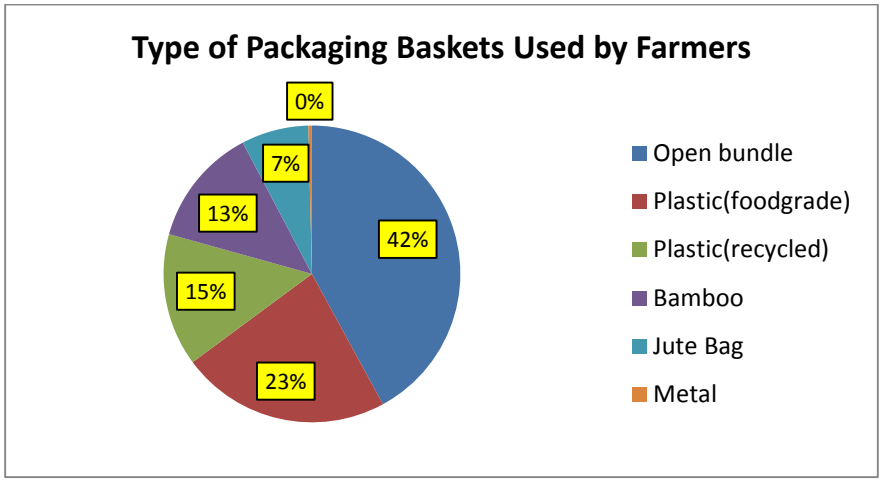


Figure 24: Types of packaging baskets used by the farmers

Most of the farmers, 42%, leave the banana bundle without any kind of packaging. Plastic (food grade) baskets and bamboo baskets were used by 23% and 13% of the farmers respectively. Jute bags were used by 7% of the farmers. Unsafe means i.e. recycled plastic baskets were used in packing by 15% of the farmers. Recycled plastic baskets lead to readily decay/rotting of the packed banana. Farmers may be financially helped by offering subsidy to purchase food grade plastic baskets, bamboo baskets and jute bags.

How is the Price Fixed?

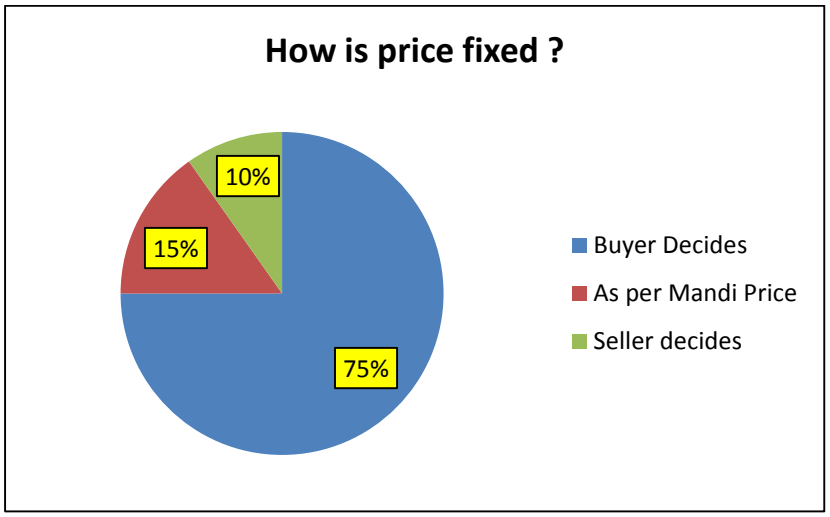


Figure 25: Who decides the price of the produce?

The prices of the farm produce are mostly fixed by middleman or traders who buy and sell the commodities in mandis.

As far as price is concerned, Fixation of price part of the horticultural produce by buyers is a very shameful issue. It has to be addressed by the Govt. very sincerely and very seriously. Glaring results may be looked in this survey as the 76% respondents of Bharuch districts reported that buyers are price fixers. In this context formation, and establishment of functional FPOs is one of the potent replies.

Government of India can play an important role of being a regulatory authority in these mandis so that the buyers/middle men are bound to purchase farmers produce at a reasonable price.

Farmers Difficulties in Selling Crop

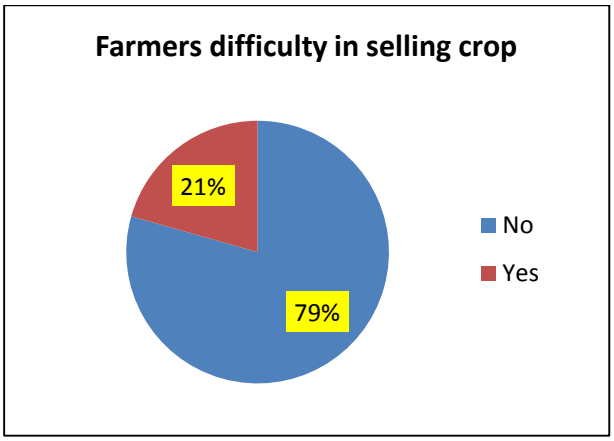


Figure 26: Did farmers have difficulties selling your crop during last season?

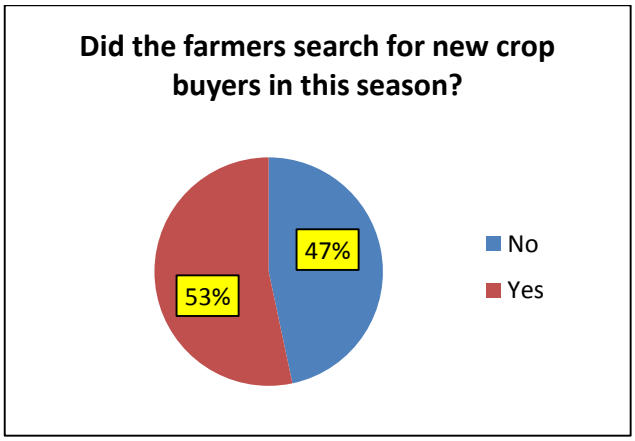


Figure 27: Did the farmers search for new crop buyers in this season?

Regarding difficulties in selling the crop produce in the last season 79% reported no difficulties as the farmers, by and large, opted to sell on farm itself to the small traders as explained earlier. However, 53% of the farmers tried to search new buyers in order to fetch a better price.

