WINROCK INTERNATIONAL

PAKISTAN AGRICULTURE DEVELOPMENT PROJECT

BASELINE REPORT

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ACRONYM LIST

BLS	Baseline Study
CB	Commercial Banks
CBO	Community Based Organization
CIs	Custom Indicators
DFR	Draft Final Report
EU	European Union
FFPr	Food for Progress
FFS	Farmer Field School
FGD	Focus Group Discussion
FHH	Farm House Hold
FMC	Farmers' Marketing Collective
FPSQ	Farm Production Survey Questionnaire
FR	Final Report
FYM	Farm Yard Manure
G9	Grand Nain
GAP	Good Agricultural Practices
HACCP	Hazard Analysis Critical Control Point
IDI	In-Depth Interviews
K	Potassium
LOP	Life of Project
M&E	Monitoring and Evaluation
MFB	Microfinance Bank
MFI	Microfinance Institution
MT	Metric Ton
N	Nitrogen
NGO	Nongovernmental Organization
P	Phosphorus
PAD	Pakistan Agriculture Development Project
PPMS	Project Performance Monitoring System
RSP	Rural Support Programme
Sis	Standard Indicators
SO	Strategic Objectives
SOW	Scope of Work
SPS	Sanitary and Phytosanitary
TOR	Terms of Reference
USDA	United States Department of Agriculture
VCs	Value Chain(s)
WI	Winrock International
Zn	Zinc

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We alone are responsible for any errors in the recorder information.

EXECUTIVE SUMMARY

A. ACTIVITY PURPOSE AND BACKGROUND

The Pakistan Agriculture Development (PAD) is a United States Department of Agriculture (USDA) funded Food for Progress Project, implemented by the Winrock International Institute for Agriculture Development. It is a five-year Project (October 2016 – Sep 2021), with an estimated financial outlay of US$16 million. The Project is expected to contribute towards two Food for Progress (FFPr) Strategic Objectives (SOs), namely, FFPr-SO1 - increased agricultural productivity by building the capacity of producers in improved productivity and profitability, training producers in improved production techniques, post-harvest handling, marketing, sanitary and phytosanitary practices, and providing in-kind grants for equipment and agriculture inputs; and ii) FFPr-SO2 - expanded trade of agricultural products by developing both domestic and export market linkages, facilitating trade relationships, researching export opportunities, promoting a coordinated and strategic approach to building market share by associations, and promoting food safety issues and requirements.

The objective of the baseline study included: i) establishing a baseline as points of comparison to support measurement of program impacts as part of the future project evaluation activities; ii) guiding realistic and feasible target setting for performance indicators; iii) supporting program design through situational analysis relevant to target beneficiaries' knowledge and capacities; access to, quality of an utilization of proposed inputs and infrastructure; value chain diagrams; and, organizational capacity; and iv) identifying and recommending responses to risks and constraints that may pose challenges to planned project implementation. The baselines will also provide benchmarks for monitoring selected Food for Progress (FFPr) Standard Indicators (SI) and Custom Indicators (CIs).

The focus of the Project is on value chain development covering four crops namely date, banana, tomato and chili in Punjab and Sindh provinces. Eleven districts, five from Punjab (Bahawalpur, Khanewal, Lodhran, Multan, and Sheikhupura), and six districts from Sindh (Hyderabad, Khairpur, Mirpurkhas, Tando Allah Yar, Thatta, and Umerkot) have been selected for the Project activities.

This report presents findings of the baseline study which is based on a sample survey of the potential stakeholders1 and beneficiaries of the selected four value chains. A description of various stakeholders and their role is presented in Attachment 1.

B. EVALUATION QUESTIONS

The questions addressed to the farm household baseline survey included area under cultivation and production thereof, variety, source, and planting method, crop production practices and level of inputs used, post production handling and postharvest losses, mode of disposal, access to production related, financial and market related information, mode and of disposal of the produce, and overall skill level. Focus group discussions were also held in the area with groups of farmers to understand the broad picture and to gauge their perception of the problems and issues related to the production and marketing of the four crops. Separate interviews were held with market functionaries such as itinerant dealers (village level trader/assembler), pre-harvest contractors (who purchase the standing crop), commission agent (auctioneer), wholesalers, processors and exporters. Information was sought on scale of operation, technical efficiency, and need for expansion and up-gradation of cold and dry storage, access to finance, etc., for storage operators and processors.

[1] Stakeholders comprised of respondents drawn from the seed/plants suppliers, agro dealers/input suppliers, equipment suppliers, pre-harvest contractors, commission agents, itinerant dealers, wholesalers, retailers, storage owners/operators, processors, exporters, producer/trader associations, lending institutions, agricultural research and extension services, NGOs, etc.

C. METHODOLOGY

This report presents findings of the baseline study which is based on a sample survey of the potential stakeholders and beneficiaries of the selected four value chains, namely farmers, input suppliers, market functionaries, processors, and exporters. Both quantitative and qualitative research methods were used for data collection. For the quantitative data collection, a structured farm production survey questionnaire was used to collect information related to on-farm production and postharvest handling of the four selected crops, etc. For the qualitative data collection, separate discussions were held with farmer groups and other stakeholders along the value chains. A representative sample of 2,200 farm households was randomly selected for quantitative data collection supplemented by 48 focus group discussions (FGDs). The sample size for in-depth interviews (IDIs) was set at 138, comprised of respondents drawn from the seed/plants suppliers, agro dealers/input suppliers, equipment suppliers, pre-harvest contractors, commission agents, itinerant dealers, wholesalers, retailers, storage owners/operators, processors, exporters, producer/trader associations, lending institutions, agricultural research and extension services, NGOs, etc.

Three sets of survey instruments were used for the study. They included i) Farm Production Survey Questionnaires (FPSQ); ii) checklists (guidelines) for FGDs to complement FPSQs at the cluster level; and iii) checklist for IDIs with directly related stakeholders of the selected crops, such as farm input suppliers, market functionaries, warehouse and cold store operators, processors, and exporters, and organizations providing support services. In the absence of written records, surveys had to rely on the statements of the farmers collected on recall basis.

The data and information analyzed suggest that productivity of the four crops namely banana, date, chili, and tomato, is significantly lower than its potential. The main binding factors for low productivity included: absence of disease-free seeds and planting material, conventional nursery raising methods; unbalanced fertilizer application, lack of micro nutrient use, poor pest management, and most importantly improper postharvest handling on the farm, particularly, drying, curing, and storing and bagging methods. In summary, there is grave absence of good agricultural practices, further accentuated with pronounced knowledge gap.

The value chain maps of the four crops show that the producer of the primary commodities has to depend on the market functionaries for fair returns to his efforts in value addition. If the farmer does not receive judicious returns to any value addition on the farm, there is no incentive for the farmer to respond to the market demand for quality products.

The knowledge gap to adopt good agricultural practices was, and postharvest, and off farm handling with reference to transportation, storage, and processing, is quite evident and need training to stakeholders in handling the commodities need paradigm shift from exploitative and unfair trade practices. One of the constraints that are impeding any change towards improving the value chains is present state of physical infrastructure which is inadequate in terms of capacity, and is largely technically inefficient.

To improve the farm productivity and remunerative value addition at all the stages of value chain, would require support from service providers, particularly financial institutions. Given the boot strapped investment capacity, fostering any value chain development efforts will be risky and not sustainable.

The baseline situation analysis suggests that:

INDICATOR	DEFINITION	BASELINE STATUS
FFPr SI-1	# of hectares under improved techniques or technologies as a result of USDA assistance	None of the hectares surveyed follow all the elements of recommended production packages (healthy seed/suckers of improved varieties, balanced use of fertilizers, judicious use of pesticides, harvesting and postharvest methods, and grading and packing)
FFPr SI-2	Number of individuals who have applied new technologies or techniques as a result of USDA assistance	None of the farmers have adopted improved production packages.
FFPr SI-3	Number of individuals who have applied improved farm management practices (i.e.	None of the farmers and other market functionaries follow good agricultural practices

INDICATOR	DEFINITION	BASELINE STATUS
	governance, administration, or financial management) as a result of USDA assistance	of farm management and planning, and do not maintain financial records even based on simple book keeping or accounting to assess the crop profitability or returns to adoption of a technology
FFPr SI-4	Number of individuals receiving financial services as a result of USDA assistance	Only up to 2% farmers access credit from formal credit sources, while rest either their own resources or borrow from input dealers and market functionaries at an implicit high rate of interest. Similarly, cold storage owners, and small processors, are credit shy because of investment capacity. Thus, the baseline should be considered zero.
FFPr SI-7	Number of private enterprises, producer organizations, water users' associations, women's groups, trade and business associations, & community-based organizations (CBO) that applied improved techniques and technologies as a result of USDA assistance	Except for chili and date growers' associations, there no crop specific water users' association, women association, CBOs, traders' associations. The chili and date growers' association are not capable of providing and any technical support to members, are not broad based and all-inclusive and serve as a pressure group favoring few individuals. Thus, the baseline should be considered zero.
FFPr SI-11	Total increase installed storage capacity (dry or cold storage) as a result of USDA assistance	Out of 26 cold/dry storages surveyed, none are technically efficient and all are ill equipped and in dilapidated condition. Thus, the baseline should be considered zero.
FFPr SI-13	Value of sales by project beneficiaries in four targeted commodities	Zero.
FFPr SI-14	Volume of commodities (metric tons) sold by project beneficiaries	Zero.
CI-2	Number of agricultural producers in target region who have access to current agricultural market information	No farmers have access to live market information, and get information on by word of mouth and through digital media (TV and radio) with a lag time. Thus, the baseline should be considered zero.
CI-9	Volume of chilies certified as meeting industry standards	Last year about 4,000 MT was certified by an international accrediting agency (SGS) for online trading, however the baseline should be considered zero.
CI-10	Number of agricultural producers reporting decreases in post-harvest losses	Zero.