Crop Production Expansion

Increase in Crop Production in Last 5 Years

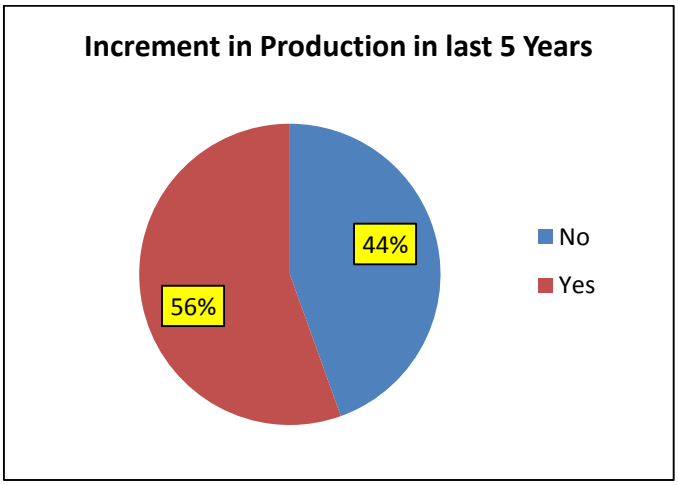


Figure 28: Increase in production of banana crop in last 5 years

Almost 44% of the farmers have increased their banana production in last 5 Years.

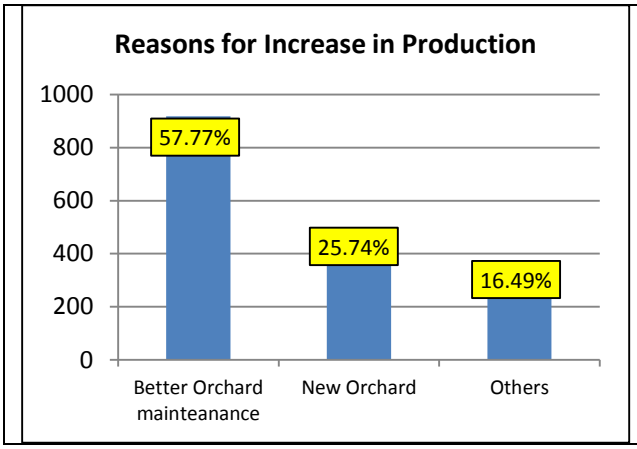


Figure 29: Reasons for increase in production

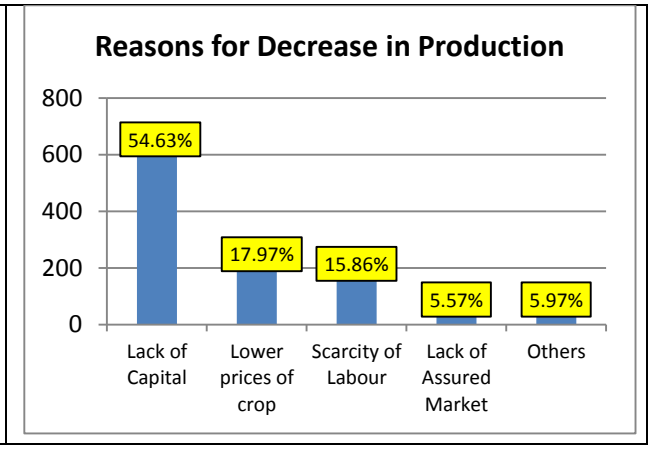


Figure 30: Reasons for decrease in production

Results for increasing trend of in the production during last 5 years indicated the 56% of the respondents admitted an increase. This increase in production trend is in conformity with increase of banana production trend at the country level.

Planning for expansion of Crop Production

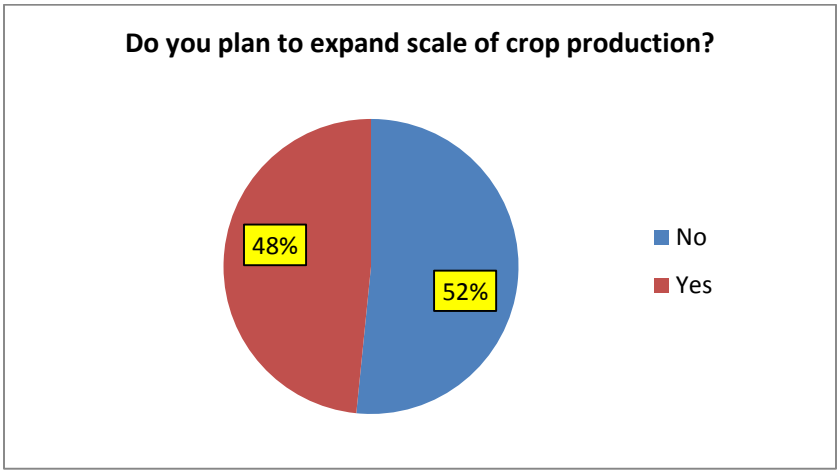


Figure 31: Number of farmers planning to expand their crop production

Almost 48% of the farmers are planning to increase their banana production

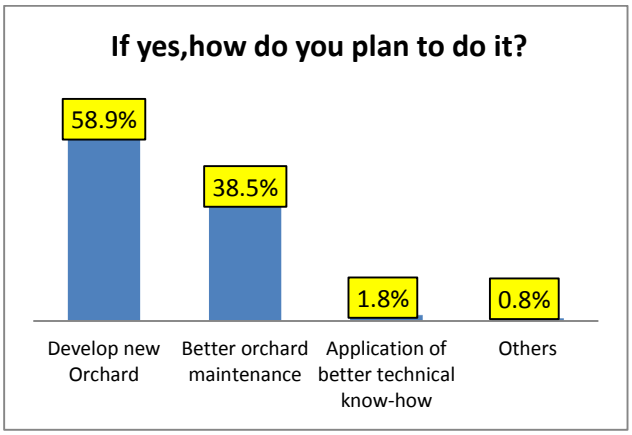


Figure 32: How are farmers planning to expand crop production

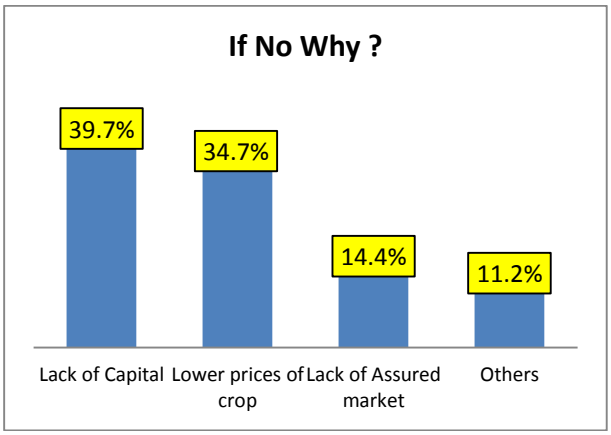


Figure 33: Why are farmers not planning to expand crop production

As per the survey it could be evident that developing new orchard and better maintenance of existing orchard were the major means to increase the production of banana.

As 52% of the growers did not plan an increase of banana production as they were facing difficulties due to lack of capital, lower price of the crop and to a certain extent lack of assured market and unforeseen factors.

OPINION OF FARMERS ON CURRENT YEAR PRICE & PRODUCTION

Opinion of Farmers

Change in Current Year Crop Production

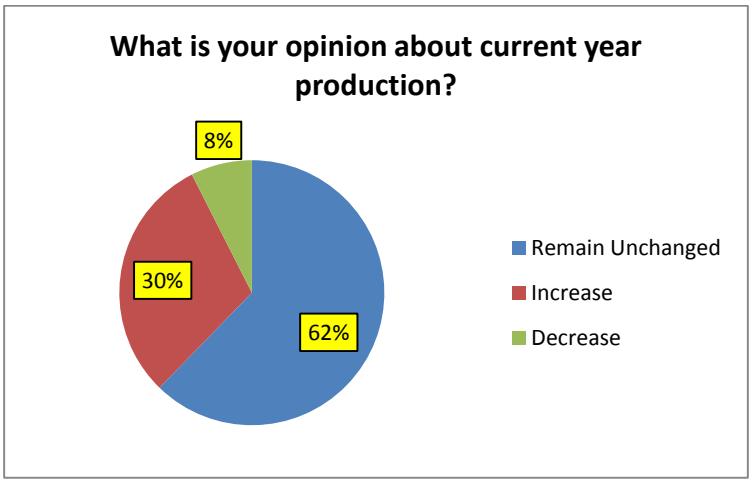


Figure 34: Opinion of farmers about current year production

Expectations for current year's production revealed that 62% admitted an expected increase in production, 30% were in the opinion that the production would remain unchanged. However 8% expected decrease also.

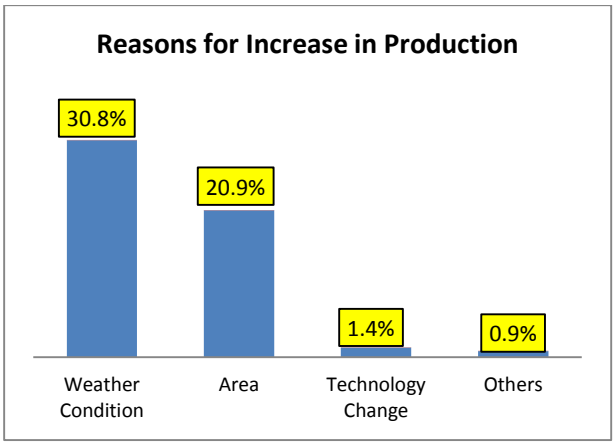


Figure 35: Reasons for increase in production

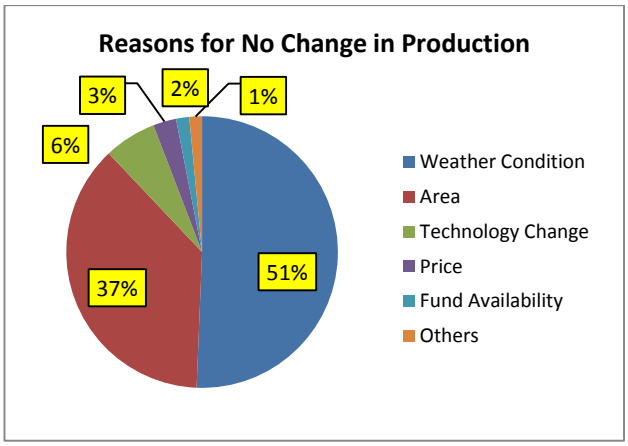


Figure 36: Reasons for no change in production

The expectation for increase may be attributed to 30.8% due to favorable weather as reported by banana growers and 20.9% opined that a little increase in area may lead an increase in production and 1.4% replied the technological change could have worked in increase of production. Decrease in yield was also attributed at large to bad weather condition by 52% of the respondents and 46% opined probable decrease in area.