D. RECOMMENDATIONS

i. Banana

- Training is provided to farmers in identifying healthy and disease free suckers, and maintaining nurseries;
- Training is conducted of selected farmers to produce healthy suckers of high yielding varieties, particularly G9;
- Organize Farmer Field Schools (FFS) covering all aspects of good agricultural practices (GAP). The coverage of topics should include *inter alia* integrated pest management (IPM);
- Conduct awareness campaign in keeping the banana fields free from stems of harvested trees and its disposal away from fields to reduce the threat of bacterial and virus spreading;
- Conduct demonstration of improved harvesting, washing, de-handing, grading, and packing of banana, proper ripening protocol;
- Commission a study to assess the viability of tissue culture in private sector;
- Provide soil testing kits on matching grant basis, and training to use them and on adjusting and blending balanced fertilizers;
- Commission a study to Agriculture University to ascertain critical level of NPK, Ca, and Mg in leaves to adjusting fertilizer doses;
- Commission a case study to assess the relative profitability of Australian variety vis-à-vis traditional varieties, and ascertain the incremental cost and incremental benefit of each intervention;
- Establish Produce Marketing Groups (PMGs) for joint marketing of inputs and output and an apex body ‘Growers Association’ for inclusive representation and providing technical support to farmers.
- It is recommended that the Sindh Matiari district, which was till recently part of Hyderabad district and grows more than three thousand ha, producing about 7.3 thousand MT, be included in the project area.

ii. Chili

- Provide training to farmers in raising healthy disease free seedlings using seed trays;
- Provide soil testing kits on matching grant basis, and training to use them and on adjusting and blending balanced fertilizers;
- Organize Farmer Field Schools (FFS) covering all aspects of good agricultural practices (GAP). The coverage of topics should include *inter alia* integrated pest management (IPM);
- Provide training to women in harvesting and postharvest handling;
- Provide training to farmers in improved drying and storage techniques;
- Provide small solar drying units to farmers on matching grant basis;
- Commission a study to ascertain the incremental cost and incremental benefit of each intervention, especially of the replacement of traditional table varieties with processing varieties;
- Establish Produce Marketing Groups (PMGs) for joint marketing of inputs and output;
- Strengthen the Chili Growers Association, make it broad base through revision of charter and rules of business;
- Provide support to establish aflatoxin testing laboratory and handheld aflatoxin testing kits.

iii. Date

- Training is provided to farmers in identifying healthy and disease free suckers, and maintaining nurseries;
- Promote establishing of new date plantation of improved high yielding varieties;
- Promote replacing of old and low yielding trees through phased attrition;
- Provide mechanical pollen dusting machines on matching grants to farmer's groups for them to rent out to member farmers;
- Organize Farmer Field Schools (FFS) covering all aspects of good agricultural practices (GAP). The coverage of topics should include *inter alia* integrated pest management (IPM);
- Provide training to women in harvesting and postharvest handling;
- Provide soil testing kits on matching grant basis, and training to use them and on adjusting and blending balanced fertilizers;
- Introduce high efficiency irrigation water management;
- Provide training to date growers in identifying pests and diseases and its preventive and curative control;
- Promote use of plastic boxes for collecting harvested fruits and plastic sheets for sun drying;
- Introduction of pip/kernel separation, grading, and packing in corrugated cartons;
- Provide training to farmers in segregating and grading date for marketing as fresh fruits, for curing, and making dry dates (chowara);
- Provide small solar drying units to farmers on matching grant basis.

iv. Tomato

- Provide training to farmers in raising healthy disease free seedlings using seed trays;
- Promote processing type varieties of tomatoes, and create linkages between growers of processing type varieties and processors to encourage contract farming arrangements on predetermined agreed prices;[2]
- Introduction of high yielding tomato varieties for processing
- Organize Farmer Field Schools (FFS) covering all aspects of good agricultural practices (GAP). The coverage of topics should include *inter alia* integrated pest management (IPM);
- Provide training to women in harvesting and postharvest handling;
- Provide training in grading and packing of output;

[2] Similar contract farming arrangements is working well between farmers and potato processing industry.

- Introduction of plastic boxes for marketing of tomato;
- Commission a study to ascertain the incremental cost and incremental benefit of each intervention, especially of the replacement of traditional table varieties with processing varieties;
- Establish Produce Marketing Groups (PMGs) for joint marketing of inputs and output.

E. GENERAL/CROSS CUTTING INTERVENTIONS

- Support agriculture department soil testing laboratories to provide services to project farmers;
- Introduce recently marketed motorized small weeding machines, particularly in the labor short areas;
- Provide financial support to dry and cold storages to refurbish with improved technologies and to enhance their capacity;
- Provide training to farmers and youth in farm management related book keeping and encourage farmers to hire trained youth on retainer basis to maintain farm records and track farm/crop profitability;
- Establish linkage between farmers and formal credit institutions to facilitate easy access to financial markets;
- It is recommended that in association with agricultural universities, students are encouraged to undertake annual impact assessment studies which would help the project management to assess the efficacy and cost effectiveness of interventions which are being promoted and to fine tune the focus on various interventions.

INTRODUCTION

BACKGROUND

The Pakistan Agriculture Development (PAD) is a United States Department of Agriculture (USDA) funded Food for Progress (FFPr) Project, implemented by the Winrock International Institute for Agriculture Development. It is a five-year Project that commenced in October 2016 and will terminate in September 2021. The estimated financial outlay is US$16 million. PAD aims to contribute towards two Strategic Objectives (SOs):

- FFPr-SO1 - Increased agricultural productivity by building the capacity of producers in improved productivity and profitability, training producers in improved production techniques, post-harvest handling, marketing, sanitary and phytosanitary practices, and providing in-kind grants for equipment and agriculture inputs; and
- FFPr-SO2 - Expanded trade of agricultural products by developing both domestic and export market linkages, facilitating trade relationships, researching export opportunities, promoting a coordinated and strategic approach to building market share by associations, and promoting food safety issues and requirements.

The PAD project focus is on the four selected crops, namely, banana, chili, date, and tomato in the Punjab and Sindh provinces. Eleven districts, five in the province of Punjab,[3] and six districts in the province of Sindh[4] have been selected for the Project interventions and activities. In Pakistan, these four crops are grown on about 241 thousand ha, of which 135 thousand ha (56%) is grown in Sindh, while share of Punjab province is 8% (19 thousand ha). The remaining about 87 thousand ha (36%) is grown in two remaining provinces. Similarly, the total aggregate output of these four crops is about 881 MT, of which about 480 thousand MT is grown in Sindh, while some 83 thousand MT (54.5%) is produced in Sindh. Sindh shares about 48.7%, Punjab shares about 10.9%, while the rest is produced by the other two provinces. Table 1 presents the crop average annual area grown, output, and yields of the four selected crops in the two provinces and at national level.

TABLE 1: AREA AND PRODUCTION[5] OF SELECTED CROPS IN PAKISTAN AND FOUR PROVINCES

DESCRIPTION	BANANA	CHILI	DATE	TOMATO	TOTAL
Area (Hectares)					
Punjab	476	5,850	5,806	7,177	19,308
Sindh	25,476	52,179	32,467	24,748	134,869
KPK	682	421	1,571	13,793	16,466
Balochistan	937	4,731	49,784	14,847	70,298
Pakistan	**27,570**	**63,180**	**89,627**	**60,563**	**240,940**
	100.0%	**100.0%**	**100.0%**	**100.0%**	**100.0%**

[3] Bahawalpur, Khanewal, Lodhran, Multan, and Sheikhupura
[4] Hyderabad, Khairpur, Mirpurkhas, Tando Allah Yar, Thatta, and Umerkot
[5] Note: Area and production are two years' averages (2012/13 and 2013/14)

DESCRIPTION	BANANA	CHILI	DATE	TOMATO	TOTAL
Production (MT)					
Punjab	1,964	9,323	24,713	47,033	83,032
Sindh	98,499	129,723	150,715	100,885	479,821
KPK	6,875	486	6,302	72,528	86,191
Balochistan	1,823	6,974	125,404	98,046	232,247
Pakistan	**109,161**	**146,506**	**307,133**	**318,491**	**881,290**

Source: Computed from data downloaded from: http://www.amis.pk/Agristatistics/DistrictWise/2012-2014/Dates.html
Note: Area and production are two years averages

A detailed table reporting area, production, yield, and percentage share of each province in total area and production in the country is presented in Annex 1. This table shows that more than 90% of banana and more than 88% of chili is produced in Sindh. Similarly, about 49% of date is produced in Sindh, followed by about 40% in Balochistan, while the Punjab shares about 8% in the total date production in the country. The table also shows that Sindh and Balochistan provinces each produce about 31% of the total tomato produced in the country, while Punjab contributes some 15% in country's tomato production. The table also shows that in Punjab, compared to national averages, per ha yields of date (4.3 MT) and tomato (6.6 MT) is higher by 25% each. In Sindh per ha yield of chili (2.5 MT) and date (4.6 MT) is higher by 9% and 35% respectively, while that of tomato (4.1 MT) is lower by 22% than the national average.

In the project area, the total area under production of the four crops is about 88 thousand ha, producing a tonnage of about 307 thousand MT, accounting for some 35% each of production in the country. Annex 2 presents the district area, production, and per acre yield of the four crops in the project area. The table shows that within the project area, 89.3% of banana is cultivated in districts of Khairpur, Mirpurkhas, and Thatta. In the case of chili, about 89.3% area is Mirpurkhas, Thatta6, and Umerkot districts. About 98.2% of the date area is in Khairpur district, while about 86.3% of tomato area is spread over Mirpurkhas, Thatta, and Sheikhupura districts.

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The objectives of the baseline survey, as outlined in the TOR (see Annex 3) are:

i. establishing a baseline as points of comparison to support measurement of program impacts as part of the future project evaluation activities;

ii. guiding realistic and feasible target setting for performance indicators;

iii. supporting program design through situational analysis relevant to target beneficiaries' knowledge and capacities; access to, quality of and utilization of proposed inputs and infrastructure; value chain diagrams; and organizational capacity

iv. identifying and recommending responses to risks and constraints that may pose challenges to planned project implementation.

As per the situational analysis requirement, 11 standard and custom indicators were included in the data collection and baseline survey to provide data on disaggregates: respondent sex, commodity grown, district of farm or business, and respondent type.

METHODOLOGY AND APPROACH

BASELINE SURVEY PURPOSE AND APPROACH

The baseline study design is non-experimental type and is based on a sample survey of the potential stakeholders and beneficiaries of the selected four value chains namely farmers, input suppliers, market functionaries, and processors and exporters.[7] Both quantitative and qualitative research methods were used for data collection.

[6] Chili produced in Thatta district is mostly sold as green
[7] This approach was discussed and approved in a kick-off meeting held in the PAD project office on Tuesday, March 14, 2017

SAMPLING DESIGN/FRAME

As per below a representative sample of 2,200 farm households was randomly selected for quantitative data collection supplemented by 48 focus group discussions (FGDs) with farmer groups. Similarly, 138 IDIs were planned to cover a range of stakeholders who have direct or supporting roles in the value chains.
The sample selection process and size determination is described in Annex 4. Considering that the project will extend technical intervention support to about 982,562 farmers in the eleven target districts, to arrive at a sample size for the farmer survey that would ensure 98% confidence level and 2% level of precision, the initial sample size was computed as 3,369. Given the homogeneity of the rural farming system, it was considered appropriate to adopt a sample size of 2,200 farmer production system questionnaires to avoid homogeneity and commonality. The district and crop distribution of farm household respondents and FGDs is presented in Table 2.

TABLE 2: DISTRICT AND CROP DISTRIBUTIONS OF FARM HOUSEHOLD RESPONDENTS & FGDS

DISTRICT	FARM PRODUCTION SURVEY QUESTIONNAIRE (FPSQ)					FOCUS GROUP DISCUSSIONS (FGD)				
	Banana	Chili	Dates	Tomato	Total	Banana	Chili	Dates	Tomato	Total
Bahawalpur	-	30	-	30	60	-	1	-	1	2
Khanewal	-	30	-	30	60	-	1	-	1	2
Lodhran	-	30	-	30	60	-	1	-	1	2
Multan	-	30	-	30	60	-	1	-	1	2
Sheikhupura	-	30	-	70	100	-	1	-	2	3
Hyderabad	30	30	-	30	90	2	1	-	1	4
Khairpur	200	30	300	30	560	2	1	7	1	11
Mirpurkhas	40	190	-	140	370	2	3	-	2	7
Tando Allah Yar	40	30	-	30	100	2	1	-	1	4
Thatta	190	70	-	250	510	3	1	-	3	7
Umerkot	-	200	-	30	230	-	3	-	1	4
Total	**500**	**700**	**300**	**700**	**2,200**	**11**	**15**	**7**	**15**	**48**

SURVEY INSTRUMENTS

Three sets of survey instruments were used for the study. They included i) Farm Production Survey Questionnaires (FPSQ); ii) checklists (guidelines) for focus group discussions (FGDs) to complement FPSQs at the cluster level; and iii) checklist for in-depth interviews with directly related stakeholders of the selected crops, such as farm input suppliers, market functionaries, warehouse and cold store operators, processors, and exporters. In addition to this, IDIs were also conducted with farm equipment suppliers, personnel of agriculture research and extension services, representatives of banks (both commercial and microfinance), microfinance institutions, Rural Support Programs (RSPs), and nongovernment organizations (NGOs). The questionnaires and checklists were finalized after field tests, followed by training of enumerators in the field. In the field, translated versions were used for better communication with the respondents.

FARM PRODUCTION SURVEY QUESTIONNAIRE (FPSQ)

For the quantitative data collection, a structured farm production survey questionnaire was developed for each crop. (Annex 5). The questions included a) area under the target crops, type of farm operator (self- cultivation, sharecropper, cash tenant, pre-harvest contractor, hereafter referred as *thekedars*; b) varieties grown and reason

of preference and level of satisfaction; c) source of planting material (seed, nursery seedlings, and suckers (whichever is relevant); d) soil ameliorants and fertilizer use, pest and disease management, and weed control, with source and level of satisfaction; e) access to canal and tube well irrigation; f) postharvest handling including indicative estimates of postharvest losses; g) including grading and packing practices, and h) source of financing inputs and access to credit; and i) selling arrangements and prices received. The crop and district allocation of farmers to be interviewed is given in Annex 6-Table A, which shows that 2,200 farmers will be interviewed. However, this number was surpassed by 36 respondents. Annex 6 Table B presents the actual number of farmers surveyed.

FOCUS GROUP DISCUSSION

For the qualitative data collection, separate farmer group discussions (FGDs) were held with the farmer groups to collect information at the community level. The checklist is attached as Annex 7. The information collected covered: production process, knowledge base, access and quality of resources, access to research and extension services and financial markets, production and marketing related issues, constraints, and problems, type of technical and infrastructure support, and other aspirations at the community level.

A total number of 48 FGDs were planned. At the time of field work, two additional FGDs were conducted, one each for banana and dates. With these additions and some reallocation amongst the districts, twelve FGDs were conducted with the farmers growing banana, 15 FGDs with farmers growing chilies, eight FGDs with date farmers, and 15 FGDs with tomato growers. (Annex 8)

IN-DEPTH INTERVIEWS

A total number of 152 IDIs were conducted against a planned target of 138 interviews. (Please see Checklist at Annex 9). The respondents were drawn from the full spectrum of value chain actors.[8] They were interviewed to describe their activities and roles in the value chain, and support needed to improve their services and backward and forward linkages. As most market functionaries combine more than one function, while the role of some of the actors was considered minimal, the targets were revised accordingly. The distribution of the IDIs planned and accomplished is presented in Annex Table 10.

SELECTION AND TRAINING OF FIELD TEAMS

A battery of experienced field enumerators, field supervisors, and subject matter specialists were hired and trained for the surveys. List of personnel who were in the field teams is attached as Annex 11.

DATA ENTRY AND PROCESSING

All the filled in FPSQs, and observations recorded during the FGDs and IDIs were checked and discrepancies and shortcomings, if any, were removed. An onscreen data entry program was developed compatible specifically with the baseline study questionnaires. The data entry software was prepared using Visual FoxPro. Viewing compatibility ensured with respect to the structure of the questionnaire on paper. The software has built-in features to protect the security and confidentiality of the data.

DATA COLLECTION, MANAGEMENT, AND PROCESSING

The field survey was overseen by experienced persons who daily back-checked about 10% of the filled-in questionnaires. Furthermore, a monitoring team also carried out 5% back-check of the work of interviewers and supervisors. This was in addition to the desk check at the head office and logical checks built in the data entry program.

The data was digitized, cleaned, and analyzed using Statistical Program for Social Scientists (SPSS+) to highlight the existing situation with regards to farm production system, and to describe the role of market functionaries that are part of value chain. A tabulation plan was developed to extract information related to measurable targets/indicators, and to construct enterprise budgets for the four crops. Based on the descriptive

[8] 1 seed/plants suppliers, 23 agro dealers/input suppliers including seeds, 10 thekedars, 6 itinerant dealers (village traders), 16 commission agents, 12 wholesalers, 11 retailers, 15 dry/cold storage owners/operators, 7 processors, 4 exporters, 8 producer/growers associations, 5 traders association, 6 equipment suppliers, 8 agricultural research and extension personals, 19 local branches of lending institutions, and 5 NGOs

tables, the situation analysis was drafted. However, all other cross tabulations and analyses techniques were used to respond to the study objectives and Client's information needs.

STUDY CONSTRAINTS AND LIMITATIONS

In the absence of farmers' written records, the team relied on statements from farmers collected on recall basis. This combined with general tendency of overstating costs and understating incomes, would have adversely impacted the quality of data.

The agribusinesses like input suppliers, commodity traders, processors and services providers (commission agents, transport companies, storage owners) were reluctant to share information about their income under the apprehension of taxation and lack of trust.

Some of the information had an element of sensitivity due to its commercial implications. For instance, due to aflatoxins contamination in red (dried) chili, Pakistan is facing restrictions on its export (ban by EU). Therefore, the progressive farmers, exporters, and processors of red chili avoided to share information in this regard.

FINDINGS ON BASELINE MEASURES

Following is the findings from the field studies *vis-à-vis* the preset indicators. It may be mentioned at the outset that the indicators being analyzed (save FFPr S1-13) are essentially progress made in terms of adoption rate and performance monitoring indicators of the interventions facilitated by the project and are not impact indicators. The preset indicators essentially reflect means to an end. As there are many sub elements of technology, the progress made in the adoption of one or more elements of set of improved technologies may well represent the progress made, but success can only be measured if every actor has been remunerated by way of incremental value addition. The information and data that was gathered through administering the survey instruments has been analyzed to ascertain the baseline status of the progress indicators including custom indicators at the commencement of the project. This will assist the project management/implementers in firming up the target indicators.

In this section the pre-project situation has been estimated by extrapolating the results of the field surveys. The technology level depends on varieties grown, source of planting material (seed or suckers), sowing methods, application of agrochemical inputs,[9] weed control and irrigation practices, and postharvest handling of crops including drying, grading, and packaging. As mentioned in the previous section, the total average yearly cropped area in the recent years under the four crops in the project area is 87,909 ha. Out of this 13,487 ha is under banana, 31,130 ha are under chili, while 28,824 ha are under date, and 14,468 ha are under tomato.

Indicator 1: FFPr S1-1

Number of hectares under improved techniques or technologies as a result of USDA assistance

The production process of the four crops is predominantly based on traditional stagnant technologies, and hence per hectare productivity and income level continues to be discernibly lower than potential. Some farmers already are following one or two elements of improved technology. This is mainly due to absence of improved production packages available to the farmers at large. There is also absence of effective agriculture research and extension system and presently is outmoded and ineffective.

TABLE 3: AREA ON WHICH IMPROVED PRACTICES ARE FOLLOWED IN THE PROJECT AREA

	Description	Banana	Chili	Date	Tomato
1	Area under improved varieties	1,290	7,615	24,854	5,354
	Percent area	9.6%	24.5%	86.2%	37.0%
2	Area on which disease free suckers planted	Nil		Nil	
3	Area under seedlings grown with improved nursery methods		Nil		Nil
4	Area on which optimum NPK levels applied	354	21,477	20,283	5,898
	Percent area	2.6%	69%	70.4%	40.8%

[9] Agrochemicals include: fertilizers, pesticides, and weedicides.

5	Area balanced NPK levels applied	Nil	Nil	Nil	Nil
6	Area on which micronutrients applied	1,002	2,624	1,189	549
	Percent area	7.4%	8.4%	4.1%	3.8%
7	Area on which pesticide is applied	4,731	30,513	23,487	11,235
	Percent area	35.1%	98.0%	81.5%	77.7%
8	Area on which appropriate pesticide was used backed by identification of pests	Nil	Nil	Nil	Nil
9	Area weedicide used	4,092	25,882	15,120	7,054
	Percent area	30.3%	83.1%	52.5%	48.8%
10	Area on which improved harvesting methods adopted	Nil	Nil	Nil	Nil
11	Area on which fruit was de handed or de-bunched, washed, and boxed	Nil	NR	NR	Nil
12	Area on which chili was dried using Tyvek		9,734		
	Percent area		31.3%		
13	Area on which output is graded as per improved standards	Nil	Nil	Nil	Nil
14	Area on which proper bagging material used		Nil	Nil	Nil

Source: Computed after extrapolating based on survey findings, and discussions with farmers

BANANA

Despite introduction of two Australian varieties, William Hybrid and Grand Naine (aka G9), traditional varieties are still predominant.10 The main source of propagation of banana is suckers that all the farmers retrieve from own plantation or other farmers in the area. Banana bunchy top virus,11 and Panama disease,12 and nematodes are soil borne and transmitted through soil adhered to the suckers. For the planting material – suckers for banana and date, farmers rely on planting material from their own farm or farms in the area. As there is heavy infestation of soil borne diseases the suckers.

As farmers, do not have required training to sift out healthy suckers these suckers carryover the fungi and nematodes and cause mortality of plants and results in low output.
At present, indiscriminately different fungicides are being used as preventive measure without proper isolation of the disease. During the discussions with farmers it was deduced that the knowledge base to identify healthy disease free suckers is almost non-existent.

The nutrient uptake requirement for banana is about 1,175 nutrient kg/ha13. At present optimum dose of fertilizer as per recommendations is being applied on some 354 ha (2.6%).14 Also based on discussions with the farmers it is evident that the balanced use of fertilizer is not there. Also, the use of potash is still lower than recommended. In addition to this at present micronutrients, particularly Zinc is applied only on 1,002 ha (7.4%) of the area under banana crop.

Traditional harvesting both in terms of timing and method is primitive, resulting in poor quality and uniformity of produce. In the case of banana, the banana bunches (locally known as lungars, are sometimes harvested just before the full development. The harvested bunches are stacked on the ground and loaded on the carriers, in the process damaging the crop. At present, none of the banana farmers is following improved harvesting method.

[10] Three Chinese varieties (Pishang, B10, and W11) are under evaluation by Pakistan Agriculture Research Council (PARC).
[11] A fungl disease in which entangles the top leaves into a bunch and plant does not bear fruit.
[12] Also known as Fusarium wilt is caused by causal organism is a soil-borne fungus chokes the vascular system of the plant causing death of the plant.
[13] 450 nutrient kg N, 225 nutrient kg P, and 500 nutrient kg K
[14] Anyone applying less than 1,000 nutrient kg/ha has been considered as not applying the recommended dose.

The postharvest handling of banana is traditional and need improvement. There is no evidence of improved method comprised of separating hands from bunches, washing, sanitizing, and packing them in boxes, before sending the output to the market. Although some level of grading of bunches is practiced on produce from 6,404 ha (47.5%), it is not up to the mark and need improvement, hence it is concluded that standard grading is not practiced in the entire area.