Change in Current Year Price

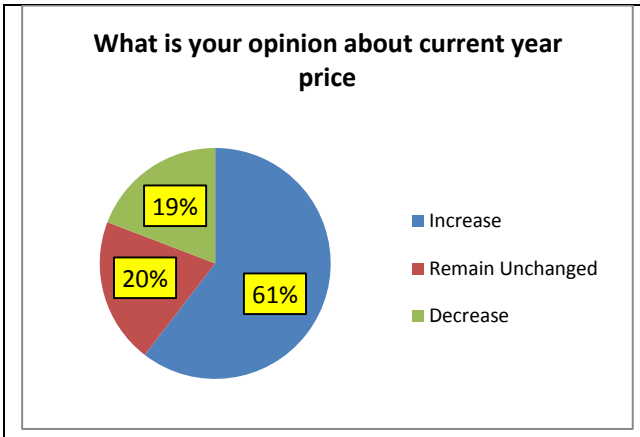


Figure 37: Opinion of farmers about current year price

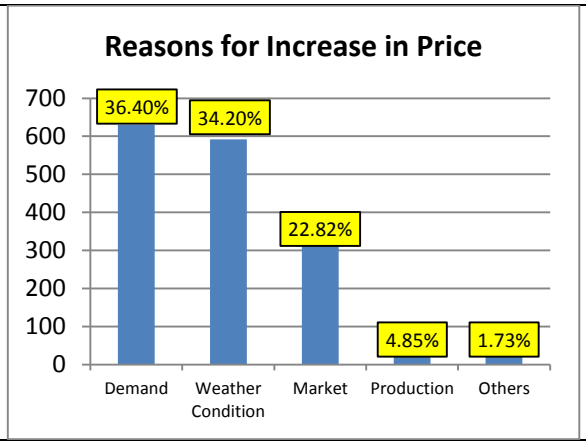


Figure 38: Reasons for increase in price

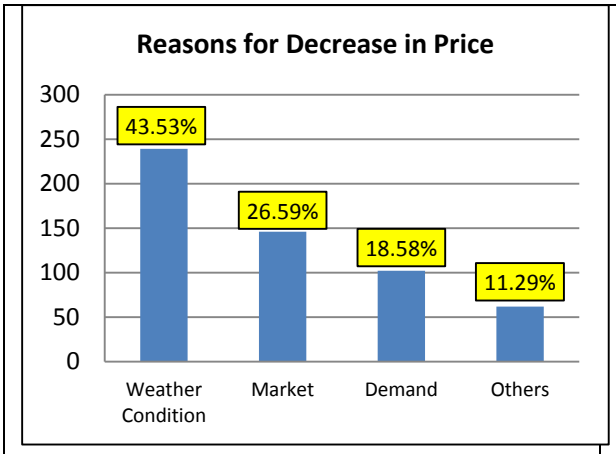


Figure 39: Reasons for decrease in price

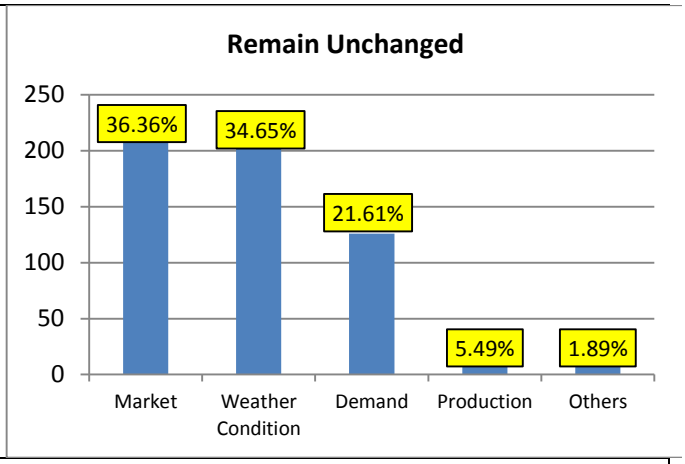


Figure 40: Reasons for no change in price

Results for expected change in current price indicated that 61% of the banana growers were of the opinion that prices could be increased, 19% expected a decrease. However, 20% of the farmers opined that there would hardly be and change in the price. Reason for increase in price may be, perhaps, due to increase in demand as the people, in general, may like to include banana in their daily diet looking into its health benefits. Or else new buyers may offer some increase in price.

Opinion about increase in current year's price is based on favorable weather condition and demand as important factors as corroborated by the survey itself. An expected decrease also depends on bad weather and marketing constraints and reasonably on diminishing demand.

Price Determining Factors

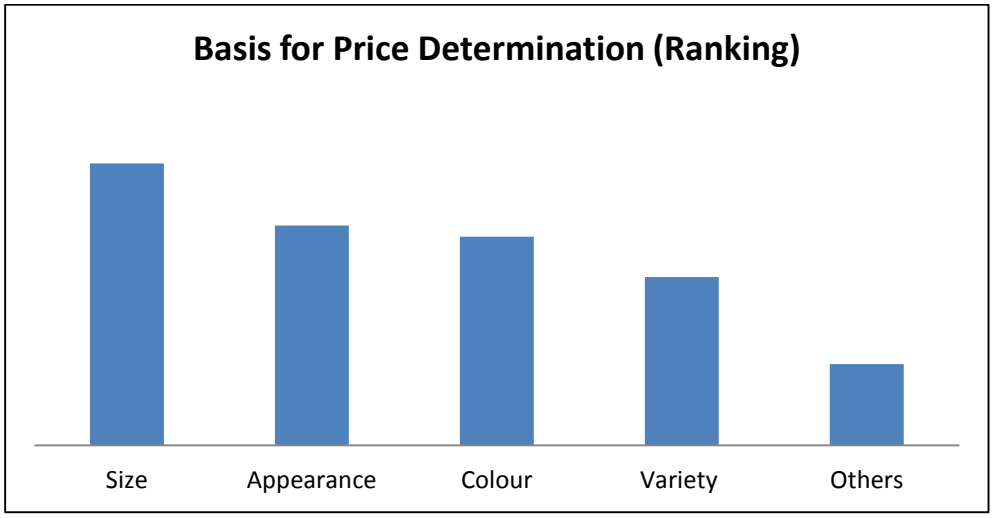


Figure 40: Basis for price determination

Results to find out basis for price determination of quality banana producers indicated that the banana size is most important factor followed by appearance, colour and variety respectively. In case, size is substantially good price increases upward with moderate contribution of appearance and colour and variety.

Post Harvest Loss Factors

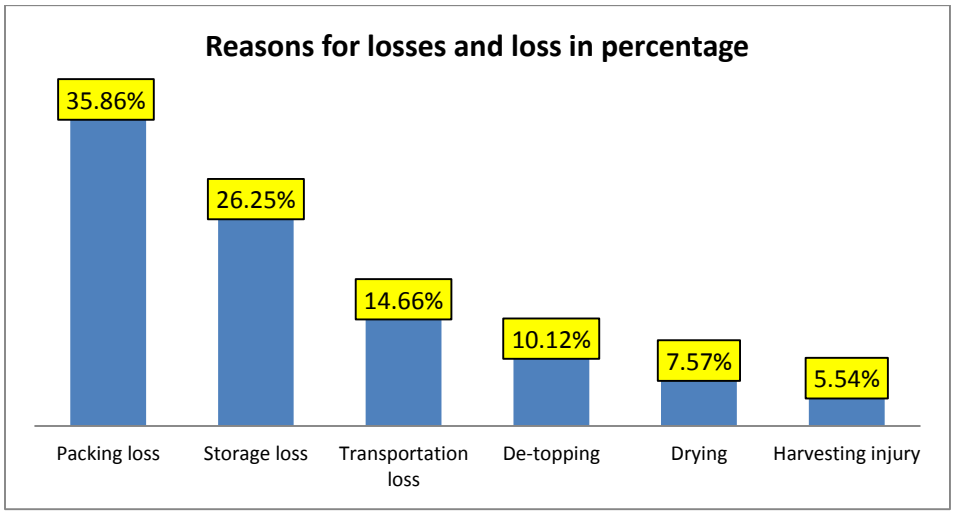


Figure 41: Factors responsible for post harvest losses

Results for factors responsible for post harvest loss indicated that the maximum loss occurred in packaging followed by losses in, storage, harvesting injury and transportation,

de-topping, drying and harvesting injury . Transportation vans may be subsidized by the Govt. to facilitate transportation. Pack houses are recommended to be strengthened.

Improvement Measures for Quality & Safety of Crop

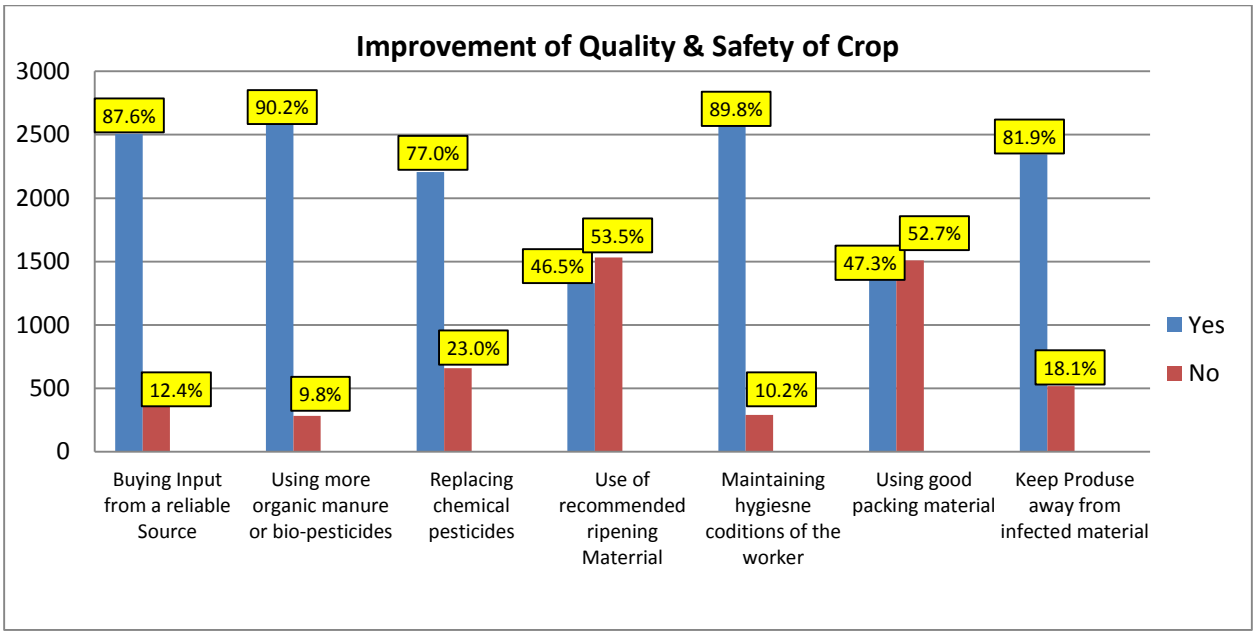


Figure 42: Improvement measures of quality and safety of crop

Survey results to identify factors influencing improvement in quality and safety of crop indicated that the plant material purchase source has to be reliable for establishing an orchard as 87% of the farmers spoke in positive that a good quality orchard may only be set up using reliable plant materials. Almost all parameters exemplified as more organic manure/biopesticide, replacement of chemical pesticide, maintaining hygenic conditions of workers and keeping produce away from infected materials were proved to be important factors that may lead a safe production of banana.

PRODUCTION AND MARKETING CONSTRAINTS

Production & Marketing Constraints

Production Constraints

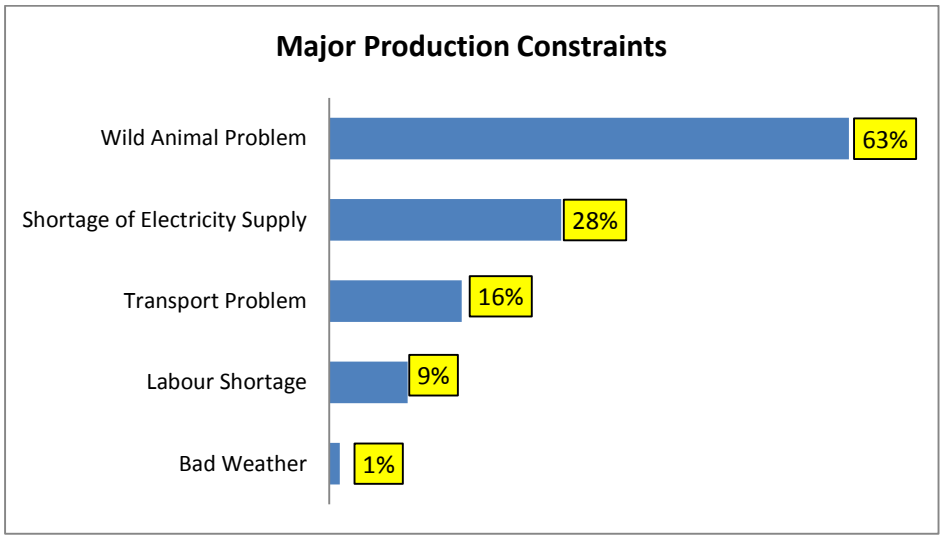


Figure 43: Major production constraints faced by the farmers

In the Bharuch district of Gujarat the very important and major production constraint was observed to be wild animals 63% and 28% felt electric tube well a major production constraint followed by transport problem as reported by 16% of the farmers. A viable problem of labour shortage as experienced by 9% of the farmers was also found to be a production constraint in this district in the chronological order.

Marketing Constraints

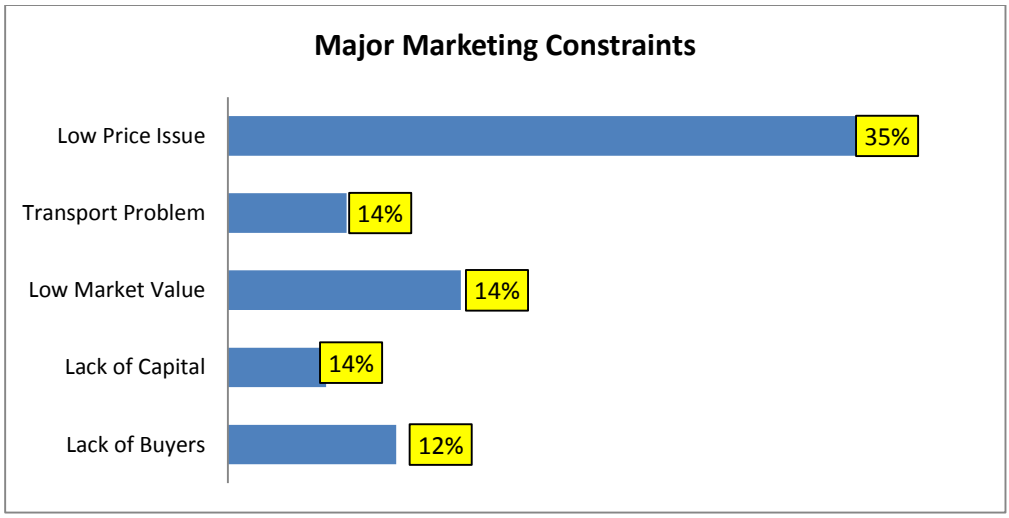


Figure 44: Major marketing constraints faced by the farmers

As regards marketing constraints low price issue was a major constraint (35%). This is a chronic problem not only of farmers of Bharuch district but a country wide prevailing in almost all the crops. The formation and establishment of functional FPOs as per SFAC guide lines lead a successful reply to this. This was followed by transport problem and low market value as reported by 145 of the farmers for each factor. Transport problems may be tackled by providing subsidized transport vans by the MIDH and low market value may be taken care of by improving quality of the product adopting INM/IPM packages and by good plant materials at the time of orchard planting. Lack of capital as experienced by 14% farmers and lack of buyers as sensed by 12% of the farmers were also found to be the constraints of marketing. Loans are available with the banks for solving capital problem. However, lack of buyers may be addressed through FPOs.