CHILI

Despite proliferation of imported hybrid varieties, a decade back, currently it is grown only on 24.5% area. Farmers either use seed retained from last crop or purchase seed of hybrid or traditional varieties from the shop keepers and raise their own nurseries in traditional way. The adoption of raising nursery is yet to be adopted. The seedling produced in the nursery carry forward the soil borne diseases, and the mortality rate is hg.

At present different fungicides and pesticides are being used indiscriminately, often with low efficacy. During the discussions with farmers it was deduced that the knowledge base to use the right pesticide, right dose and at the right time is lacking.

The nutrient uptake requirement for chili is about 380 nutrient kg/ha. At present optimum dose of fertilizer as per recommendations is being applied on some 21,477 ha (69%) of the cropped area. However, based on discussions with the farmers it is evident that the knowledge of balanced use of fertilizer is not there, and there is excess of nitrogenous fertilizers is more than required. Also, the use of potash is still lower than recommended. In addition to this at present micronutrients, particularly Zinc is applied only on 2,624 ha (8.4%) of the area under chili crop.

Traditionally harvesting of chili is done by women. They do not have the knowledge base to harvest healthy or immature fruits. The harvested chili is heaped on the ground and carried to the drying yard in unclean sacks in the process contaminating the crop with aflatoxin.

The postharvest handling of chili is traditional and need improvement. The chili is spread over mud-plastered ground causing further dust and fungi contamination. More recently Tyvek sheets have been introduced and about 9,734 (31.5%) farmers are using either Tyvek sheet of plastic sheets to avoid the contact with bare soil. However, there is no stringent grading system followed, and chili is bagged in old bags infested with aflatoxin spores.

DATE

At present the date plantation are predominantly of Aseel variety, which occupies 85% in the total population area. It is considered a robust variety given the harsh climate of Khairpur. Farmers rely on suckers from their own farm or other farmers' plantation. The problem is in the identification of disease free suckers. Varietal improvement, if a variety is identified, can only be accomplished in the new plantation. Although about 70% of the area is adequately fertilized, the issue of balanced fertilizer needs attention. Pesticide, as in other crops, is used indiscriminately and despite farmers have reasonable knowledge base to identify pests and diseases, the use of pesticides needs improvement.

The pollination method is traditional. The plants are hand pollenated. There is no evidence of mechanical pollinators use. Similarly, dates are harvested and stacked on the ground before moving it on the transport. The fresh dates are marketed in the open transport or in sacks. The bagging is also done in a primitive way.

TOMATO

About 37% of the tomato area is under improved variety. But most of the varieties used are table varieties that are prone to damage during transport. The farmers purchase seeds both produced by national seed companies and imported. The seedlings are raised in nurseries for transplanting. Most farmers still have not adopted improved method of raising nursery, particularly in the seedling trays. It is estimated that only 41% farmers are applying recommended dose of fertilizer, though not in proper combination. Although about 78% of the farmers are using pesticide it is indiscriminate without proper identification of level and type of infestation, rendering the crop vulnerable. Similar to chilies and dates, the harvesting and grading method is primitive, and the tomato that is marketed is of varying quality.

Indicator 2: FFPr S1-2

Number of individuals who have applied new techniques or technologies as a result of USDA assistance

The following Table 5 presents number of farmers who are following improved methods of production and postharvest handling.

TABLE 4: NUMBER AND PERCENTAGE OF FARMERS FOLLOWING IMPROVED PRACTICES

#	Description	Banana	Chili	Date	Tomato
1	Number of farmers growing improved varieties	475	19707	2,718	2,914
	Percent of total	13.2%	52.5%	20.2%	41.1%
2	Number of farmers using disease free suckers	Nil		Nil	
3	Number of farmers growing seedlings with improved methods		Nil		Nil
4	Number of farmers using optimum dose of NPK	279	27,785	9,301	5,328
	Percent of total	7.7%	74.1%	69.1%	75.1%
5	Number of farmers applying balanced NPK levels	Nil	Nil	Nil	Nil
6	Number of farmers who applied micronutrients	286	3,345	807	499
	Percent of total	7.9%	8.9%	6.0%	7.0%
7	Number of farmers applying pesticides	1,499	35,041	10,278	6,148
	Percent of total	41.5%	93.4%	76.3%	87.2%
8	Number of farmers applying appropriate pesticide backed by identification of pests	Nil	Nil	Nil	Nil
9	Number of farmers using weedicide	1,228	31,490	5,394	4,570
	Percent of total	34.0%	84.0%	40.1%	64.4%
10	Number of farmers harvesting with improved methods	Nil	Nil	Nil	Nil
11	Number of farmers de handed/ de bunched, washed, and boxed fruits	Nil		Nil	
12	Number of farmers drying chili on sheets	-	9,725	-	-
	Percent of total	-	25.9%	-	-
13	Number of farmers grading the produce as per standards	Nil	Nil	Nil	Nil
14	Number of farmers using proper bagging material		Nil	Nil	Nil

Indicator 3: FFPr S1-3

Number of individuals who have applied improved farm management practices (e.g. governance, administration, or financial management) as a result of USDA assistance

At present, out of 22,076 farmers interviewed none of them, except very few, maintain structured records of cost of production, sale proceeds, net crop income, and amount borrowed and outstanding. At best, they maintain ledgers for sharecroppers to record their cash borrowing and value of their share of input costs, and their share of sale proceeds. Therefore, baseline for this indicator is zero.

Indicator 4: FFPr S1-4

Number of individuals receiving financial services as a result of USDA assistance

The following Table 7 presents number of farmers who are self-financing, availing credit from formal and informal sources.

TABLE 5: SOURCE OF FINANCING BY FARMERS

#	Description	Banana	Chili	Date	Tomato
1	Farmer: Own capital	84.6%	85.8%	70.5%	75.4%
2	Friends and relatives		0.9%		0.9%
3	Input dealers and commission agents	15.4%	6.6%	29.6%	15.8%
4	Bank borrowing		0.9%		
5	No response		4.7%		7.9%

To finance the inputs, most farmers generally receive the inputs in-kind from the input dealers and/or commission agents. They also borrow cash to meet the consumption needs and also to meet the harvesting and bagging costs. During the survey, it was observed that farmers did not keep record of expenditure and amount they borrowed, nor did they keep track of the purpose for amounts borrowed. The baseline survey revealed that about 85% each of banana and chili growers financed the production costs from their own resources. Similarly, about 71% of date growers and 75.4% also used their own resources. This is attributed partly to lack of awareness, financial literacy, and collateral. These figures should be read with care as the farmers do not reveal the actual source of funding, particularly if they are loan defaulters of either informal sources and/or formal sources.

Amongst the value chain actors, other than farmers, some cold and dry storage owners and processors may borrow for refurbishing and increase in the storage/processing capacity. As most of these actors are from urban areas, they may already have credit limits with the banks, and may not require facilitation from the project unless the credit is extended with matching grant facility or concessional credit line. During the interviews, the other respondents like traders, storage owners/operators, and processors did not divulge information on borrowings, repayments, and credit need. The IDI surveys indicate that all the surveyed 26 cold and dry storage owners indicated that they would like to refurbish and increase the capacity of their operations. The baseline is zero.

Indicator 5: FFPr S1-7

Number of private enterprises, producers' organizations, water users' associations, women's groups, trade and business associations, and community-based organizations (CBO) that applied improved techniques and technologies as a result of USDA assistance

At present, there are no farmers' marketing groups who engage in joint marketing of inputs or outputs. Similarly, there are no crop specific traders' associations, and commission agents and traders dealing in the four crops are members of the fruit and vegetable marketing associations.

There are no specific banana or tomato growers' associations. Chili growers have one association (in Kunri district in Sindh), and date farmers have two associations (in Khairpur). These associations are vibrant but perform in an ad hoc manner that is not transparent enough, and they do not have business protocols or inclusive by-laws. They have not received any technical and/or financial support to organize their associations to provide services to the members.

The same is applicable to the processors' associations. They have not yet taken any collective action to upgrade and refurbish their individual units. The functioning of most of the above-mentioned associations is limited to representing the farmers, or related traders and processors with the administration. The membership is also not broad based and transparent. The baseline is zero.

Indicator 6: FFPr S1-11

Total increase in installed storage capacity (dry or cold storage) as a result of USDA assistance

At present, none of the 26 cold and dry storage facilities visited have adequate capacity to meet the demand for storage and are technically inefficient. They need technical and financial support to refurbish with cost effective technologies and enhance their capacity. The storage owners either were reluctant to report the size of the facilities or did not know the size, therefore the baseline is zero.

Indicator 7: FFPr S1-13

Value of sales by project beneficiaries in four targeted commodities

Based on the survey estimates of production of the four crops and the prices received, it is estimated that the total value of the production in the project area is Rs.30.9 billion. Table 10 presents the present value of the four commodities produced in the project area.

TABLE 6: CROP VOLUME AND VALUE OF THE CROPS PRODUCED/MARKETED IN THE PROJECT AREA

#	DESCRIPTION	BANANA	CHILI	DATE	TOMATO	TOTAL
1	Volume produced and marketed (MT)	103,642	134,502	248,411	137,105	623,660
2	Volume traded[15], MT)	72,549	94,152	173,888	95,973	436,562
3	Rate per MT	43,802	100,089	41,167	44,432	55,030
4	Value Rs Million	3,177.8	9,423.5	7,158.4	4,264.3	24,024.1

Source: Consultants estimate

Indicator 8: FFPr S1-14

Volume of commodities (metric tons) sold by project beneficiaries

The volume reaching the commodity market is a function of overall farm productivity, postharvest losses on the farm, during transportation, in clod stores during ripening (for banana), at the auction, dry warehousing of chili, sun drying of date, and over ripening of tomato during transit and at the terminal markets. The above-mentioned Table 10 also shows that the volume of the four commodities traded in the market is about 436,562 MT after adjusting the postharvest losses at different stages on value chains. The table also presents the crop value of the commodities.

Indicator 9: CI-2

Number of agricultural producers in target region who have access to current agriculture market information

Most farmers mentioned that they are well informed about the prevailing prices in the local markets through other farmers and through their frequent visits to the markets for various reasons. However, they are not aware of the prices in the distant markets to relate with the local prices. The progressive farmers also get the information using their landlines and/or cellphones. The baseline is zero.

Indicator 10: CI-9

Volume of chilies certified as meeting industry standards

[15] after adjusting for postharvest losses

More than 90% of chili growers are not aware of the existing commercial certification facility. Those who knew are reluctant to use the facility because of high charges for certification. Last year 4,262 MT was certified by an accredited agency. About 2,205 MT was graded as Class 1 and was traded online, while the rest being graded Class 2 was sold in the open market through negotiations. This information provides a benchmark but the baseline should be considered zero for PAD specific beneficiaries.

Indicator 11: CI-10

Number of agricultural producers reporting decrease in postharvest losses

As the project would support improved harvesting, washing, grading, and packing process drying methods, about 50% of 3,609 banana farmers will acknowledge reduction in the postharvest losses, followed by 37,510 chili growers, 13,463 date farmers, and 7,094 tomato growers. The baseline is zero.

FINDINGS ON VALUE CHAIN ASSESSMENT

This section presents situation analysis at baseline, vis-à-vis i) situation analysis at the baseline including value chain maps; and ii) on-farm production and disposal systems.