Income Profile of Farmers

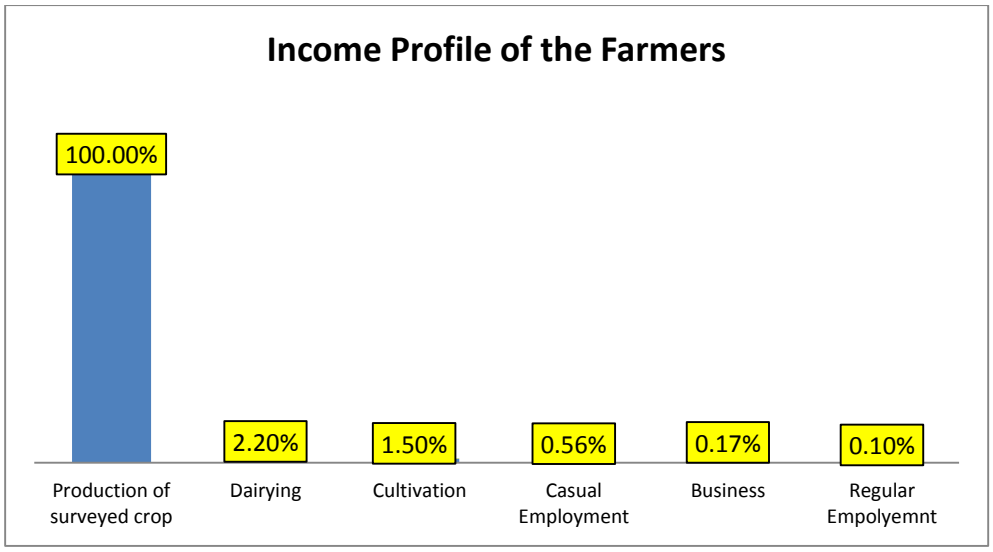


Figure 45: Income profile of the farmers

Income profile of the banana growers indicated all of the income has reported from the selling of banana produce as all the surveyed farmers were banana producers, 2.2% from animal husbandry and dairying 1.5% from cultivation of field crops and 0.56% from casual employment on temporary basis. The composition of income profile of banana growers of Bharuch district is quite natural and need not any intervention.

MAJOR FINDINGS OF SURVEY

Major Findings of the Survey

Inferences of the survey read as under:

- It could be evident that a large chunk of the banana growers fell in the age group of 35-45 years and predominantly they were educated to a higher secondary school level.

- A large proportion of banana growers in Bharuch district established orchard on their own land and about 95% of the farmers are facing transport problems and they do not have on efficient means of transportation of their own.

- Large percentage of farmers appeared to be marginal to small farmers group as regards cultivated area under banana.

- There had been a rising trend in the expansion of area under banana orchard establishment indicating banana to have appeared much remunerative as compared traditional crops in Bharuch. That too shared orchard is not in the liking of the banana growers.

- Frequency of established orchards with capital investment from Rs 50,000 to 2,00,000 was observed to be higher among the farmers surveyed.

- A majority of banana growers maintained 1,000 to 5,000 banana plants in their orchards i,e orchard size approximately to a maximum of about 1.7ha.

- Adoption of mechanisation appeared scanty . This may be due to lower purchasing power of the banana growers.

- Majority of the banana growers , over 75%,were found using chemical fertilizers and chemical pesticides. There is a need to educate them about the hazards of using such fertilizers and pesticides. Adoption of INM and IPM package need to be promoted by the Govt. through extension division of SAU's and state Horticulture Deptt.

- Electric tube wells for irrigation are common means of irrigation .Promotion of drip irrigation appears a task for the Govt. in order to save undue wastage of water.

- Majority of banana growers produces 100 quintals to 500 quintals, meaning thereby , that majority falls in marginal to small farmers group as regards production as well.

- Results for marketing of banana indicated that 86% of the growers sell their produce on farm in order to avoid inconvenient transportation.

- Transport facilities in the control of the banana growers are lacking, therefore, farmers do not get good price of their produce and , largely, they sell their produce on farm only on low price.

- Growers do not have the liberty to fix price of their own banana produce. Since, the fruit crop produce, in general, has low keeping quality , therefore, growers are bound to accept the low price fixed by the traders and intermediaries in order to avoid a storage loss. Formation of FPO's is strongly recommended to address this situation.

- Wild animals have been reported to be major production constraint as they damage orchard in the hours of absence of growers during night. Watchman with false guns may prove helpful. A fixed amount to banana growers may be remitted by the Govt. per watchman per month.

- Predominanantly , low price is a production constraint and also a marketing constraint which need to be taken care of as indicated above.

PROJECTED SUPPORT - RECOMMENDATIONS

Projected Support from Govt. / MIDH

A substantial support is required from Mission for Integrated Development of Horticulture to banana growers of Bharuch district of West Bengal so as to increase the quality production of banana and streamline the marketing chain in order to enhance the income of growers. The support category is detailed hereunder.

Sl. No.	Item	Pattern of Support/Assistance
1.	**PLANTATION INFRASTRUCTURE DEVELOPMENT**	
	1(a). Production of Planting Materials	
	(i) Hi Tech Nursery	Public sector owned Hi-Tech Nursery is required to be established.
	(ii) Small Nursery	Small nurseries in the private sector have to be established. Financial support in terms of credit linked back ended subsidy of cost may be awarded.
	(iii) Setting up New Tissue Culture (TC) units	New Public sector owned Tissue Culture units are required to be established.
	(iv) Strengthening of existing Tissue Culture (TC) units	Already existing Public sector owned TC units may be strengthened. In case of private sector owned existing TC units 50% subsidy credit linked back ended to the cost of strengthening may be awarded.
	1(b) Establishment of New Orchard (Area expansion – for a maximum area of 4 ha. per beneficiary) Banana (suckers)	
	(i) Integrated package with drip irrigation	Fruit growers may be awarded financial support for meeting expenditure on planting material, drip irrigation and cost of material for INM / IPM as per Govt. norms.
	(ii) Without integration with drip irrigation	Fruit growers unable to afford drip irrigation may be provided finances for meeting expenditure on planting materials and cost incurred for INM / IPM.
	Banana (TC)	
	(iii) Integrated package with drip irrigation	Financial support to banana growers may be awarded as per Govt. norms for meeting expenditure on planting materials cost of material for drip irrigation system and INM / IPM