FINDINGS: SITUATION ANALYSIS AT BASELINE

VALUE CHAIN MAPS

Following is a description of four value chains, one each for target crops, namely banana, chili, date, and tomato. The description and role of value chain partners,[16] support institutions, and service providers that facilitate the value chain are presented in Annex 12.

Banana value chain map

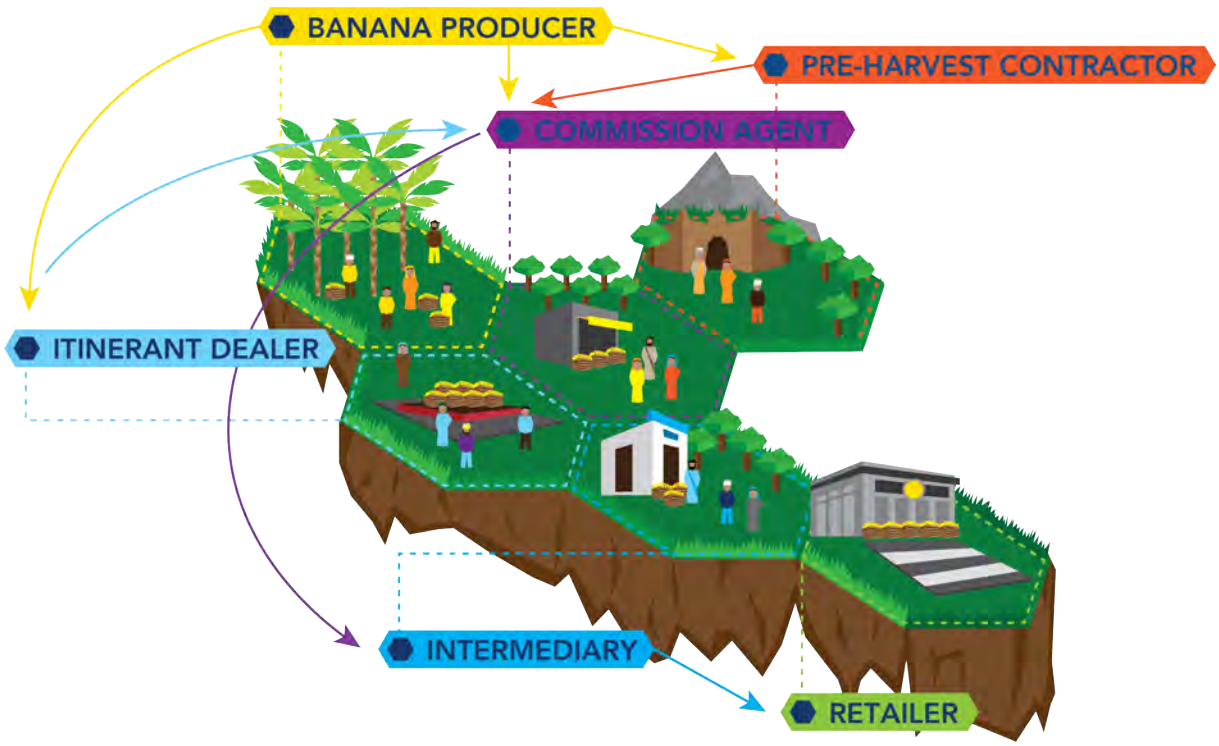


Figure 1: Value Chain – Banana

The above Figure 1 depicts the value chain for banana. Of the total banana produced by the sampled farmers, 8,440 MT (61%) was sold directly through the commission agents, while 2,336 MT (17%) was sold to itinerant dealers at the farm gate. About 1,337 MT (10%) of the produce was channeled through the contractors, while

[16] These include: itinerant dealers, postharvest contractors, commission agents, wholesalers, and support institutions such as input suppliers, machinery dealers, agriculture research and extension department, and processors, and exporters.

1,313 MT (10%) was sold directly to the wholesalers. About 331 MT (2%) was lifted by the exporters. The main buyers from the commission agents are wholesalers for onward selling to the retailers. However, there is anecdotal evidence that some of the buyers from commission agents are exporting to Afghanistan, but this was not observed in the survey. Table 11 presents the typology of volumes supplied by producers through different intermediaries to the main market functionaries.

TABLE 7: VOLUME AND VALUE OF BANANA SUPPLIED BY VARIOUS ENTITIES AND ASSOCIATED VALUES

DESCRIPTION	SUPPLY VOLUME (MT)	PERCENT SHARE	MARKET VALUE (RS. MILLION)	PERCENT SHARE
To commission agents	8,440	61.4%	200.84	46.2%
To itinerant traders	2,336	17.0%	79.55	18.2%
To pre-harvest contractors	1,337	9.7%	108.46	24.9%
To wholesalers direct	1,313	9.5%	40.89	9.4%
To exporters	331	2.4%	6.32	1.5%
Total	**13,757**	**100%**	**436.07**	**100%**

Source: Consultants estimate

Figure 2: Value Chain – Chili

The above Figure 2 describes the value chain for chili. Of the total chili produced in the project area, 2,018 MT (79%) was sold directly through the commission agents, while 93 MT (4%) was sold to itinerant dealers at the farm gate. About 438 MT (17%) of the produce was sold directly to the wholesalers, while about 16 MT (0.6%) was lifted by the exporters. The main buyers from the commission agents are wholesalers for onward selling to the processors. Table 12 presents the typology of volumes supplied by producers through different intermediaries to the main market functionaries.

TABLE 8: VOLUME AND VALUE OF CHILI SUPPLIED BY VARIOUS ENTITIES AND ASSOCIATED VALUES

DESCRIPTION	SUPPLY VOLUME (MT)	PERCENT SHARE	MARKET VALUE (RS. MILLION)	PERCENT SHARE
To commission agents	2,018	78.6%	361.84	76.0%
To itinerant traders	93	3.6%	16.79	3.5%
To pre-harvest contractors	-	-	-	-
To wholesalers direct	438	17.1%	94.10	19.8%
To exporters	16	0.6%	3.55	0.7%
Total	**2,565**	**100%**	**476.27**	**100%**

Source: Consultants estimate

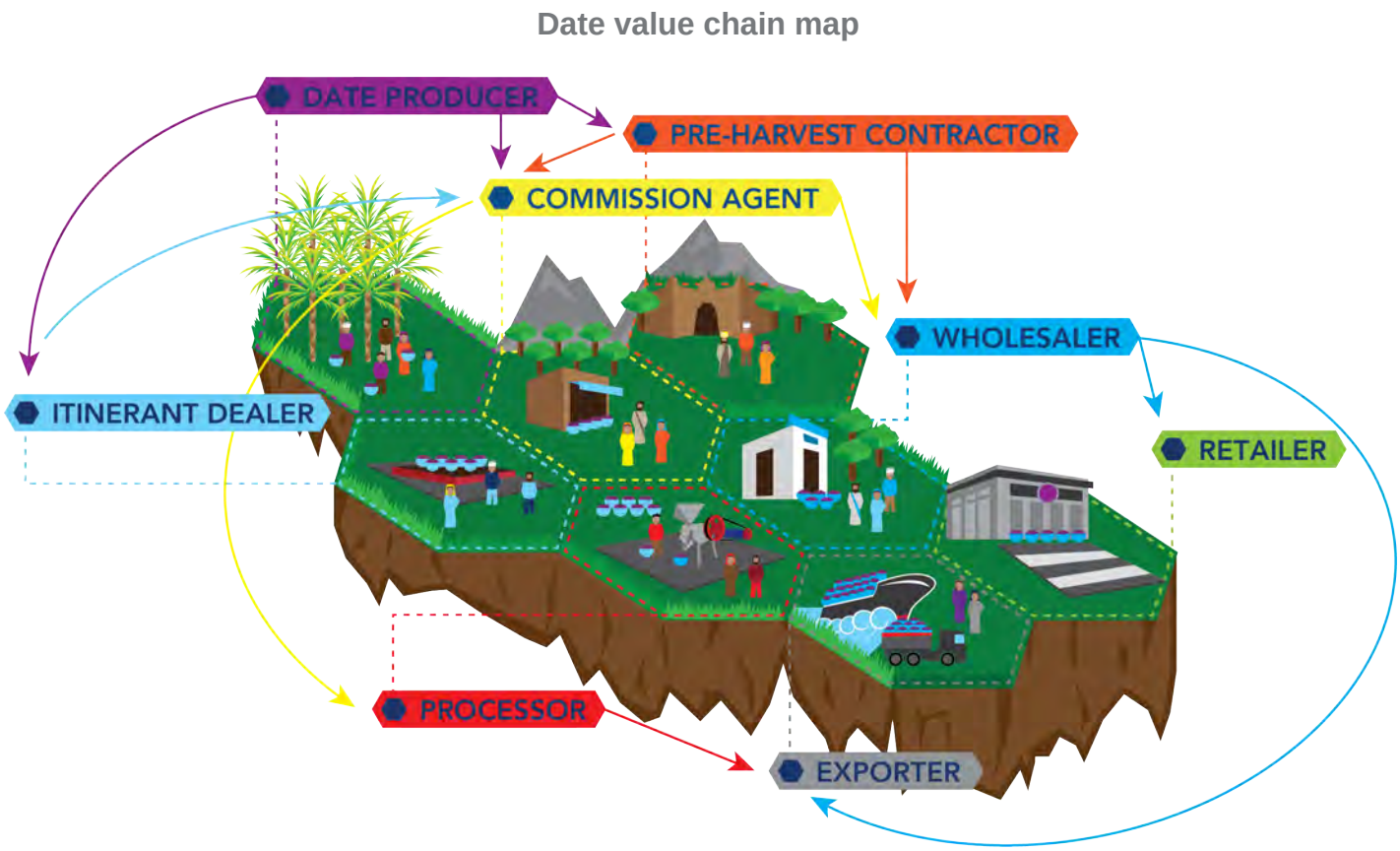


Figure 3: Value Chain Map - Date

The above Figure 3 shows the value chain for date. Of the total date produced in the sampled area, 3,873 MT (66%) was sold directly through the commission agents, while 161MT. (3%) was sold to the itinerant dealers at the farm gate. Similarly, about 291 MT (5%) was routed through contractors, while 1,453 MT (25%) of the produce was sold directly to the wholesalers. 71 MT (1%) was directly sold to the exporters. The main buyers from the commission agents are wholesalers who onward sell to the processors. Table 13 presents the typology of volumes supplied by producers through different intermediaries to the main market functionaries.

TABLE 9: VOLUME AND VALUE OF DATE SUPPLIED BY VARIOUS ENTITIES AND ASSOCIATED VALUES

DESCRIPTION	SUPPLY VOLUME (MT)	PERCENT SHARE	MARKET VALUE (RS. MILLION)	PERCENT SHARE
To commission agents	3,873	66.2%	133.76	59.0%
To itinerant traders	161	2.8%	13.56	6.0%
To pre-harvest contractors	291	5.0%	5.91	2.6%
To wholesalers direct	1,453	24.8%	70.042	30.9%
To exporters	71	1.2%	3.63	1.6%
Total	**5,849**	**100%**	**226.90**	**100%**

Source: Consultants estimate

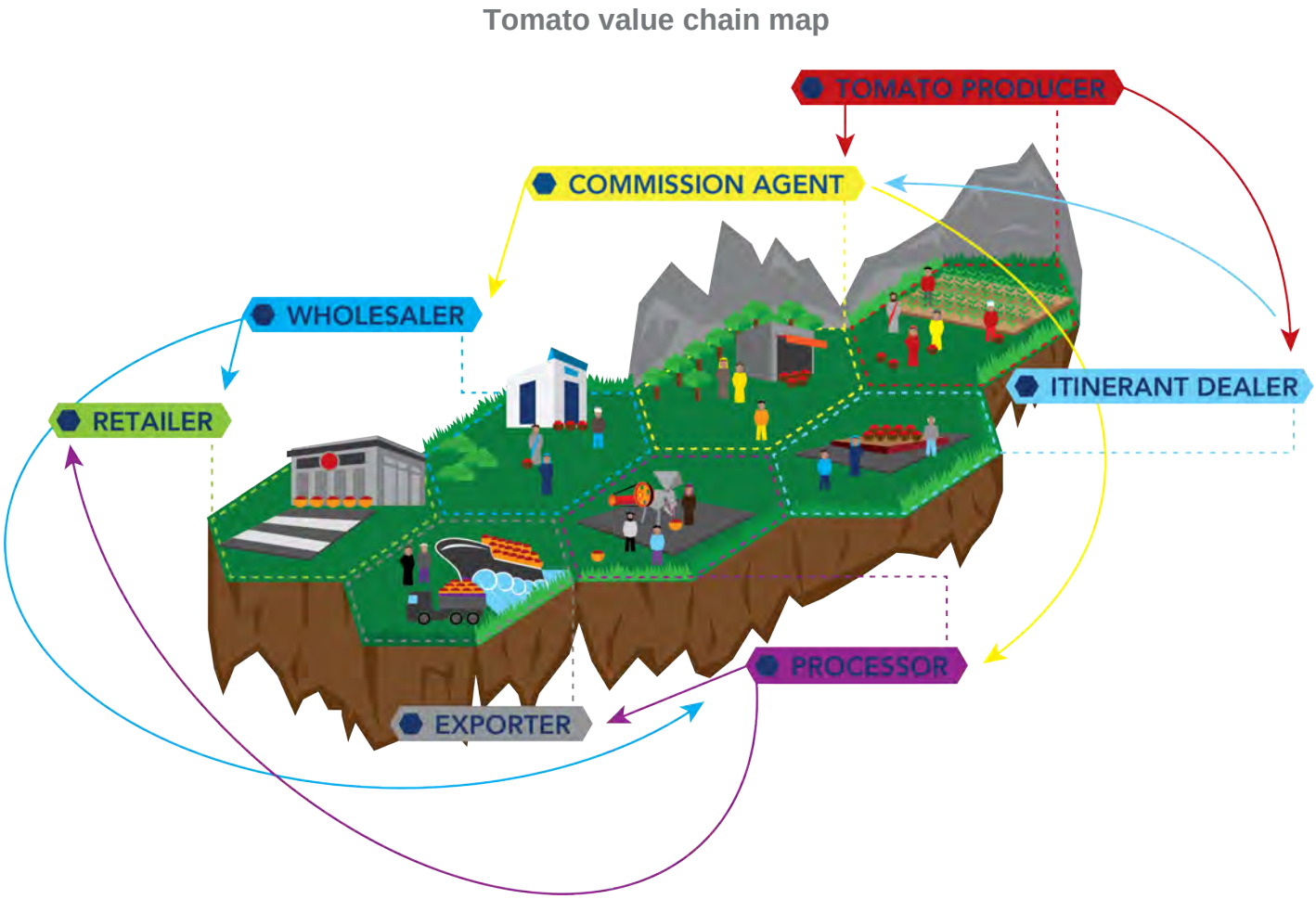


Figure 4: Value Chain Map - Tomato

The above Figure 4 outlines the value chain for tomato. Of the total tomato produced in the project area, 1,207 MT (81%) was sold directly through the commission agents, while 387 MT (3%) was sold to itinerant dealers at the farm gate. 2,084 MT (15%) was sold directly to wholesalers, and about 189 MT (1%) was lifted by the exporters. The main buyers from the commission agents are wholesalers for onward selling to the processors. Table 14 presents the typology of volumes supplied by producers through different intermediaries to the main market functionaries.

TABLE 10: VOLUME AND VALUE OF TOMATO SUPPLIED BY VARIOUS ENTITIES AND ASSOCIATED VALUES

DESCRIPTION	SUPPLY VOLUME (MT)	PERCENT SHARE	MARKET VALUE (RS. MILLION)	PERCENT SHARE
To commission agents	1,1071	80.6%	509.72	80.8%
To itinerant traders	387	2.8%	16.72	2.6%
To pre-harvest contractors				
To wholesalers direct	2,094	15.2%	98.10	15.5%
To exporters	189	1.4%	6,56	1.0%
Total	**13,741**	**100%**	**631.10**	**100%**

Source: Consultants estimate

Postharvest Losses in the Value Chain

The response to the extent of postharvest losses during different stages has been perceptive estimates. It is believed that for the banana crop the postharvest losses are about 20%, 35% in the case of chili, 28% in date, and 20% in tomato. The market functionaries' response was to explain that nothing is lost, and that the discarded produce is purchased by the poor segment of the population who cannot afford to purchase graded fruits and vegetables. However, these losses can be reduced by adopting improved harvesting methods, improved drying and curing methods, better packaging, and improved cold and dry storages. The indicative crop postharvest losses in various stages is presented in Table 15.

TABLE 11: CROP INDICATIVE POSTHARVEST LOSSES AT DIFFERENT STAGES

	Stages	Banana	Chili	Date	Tomato
1	During harvesting	5%	5%	5%	5%
2	During drying and curing stage		10%	10%	
3	Culling out during grading			3%	10%
4	Due to Improper packaging		3%	3%	3%
5	During transportation	5%	2%	2%	2%
6	During ripening	10%			
7	During inefficient storage		15%	5%	
	Overall	**20%**	**35%**	**28%**	**20%**

Source: Consultants estimate

PRESENT NUMBER OF PRODUCERS AND HOUSEHOLDS

Reliable estimates of the number of farmers growing a particular crop and the areas cultivated are not available in the government statistics. Based on evaluating the total reported cropped area in the project by average farm size of the sample, the total number of farms were estimated. Employing this approach, it is estimated that there are 61,677 farm households in the project area. Out of this, it is estimated that 3,609 are banana farmers, 37,510 are producing chili, 13,463 are managing date plantations, and 7,094 are producing tomato. Assuming the national average of 7 persons per family, the total population is estimated at 432,000. This is a conservative estimate as the number of families that are dependent on one farm are typically more than one (due to joint holdings), the number of actual farmers could be higher by about ten to fifteen percent. The crops also provide seasonal employment to a large number of landless seasonal labor needed for weed control and harvesting.

GAPS IN QUALITY AND PACKAGING

At present the banana bunches are harvested and stacked on the ground and later loaded in the transport vehicles. The producers can realize higher prices if the banana bunches are washed and de-handed (or de-tiered) and packed in corrugated paper boxes prior to sending the produce to cold storages equipped with ethylene generators for ripening and disposal. By adopting improved harvesting, washing, de-handing, grading, and packing, the suppliers (mainly farmers and pre-harvest contractors (PHCs)), and the buyers (itinerant dealers, wholesalers, and retailers) can realize higher value by about fifteen to twenty percent.

Similarly, the current practice to dry chili on mud plastered ground results in contamination with dust and aflatoxin spores. This severely hampers the quality of produce at the farm level. The present practice of bagging in older, reused bags is another cause of loss of quality and aggravated aflatoxin contamination. Adopting the under laying of chili at the time of drying with Tyvek sheets will ensure chili does not come in contact with the ground, and also covering chili in the night with green mesh sheets to avoid dew, will help in avoiding dust and aflatoxin contamination, resulting in improved quality of the produce, reduced postharvest losses, and ensure higher prices by about ten to fifteen percent.

In the case of date, the present practice is that the raw date bunches are sent to market without any grading and/or proper packing. If the date fruit is removed from the bunch, graded, and packed in corrugated cartons, this will reduce the transportation cost losses in transit and will fetch higher prices by ten to fifteen percent. Also, it was mentioned that a handful of farmers are curing the raw dates to produce wet dates. These are then packed in mats. The farmers can realize higher prices if they improve the drying process by using solar dryers and then packing the wet dates in corrugated cartons. Similarly, date which is boiled to convert into dry dates (*chowara*) is dried in the sun. If these farmers use solar dryers and fumigate the fruits, they can realize higher prices. At present, farmers are reluctant to process date on the farm because they want to avoid damage due to unpredictable precipitation.

At present, the tomato is harvested, heaped on the ground, and packed in sacks or ten to fifteen kg plastic/cellophane bags without any grading into partially or fully ripe fruits. The farmers can garner higher prices if they grade and pack the produce in standard plastic boxes.

ACCESS TO INPUTS, EQUIPMENT, AND INFRASTRUCTURE

The main inputs for producing the four crops include good and disease free suckers for high yielding banana and date, seeds for chili and tomato, and agrochemicals (fertilizers, pesticides and weedicides).

Banana and date farmers prefer suckers from their own plantation or fields of other farmers. There are no established nurseries to source good planting materials. For chili seeds, most farmers either use seed from their own or other farmers' previous crop, or purchase the seedlings from other farmers who have either surplus seedlings or have raised nurseries to market the seedlings. More recently, there has been a trend to buy locally produced or imported hybrid seeds from local seeds stores or franchises of seed companies.

The agrochemicals are bought from authorized dealers and/or franchises of companies formulating and/or importing agrochemicals. These dealers are obliged to sell the products of the company they are representing. Also, there are a number of seed and agrochemical shops that sell inputs of different companies. The access to these inputs is unrestrained unless there is shortage of a particular brand in the market. In such cases, farmers have had to pay higher prices over and above the controlled price. However, the access is restrained due to farmers' capacity to purchase the inputs in cash. If farmers are short of cash they buy it on credit and have to pay higher prices, or they borrow the funds from commission agents and pay implicit financial charges.

Notwithstanding the accessibility aspect, they main issue is of quality of agrochemicals, particularly pesticides and weedicides. The products available are often adulterated or relabeled expired ones, hence efficacy is low resulting in poor yields.

GAPS IN PRODUCERS KNOWLEDGE BASE AND SKILLS

Given the inadequate agriculture extension services, farmers do not have required knowledge base for applying the balanced fertilizers following the four R approach,17 need for micronutrients, and identifying the pest, disease and weeds and their infestation level for preventive curative measures is extremely worrisome. Farmers generally rely on the advice of other farmers or the fertilizer and agrochemical dealers who have received short orientation training from their principals, which is very scanty.

Also, the input dealers and shopkeepers in a bid to offload their inventories, advise the farmers without any consideration of level of infestation and efficacy of the product. In addition, there is a severe lack of awareness or access to any training about the improved harvesting, postharvest loses, and grading and packing standards is severely inadequate. To site an example of misconceptions due to lack of knowledge, banana farmers are generally apprehensive of adopting G-9 variety as they perceive that there is an additional cost of providing support to heavy bunches to ward of lodging. They need to me made aware about the benefit: cost ratio of this intervention meaning the additional cost of providing support and incremental revenue that would realize. Similarly, farmers are not aware that varieties that have longer shelf life over the long run higher income, for example processing type varieties that may fetch lower price is more sturdy and the extent of spoilage during transportation is less than the soft varieties.