		package adoptions.
	(iv) Without integration with drip irrigation	Financial support for meeting expenditure on planting materials and cost of INM / IPM.
	1(c) <u>Creation of Water Resources</u>	
	(i) Community tanks/on farm ponds / on farm water reservoirs with use of plastic / RCC lining	Financial aids may be awarded to banana growers for creating such water resources with plastic / RCC lining or without plastic / RCC linings as the case may be in accordance to the Govt. norms.
	(ii) Water harvesting system for individuals – for storage of water in (20m x 20m x 3m) ponds/tube well/dug wells	Financial assistance is required to be awarded to banana growers by the Govt. for creating defined water harvesting system as per Govt. norms.
	1(d) <u>Promotion of INM and IPM</u>	
	(i) Promotion of Integrated Nutrient Management (INM) and Integrated Pest Management (IPM)	Financial assistance to banana growers as per area coverage according to Govt. norms may be awarded.
	(ii) Plant Health Clinic	Public sector controlled / or Public private partnership owned 4 clinics may be awarded to Bharuch districts.
	<u>1(e) Organic farming</u>	
	(i) Adoption of organic farming	Financial assistance to banana growers as per Govt. norms may be awarded.
	(ii) Organic Certification	Project based and area based assistance to banana growers is required as per Govt. norms.
	1(f) <u>Horticulture Mechanization</u>	
	(i) Tractor	Banana growers are required to award financial support in terms of subsidy to purchase a tractor.
	(ii) Land Development tillage and seed bed preparation equipments	Banana growers may be awarded financial assistance as per Govt. norms.
	(iii) Plastic mulch laying machine	Banana growers may be awarded financial assistance to purchase the machine.
	(iv) Plant protection equipments • Manual Sprayer • Knapsack/Foot operated sprayer	Since large no. of banana growers are small to marginal farmers, therefore, these two types of sprayer would suffice the need for which financial assistance may be awarded as per Govt. norms.
2.	**INTEGRATED POST HARVEST MANAGEMENT**	

	2(a) Pack Houses	Financial assistance for new pack houses of size 9M X 6M may be rendered as per norms detailed in SFAC operational guidelines.
	2(b) Ripening Chamber	Credit linked back ended subsidy in the capital cost of project as per norms of the Govt. may be awarded to the growers.
3.	**ESTABLISHMENT OF MARKETING INFRASTRUCTURE FOR HORTICULTURE PRODUCE**	
	3(a) Rural Marketing/Apni Mandies/Direct markets	Credit linked back ended subsidy in the capital cost of project is required to be awarded for banana growers.
	3(b) Retail Markets/Outlets (environmentally controlled)	Credit linked back ended subsidy in the capital cost is required to be awarded to the banana growers.
4.	**MISSION MANAGEMENT**	
	4(a) District level exhibition and Kisan Mela	These are required to be organised by the Govt. / SAU sponsored by MIDH collectively both the events in one stroke two times in a year in Bharuch district.
	4(b) Information dissemination through publicity, printed literature etc and local adventures	This information dissemination part may be clubbed with the above 4(a).
	4(c) 7 Promotion of Farmer Producers Organisation (FPO) / Farmer Interest Groups (FIG) of 15-20 farmers / 20 ha. Growers Association and tie up with financial Institution and Agregators.	As per norms issued by SFAC finances are required to be provided.

Interaction with Farmers

Annexure 1: Survey Questionnaire

HINDUSTAN INSECTICIDES LTD
New Delhi-110003

(Farmer Survey Questionnaire)

1.Farmer's Details:

District: _____ Block: _____

Village: _____ State: _____

Name of Farmer: _____ Age: _____

Education: _____ Contact Number: _____

Category: GENERAL ☐ OBC ☐ SC ☐ ST ☐ ID Card Type: _____

Years of experience in growing crop: _____ Signed any contract with processors/traders: YES ☐ NO ☐
If yes, Name of the processor/trader: _____

2. Assets Profile:

LAND		PHYSICAL ASSETS	
Area under cultivation		Tractor	
Own crop orchard area		Pick-up van/truck	
Leased-in crop orchard area		Others	
Leased-out crop orchard area			

3. Trees and Production under orchard area:

A : Orchard Details		B: Total trees/production	
Type of orchard	Own ☐ Leased-in ☐ Share ☐ Others ☐	No. of total trees	
When was orchard planted?		Production in last season (in quintal)	
Total planting cost		Production estimate of current season (in quintal)	
Current Value of orchard			
Variety of crop in orchard			
C: Surveyed trees/production		**D: Other trees/production**	
No. of trees of surveyed crop		No. of other trees	
Production in last season (in quintal)		Production in last season(in quintal)	
Production estimate of current season (in quintal)		Production estimate of current season (in quintal)	

4. Orchard Maintenance:

Maintenance type		Details	Quantity	Cost
Fencing		Yes ☐ No ☐ Specify: _____		
Site preparation		Yes ☐ No ☐		
Ploughing	Manual	Yes ☐ No ☐		
	Tractor	Yes ☐ No ☐		
No. of sapling				
Type of Fertilizer		Urea ☐ DAP ☐ Zinc ☐ Phosphate ☐ Organic ☐ Vermi compost ☐ Chemical fertilizer ☐ Others, specify: _____		
Irrigation		Electric Tubewell ☐ Diesel Tubewell ☐ Drip ☐ Sprinkler ☐ Well ☐ Others, specify: _____		
Spraying		Chemical ☐ Non-Chemical ☐ Others, specify: _____		
Hormone		Yes ☐ No ☐ Specify _____		
Labour		Family Labour ☐ Casual Labour ☐ Permanent Labour ☐ Others, specify: _____		

5. Production and Consumption

Variety	Total Production (in Qtl)	Total Sale (in Qtl)	Self Consumption (in Qtl)	Wastage (in Qtl)