CURRENT STATE OF STORAGE AND PROCESSING INFRASTRUCTURE

Of the 26 cold and dry storages surveyed, storage availability suggests that all of them are based on low level technical specifications and are generally inefficient. They all need refurbishment in terms of standard technical specifications. They also mentioned that their capacities are limited and there is unmet demand. A list of the surveyed storages is appended as Annex 13.

CROP ENTERPRISE BUDGETS

The decision to allocate a crop in the cropping pattern depends on the relative profitability of a crop *vis-à-vis* other crops, and also on local climate, soil type, and the overall resource base. A farmer will only be encouraged to adopt a shift in technology if he/she finds it remunerative. Guided by this, it would be worthwhile to evaluate a technology in terms of present level of return to farmers in terms of gross margins and net farm income for the four crops. It is estimated that the per hectare net farm income (NFI) for banana is Rs. 258,993; Rs. 267,171 for chili; Rs. 279,933 for date; and Rs. 279,933 for tomato. Table 16 presents crop gross revenue, gross margins, net revenue, and NFI. It may be mentioned here that the presented budgets are indicative, as the level of net farm incomes will vary by farm size, type of operation meaning tenurial arrangements, and overall physical features.

TABLE 12: CROP ENTERPRISE BUDGETS (RS PER HA)

Description	Revenue Details			
	Banana	Chili	Dates	Tomato
A. Revenue (Rs. Per ha)				
Production (MT)	7.7	4.2	8.6	9.5
Rate per MT	43,802	100,089	41,167	44,432
Gross Revenue (Rs/ha)	336,600	424,377	354,786	421,056
B. Expenditure (Rs./ha)				

[17] Fertilizer Best Management Practices: 4R stewardship: Right source, right rate, right time, and right place, promoted by International Fertilizer Development Council

Land preparation	11,380	15,965	6,438	11,313
Seed/seedlings/suckers	17,605	29,751	4,850	16,463
Fertilizer	19,210	26,736	11,018	16,715
Pesticide/insecticides	4,023	12,101	1,773	9,078
Hired labor for manual weeding	3,460	11,730	4,593	7,113
Weedicide	3,628	9,013	3,670	8,318
Tube well Irrigation	1,790	13,854	2,000	23,288
Harvesting/picking	5,748	6,960	10,380	8,005
Labor for drying (Rs/ha)	.	5,406		.
Total Expenditure (Rs/ha)	**66,843**	**131,516**	**44,720**	**100,290**
C. Gross Margin (Rs/ha)	**269,758**	**292,861**	**310,066**	**320,766**
D. Marketing Cost (Rs/ha)	**10,765**	**25,690**	**30,133**	**18,258**
E. Net Farm Income (Rs/ha)	**258,993**	**267,171**	**279,933**	**302,509**

Source: Consultants estimate

FINDINGS: PRESENT CROP PRODUCTION AND DISPOSAL SYSTEM

The information and findings presented below represent information collected and analyzed from the FPSQ, FGDs, and IDIs.

BANANA CROP

PLANTING MATERIAL

About 91.4% farmers plant the Cavendish variety and have different local names[18]. About 9.63% of farmers have planted Grand Nain (G9) - an Australian hybrid variety, which is high yielding and has large fruit size (finger). Farmers who do not have G9 state that the plant's availability is limited and is expensive; its fertilization and management costs are also high, beyond their investment capacity. Plants need support due to oversized bunch. In the absence of information on incremental economic benefits of high yielding varieties like G9, the risk-averse farmers are reluctant to cultivate them and make investment.

Most farmers (91%) select planting material (suckers) from their own plantation. They select healthy suckers after culling out stunted and weaker ones. About 61% farmers supplement any shortages from neighboring banana farmers on gratis. Notwithstanding suckers' susceptibility to viruses (bunchy top), about 96% farmers are satisfied with the quality of suckers irrespective of the source.

Despite their best efforts to select disease free suckers, the suckers they select are seemingly healthy but infected with viruses and other soil borne diseases. As the banana fields are skirted around with stubbles of the previous crops, banana ratoon crops are generally susceptible to diseases. Most farmers opine that one way to ensure disease free and healthy planting material is through tissue culture. More recently, resourceful farmers have arranged tissue cultured plants from India. However, the farmers interviewed observed that cost is prohibitive, and overall performance in terms of yield is not encouraging. Some farmers suggest that production of planting material employing tissue culture method would increase the banana output.

CROP PRODUCTIVITY

The per acre average yield of banana by sampled farmers is about 4.85 metric tons. Seven percent of farmers are satisfied with their yield levels, while 89% of farmers consider their production is reasonable, given the interrupted canal supplies and system shortages, and damage from the untimely excessive rains and its delayed evacuation.

About 8% of farmers feel that by adopting high yielding varieties, productivity can be significantly increased while 33% of farmers think that productivity can be increased with the availability of good quality planting

[18] Such as Behari, Belly, Desi, Dhaka, Sindhi, Shahzadi, etc.

material. Similarly, 28% of farmers feel that judicious and balanced use of fertilizer would also improve the yield.

SOIL FERTILITY MANAGEMENT

The soils are generally low in organic matter, affecting nutrient uptake and water holding capacity. Farm yard manure (FYM) also helps in generating heat in the winter months when frost is likely to damage the crop. During the frosty days, some farmers also burn the FYM for smoking to prevent the adverse effects of frost damage. About 56% of farmers reported applying FYM. Of these about 20% of farmers used FYM from their own cattle barn, while the rest bought it from the local cattle yards. Also worrisome is the practice of applying un-decomposed FYM, which is infested with seeds of weeds. Farmers need to be trained in ensuring that FYM is properly decomposed and free from weed seeds.

The nutrient requirement of banana is very high, and farmers tend to follow blanket recommendations with disregard to the soil fertility status of their farms. The nutrient combination (N, P, K) is not often balanced. Also, most farmers are not aware if their soils are deficient in micronutrients. About 68% of farmers mentioned that they decide on the fertilizer regimens based on their own and/or other farmers' experience and knowledge; 24% of farmers also solicited advice from the agriculture extension agents, while 24% also consulted sales representatives of the fertilizer companies.

Farmers purchase their fertilizers from multiple sources, depending on availability of stocks. About 48% of farmers mentioned that they buy fertilizers direct from shopkeepers, while 42% buy through the wholesalers' agents. Only 10% procure their requirements from the authorized company dealers.

Only 4% of respondents have their soil tested and apply fertilizer doses accordingly. Of these, 47% of farmers availed the government soil testing facility, while 53% accessed fertilizer companies' facilities. Although the public sector's soil testing laboratories are located in all districts, these labs are short of testing reagents and are financially boot strapped.

PEST AND DISEASE MANAGEMENT

The banana crop does not need much pest and disease management. Currently, banana orchards have nematode issues but are manageable. Bunchy Top Virus has been quite serious in the past due to its devastating effect. Crop sanitation is poor and experts advise that banana stubbles should be buried in the ground and should not be left for rotting near the banana fields, as it serves as a breeding ground for the virus spores.

WEED CONTROL

A wide range of unwanted weeds are observed in the banana fields that need periodic removal, which is commonly done manually through hoeing.

IRRIGATION

Banana is a high delta crop and needs frequent irrigation. Canal is the main source of irrigation, however about 18% of farmers also have access to tube-well water. As these farms have access to supplementary irrigation, the banana crop does not face an acute shortage of irrigation supplies. Nonetheless, where tube-well irrigation is available, high efficiency irrigation systems could be installed.

MECHANIZATION

Banana cultivation is labor intensive. Tractors and tractor drawn implements[19] are mainly used during land preparation. Hand tools like spades for digging of pits at the time of planting, hand weeding, and curved-blade knife and sickles for harvesting banana bunches are used. Farmers reported having knap-sack sprayers; no power sprayers.

[19] Tractor drawn machinery and equipment include: Chisel plow, disc plow, disc harrow, leveling blade, rotavator, trolley. Not all farmers have the full set. Few farmers also have laser levelers.

HARVESTING, GRADING, AND PACKING

Multiple harvestings are practiced at different times of the crop cycle. Responding to harvest maturity determination, about 90% of farmers suggest that the fruit is ready to be harvested when black spots appear on the skin, while 10% consider thickness and fullness of fruit (fingers) as good signs of harvest maturity if the crop is to be marketed in distant markets. About 88% of farmers feel that experienced labor is critical for an efficient and quality harvest. About 54% of farmers mentioned that it is difficult to find skilled labor.

About 35% of farmers mentioned that they grade the produce to fetch better prices, while 29% of farmers said that with grading, they realized a per metric ton price premium of Rs. 6,778. Only 6 percent think that grading does not payoff.

Banana is transported unpacked. Also, it is ripened in cold rooms (cold storage) in the absence of purpose built ripening chambers. As the farmers are informed of the value-added benefits of washing of banana after harvesting (sanitation), de-handing, grading and packing on the farm, promoting (through cost share) establishment of modest customized farm pack-houses equipped with washing (sanitation), and other facilities will be required.

TRANSPORTATION

Farmers, itinerant buyers, and PHCs select trucks of various sizes depending upon the quantity to be transported and distance. The types of transport include: Suzuki, Trolley, Mazda/Datsun, and Truck and Trolley depending upon the quantity of crop. The cartage varies by type of truck, load, and availability. Smaller carriers are used for the nearby markets and bigger carriers for the distant markets. Accordingly, 45% of respondents used Mazda trucks, followed by Suzuki pick-ups at 38%, Shehzore truck use was at 19% and tractor-trolley and others 2% each. Some of the respondents used multiple means.

Table 17 gives an idea of transport cost.

TABLE 13: MODES OF TRANSPORT AND CARTAGE

Transport	Route	Weight	Rate (In PKR)
Suzuki	Local market	1MT	1,000
Trolley	Local market	5 MT	4,000 to 5,000
Suzuki	Thatta to Karachi	1MT.	4,000 to 5,000
Mazda	Hyderabad to Karachi	5 MT	9,000 to 10,000
Truck	Sindh to Karachi	10 MT	15,000 to 20,000
Truck	Sindh to Upcountry	10 MT	65,000 to 70,000

Source: Consultants estimate

MARKETING SYSTEM

About 27% of farmers reported that they prefer selling the standing crop to pre-harvest contractors; 47% of farmers sell the crop through commission agents, and 9% of farmers sell their crop directly to wholesalers, bypassing the commission agents. About 13% of farmers sell the produce at the farm gate to itinerant dealers. About 94% of farmers are satisfied with the prices received, 1% of farmers are dissatisfied and the remaining 5% have an indifferent opinion.

When sold through commission agents, farmers prefer to get sale proceeds as the sales are in effect. However, 22% of farmers receive their payments after adjusting cash advances received from the commission agent and 11% of farmers complain about delayed payments. The commission agents charge a commission of 10% on the gross value of sales. The commission agents give a rebate of 2% to non-borrowers.

KNOWLEDGE ABOUT SANITARY AND PHYTOSANITARY (SPS) STANDARDS

Although 29% of farmers claim to be aware of SPS, it seems that they have a superficial understanding of the standards.