6. (i) Crop Marketing

a) Buyer Type:	Consumers ☐ Small village traders ☐ Middle man Processor ☐ Others, specify _____
b) Crop Variety	
c) Total quantity sold (in quintal)	
d) Total value of sale (in rupees)	
e) Where sold	On farm ☐ Within the village ☐ Within the block ☐ Within the district ☐ Within state ☐ Outside state ☐
f) Distance to selling point (in Km)	Less than 5 kms ☐ More than 10 kms ☐ More than 50 kms ☐ More than 100 kms ☐
g) Travel time per visit (in minutes)	
h) Cost of travel (in rupees)	
i) Transport mode	On-foot ☐ Bullock-cart ☐ Rickshaw/thela ☐ Tractor ☐ Public vehicle/bus ☐ Private pickup van/Truck ☐ Others, specify _____
j) Cost of transport (in rupees)	
k) Terms of payment	Cash ☐ Credit ☐ Full advance ☐ Partial advance ☐ Others, specify _____
l) Types of baskets	Bamboo ☐ Plastic (recycled) ☐ Plastic (foodgrade) ☐ Jute bag ☐ Metal ☐ Open bundle ☐ Others, specific _____
m) Other facilities by the buyer	Orchard maintenance ☐ Loans ☐ Any subsidy ☐ Others, specify _____
n) How is price fixed?	As per mandi price ☐ Seller decides ☐ Buyer decides ☐ Others, specific _____
o) Is there written contract	Yes ☐ No ☐
p) Penalty for violation of contract	Rejection of supply ☐ Price reduction by x% ☐ Termination ☐ Suspension for x period of time ☐ None ☐

(ii) Did you have difficulties selling your Crop name during last Season**? Yes** ☐ **No** ☐

If yes, reasons for difficulty

Market is too far ☐ Monopoly of buyer ☐ Buyer stopped buying ☐ Price is too low ☐ Loss of Production ☐

Bad Quality of production Others, specify _____

(iii) In the Season, have you searched for new crop buyers**? Yes** ☐ **No** ☐

If Yes, why?

For better price ☐ Want a single buyer of larger quantity ☐ Want more no. of buyers ☐ Want a more reliable buyer ☐

Buyers stopped buying ☐ Difficulty in getting payment ☐ Others, specify _____

(iv) Do you ever experience delays in getting paid for crop sold (on agreed term)? **Yes** ☐ **No** ☐

If yes, on average, how many days it takes to get paid after the committed time? _____

(v) How many times in the last season have crop buyers not paid at all? (no. of times) _____

If not paid, what action taken against him

None ☐ Stop giving crop ☐ Legal action ☐ Attachment of buyer's property ☐ Community action ☐

Other (specify) _____

7. MEASURES FOR IMPROVING COMPETITIVENESS MARKETS

(i) Whether crop production increased in the last 5 year? **Yes** ☐ **No** ☐

If yes, how?

New orchard ☐ Better Orchard maintenance ☐ Integration with trader (exporter) ☐ Application of better technical know-how ☐

Don't know ☐ Others, specify _____

If yes, why?

Assured market ☐ Better price ☐ Provisions of better inputs & services ☐ Don't know ☐

Others, specify _____

If no, why?

Lack of capital ☐ Scarcity of labour ☐ Lower prices of litchi ☐ Lack of assured market Higher price of input ☐

Decreasing Orchard land ☐ Others, specify _____

(ii) Do you plan to expand scale of crop production? **Yes** ☐ **No** ☐

If yes, how do you plan to do it?

Develop New orchard ☐ Better Orchard maintenance ☐ Integration with trader (exporter) ☐

Application of better technical know-how ☐ Don't know ☐ Others, specify _____

If no, why?

Lack of capital ☐ Scarcity of labour ☐ Lower prices of crop ☐ Lack of assured market Higher price of input ☐

Decreasing Orchard land ☐ Others, specify _____

8. OPINION OF FARMERS

(i) What is your opinion about current year production?

		Reasons
a) Increase	☐	Area ☐ Technology change ☐ Weather condition ☐ Fund availability ☐ Price ☐ Government Policy ☐ Others, Specify _____
b)Decrease	☐	Area ☐ Technology change ☐ Weather condition ☐ Fund availability ☐ Price ☐ Others, Specify _____
c) Remain unchanged	☐	Area ☐ Technology change ☐ Weather condition ☐ Fund availability ☐ Price ☐ Others, Specify _____

(ii) What is your opinion about current year price?

		Reasons
a) Increase	☐	Demand ☐ Market ☐ Production ☐ Weather condition ☐ Processors ☐ Export/Import Policy ☐ Others, Specify _____
b)Decrease	☐	Demand ☐ Market ☐ Production ☐ Weather condition ☐ Processors ☐ Export/Import Policy ☐ Others, Specify _____
c) Remain unchanged	☐	Demand ☐ Market ☐ Production ☐ Weather condition ☐ Processors ☐ Export/Import Policy ☐ Others, Specify _____

(iii) Basis for price determination (Please rank)

Variety (Seed/Seedless)		Colour	
Appearance		Size	
Pulp content		Thickness of outer coat/skin	
Ripeness		Any other, specify	

**1-10 (Points to be given)

(iv) Post harvest losses

Reasons for losses	Loss in percentage (Mention only if loss is more than 3%)
Harvesting injury	
De-topping	
Packing loss	
Storage loss	
Transportation loss	
Drying	
Handling loss	

(v) Are you aware of World Trading Organization? **Yes** ☐ **No** ☐

a. **If yes, How it is effecting your farm practices** _____

(vi) Are you aware about food safety measurement? **Yes** ☐ **No** ☐

a. **If yes, what measure are being taken by you to improve the quality** _____

9. MEASURE TO IMPROVE QUALITY AND SAFETY OF CROP

a) Buying input from a reliable source	Yes ☐ No ☐	**b) Using more organic manure or bio-pesticides**	Yes ☐ No ☐
c) Replacing chemical pesticides	Yes ☐ No ☐	**d) Use of recommended ripening material**	Yes ☐ No ☐
e) Maintaining hygiene conditions of the worker	Yes ☐ No ☐	**f) Using good packing material**	Yes ☐ No ☐
g) Keep produce away from infected material	Yes ☐ No ☐	**h) Sorting produce frequently**	Yes ☐ No ☐
i)Staggered harvesting	Yes ☐ No ☐	**j)Others, specify** _____	

10 (i) INDICATE FIVE MAJOR PRODUCTION CONSTRAINTS.

1. [_____]
2. [_____]
3. [_____]
4. [_____]
5. [_____]

10 (i) INDICATE FIVE MAJOR MARKETING CONSTRAINTS.

1. [_____]
2. [_____]
3. [_____]
4. [_____]
5. [_____]

11. INCOME PROFILE

Activities	**For how long (years)**	**Annual household income in 2015-16 (Rs.)**	**Annual household income in 2016-17 (Rs.)**
a) Production of Surveyed Crop			
b) Dairying			
c) Cultivation			
d) Casual Employment			
e) Regular Employment			
f) Business			
g) Others			

I hereby declare that the above information is provided by me as best of my knowledge.

Signature: _____

(Thumb Impression)

Annexure 2: List of Figures and Tables