SOURCE OF FINANCING

Only about 16% of farmers mentioned that they get cash advance from the commission agents, while the rest invest from their own resources/savings. When borrowed from the commission agent, the farmer is obliged to sell his output through the commission agent. They lock their money to ensure that the produce is sold through them. Respondents mentioned that collateral is the main constraint for not borrowing from institutional sources. Only 3 farmers (less than 1%) mentioned that they borrowed from the bank. However, the loan was not specifically for banana crop, but to meet overall farm expenses.

SOURCE OF KNOWLEDGE ABOUT BANANA PRODUCTION

Majority of the farmers (88%) mentioned that they have reasonable acquired knowledge and expertise to grow banana, while 28% of farmers also benefitted from electronic media. About 23% of farmers informed that they have received training through Farmer Field Schools (FFS)[20], but not specifically in banana.

MARKET INFORMATION

The main source of information about market price of banana is fellow farmers. About 63% of respondents informed that farmers exchange information on prevailing prices and price trends, while 14% rely on market functionaries. About 92% of the respondents consider that the aforesaid sources of market information are reliable and dependable.

POSTHARVEST LOSSES

The produce losses can be attributed to a number of factors. About 86% of respondents (farmers) opined that losses were attributed to pests and diseases followed by poor quality of produce at 28%, poor transportation 28%, rains 24%, poor packaging 13%, and others 9 percent. These losses can be significantly reduced through awareness, training, and adoption of best practices, including effective pest and disease management and improved transport and packaging.

FARMER PERCEIVED TRAINING NEED

Over 75% of farmers assigned a high priority to training in improved planting methods, and as well as pest and disease management, although in the case of banana it is not a significant issue. 35% of the farmers desired training in improved fertilizer application and irrigation management, while 16% mentioned harvesting and field handling as an important training requirement.

AWARENESS ABOUT GROWERS' ASSOCIATION

Out 479 banana growers in the sample, only 20 farmers knew about the association. However, they were neither members of any of the mentioned associations nor did they know other members, nor the mandate and objective of the association.

OVERALL FARMERS' SUGGESTIONS/COMMENTS

The main suggestion with regards to banana is to provide training in best practices, i.e. orchard management, balanced use of fertilizers, improved harvesting methods and packaging, irrigation scheduling, etc. Others include improving farmers' financial literacy so that they may benefit from the existing sources of lending like micro finance banks (MFBs) and micro finance institutions (MFIs), etc.

[20] In recent years different agriculture development projects have adopted the FFS, particularly for IPM. This approach is considered very effective being hands on knowledge transfer approach, and cost effective.

CHILI CROP

PLANTING MATERIAL

Chili nursery is sown by farmers as per his/her requirements. To prepare nursery, most farmers get seed from multiple sources, including seed from previous crop. Surplus nursery products, after meeting own requirement, is sold to other farmers. There is a high likelihood that seeds retained from previous crops may carry seed borne diseases, particularly aflatoxin spores. Farmers generally use pesticides as preventive measures. However, the use of fungicides to prevent fungal infestation is not very common.

The seeds available in the market include locally produced seed (without any brand name), seeds produced and marketed by local registered seed companies, and imported hybrid seeds. The varieties that are mostly available and grown include: Longi (43%), Ghotki (20%), Moro (8%), and hybrid varieties Sanam 30%, Skyland (6%), other hybrids (16%), and nondescript varieties (15%).[21] Most farmers mentioned that they are satisfied with the quality of seed in terms of germination percentage and mortality rate. The nursery is established on raised beds bordered with water channels to drain off excess water. Initially, the nursery is covered with thatched material to protect the crop from intense sun exposure. Later, the cover is removed when seedlings gain some height. Use of seed trays and peat moss was not reported by any farmers.

CROP PRODUCTIVITY

The average per acre yield of chili of the sampled farmers is about 1.8 MT. The yield is less than the average for the provincial average for Sindh at 2.4 MT and the national average of 2.2 MT.[22] Seven percent of farmers are satisfied with their yield levels, while 89% of farmers consider their production to be reasonable.

SOIL FERTILITY MANAGEMENT

The soils are generally low in organic matter, affecting nutrient uptake and water holding capacity. About 40% of farmers used FYM. Very few farmers (4%) reported green manuring before planting. This, together with an unbalanced fertilizer regime (N, P, K) and lack of the use of Zn and other micronutrients, tends to keep crop productivity low. Only 23% of farmers reported using micronutrients. The chili fields in the project area have high pH, available Zn is low, and generally a higher dosage of urea (N) is applied. This results in excessive vegetative growth, depressing floral growth.

Farmers mentioned that they decide on the fertilizer regimen based on advice from multiple sources, such as experience and knowledge from farmers in the area, fertilizer company dealers, and agriculture extension agents. About 80% of farmers buy fertilizers from shop keepers/retailers, while remaining from the dealers.

About five percent of respondents had their soil tested and applied fertilizer doses accordingly. Of those who got their soil tested, 60% of farmers availed the government soil testing facility, while the remaining 40% accessed fertilizer company facilities.

PEST AND DISEASE MANAGEMENT

The incidence of pest and disease infestation is quite high, as the main growing season is mostly humid which

[21] As most farmers grow more than one variety, the percentages represent respondents and therefore total may not add to 100%.
[22] This comparison should be read with care as the reported yields may be for green, where farmers have reported the yield of dried chili. The ratio between red and green is 1:4.

offers conducive condition for multiplication. These include thrips, aphids, caterpillars, cutworms, and others. The commonly found diseases include: bacterial spot, anthracnose and sudden wilting. Farmers generally get advice on pest and disease management from multiple sources (neighboring farmers, franchisees, dealers, and shopkeepers). Farmers are predominantly happy with the quality and efficacy of the pesticides. This is contrary to farmers' comments in FGDs, where the farmers expressed their concern about quality of pesticides due to their being expired and adulterated. They think the prices of pesticides are exorbitant.

WEED CONTROL

A wide range of unwanted weeds are observed in the chili fields that need periodic removal. The main weeds that infest the fields are: sawri (Jungle rice), chabbar (Lawn grass), and dumbi sitti (English plantain). About 76% of farmers mentioned that they initially use weedicide, followed by periodic hand weeding. Similar to pesticides, farmers generally get advice on weed management from multiple sources (neighboring farmers, franchisees, dealers, and shopkeepers). Similar to pesticides, farmers are predominantly happy with the quality and efficacy of the weedicides. This is contrary to farmers' views expressed in FGDs, where the farmers expressed their concern about quality of weedicides due to their being expired and adulterated. They also think the prices are too high.

IRRIGATION

Chili is a short duration, but high delta crop and needs frequent irrigation. Canals are the main source of irrigation. The main chili area in Sindh is a brackish zone and there are no tube wells to supplement canal irrigation. The production is vulnerable to irrigation shortages and erratic supplies.

MECHANIZATION

Chili is a labor-intensive crop. Tractor plowing is used at the time of planting. Only hand tools like spades and hand weeding are used.[23]

HARVESTING, DRYING, GRADING AND PACKING

Chili is harvested manually and in several passes. Mainly women are deployed who are not trained in sifting out healthy from infected fruit. Therefore, healthy and infected chili is put into the same basket. This practice is likely to result in the spread of aflatoxin contamination to the entire harvested crop. About 70% of farmers felt that experienced harvesting labor is critical for the work efficiency and quality of the harvest.

The drying method is of concern. Most farmers spread the fresh harvested chili on ground, which results in dust contamination and infestation with aflatoxin. An insignificant number of farmers mentioned using the recommended Tyvek sheets to avoid soil contact, and green polyvinyl mesh sheets as cover to save produce from dew. Also, farmers put the dried chili in used fertilizer or jute bags that may have remnants of aflatoxin fungus from the previous crop. The situation is further accentuated when these bags are stored in poorly managed warehouses, both at the farm and market/processing levels.

About 30% of farmers mentioned that they grade the produce to fetch better prices. Similarly, 26% of farmers said that with grading, they realized a price premium of Rs.375 per 40 kg (Rs. 9,375 per MT).

TRANSPORTATION

Depending upon the volume and haulage distance, farmers exercised multiple transport options. Of the respondents surveyed, 66% used Suzuki pick-ups and 22% used Mazda pick-ups. Similarly, 10 percent of respondents used other means, while 3 percent each used tractor-trolley and Shehzore trucks. Some of the respondents used multiple means of transport.

MARKETING SYSTEM

About 58% of farmers preferred selling the standing crop through the contractors, while 5% sold the crop to itinerant dealers, 22% preferred to sell the crop through commission agents, while 14% sold the crop directly to

[23] Tractor drawn machinery and equipment include: Chisel plow, disc plow, disc harrow, leveling blade, rotavator, trolley. Not all farmers have the full set. Few farmers also have laser levelers.

wholesalers, bypassing the commission agents, while one percent managed to sell the crop directly to exporters. About 90% of farmers indicated that they are satisfied with the price received, while 4% of farmers expressed their dissatisfaction. The remaining 6% of farmers had no opinion.

When sold through the commission agent, farmers will receive sale proceeds after settlement of advances. About 84% of farmers preferred to receive their payments after adjusting the advances while 14% of farmers mentioned that they prefer getting some money in advance.

KNOWLEDGE ABOUT SANITARY AND PHYTOSANITARY (SPS) STANDARDS

Although 66% of farmers claim having awareness regarding SPS, but it seems that they have superficial understanding of the standards.

SOURCES OF FINANCING

About 91% of farmers mentioned that they finance from their own resources, while only 7% acknowledged getting advances from the commission agents, and only one percent borrowed from the bank. Those who borrowed from the commission agent were obligated to sell their output through them. The commission agents charge a commission of 10% on the gross value of sales. They lock farmer's money to ensure that the produce is sold through them. The commission agents give a rebate of 2% to non-borrowers.

SOURCE OF KNOWLEDGE ABOUT CHILI PRODUCTION

Most farmers acquired production knowledge from multiple sources. About 89% of farmers mentioned that they have reasonable knowledge and expertise to grow chili, about 69% updated their information from electronic media, while 21% mentioned that they got tips from the input suppliers. About 15% of farmers claim that they have received training in the Farmer Field Schools. However, the training was related to cotton crops.

MARKET INFORMATION

The main source of market information is fellow farmers. About 87% of respondents mentioned that the farmers exchange information on prevailing prices and price trends, while 8% mentioned that they rely on the information from electronic media (TV, radio, mobile phones).

POSTHARVEST LOSSES

The sampled respondents shared that they faced both pre-and post-production crop losses caused by different factors. About 98% of farmers reported that crop losses are caused by pest and disease attacks. The other factors reported included poor quality (51%), transportation (46%), stagnant rain water (40%), packaging (20%), shortage of irrigation water (18%), and diseases (8%).

AWARENESS ABOUT GROWERS' ASSOCIATION

Out of 729 sampled chili growers, only 15 farmers (2%) knew about the chili growers' association. However, they were not fully conversant with the mandate and objective of the association.

OVERALL FARMERS' SUGGESTIONS/COMMENTS

The main suggestion with regards to chili is to provide training in best practices. Farmers also complained about water shortages and demanded Government's control. Instead, training in and demonstration of efficient water use practices will be helpful. Similarly, demand for financial aid from the Government can be addressed through grants for inputs and equipment to induce adoption of best practices.

DATE PLANTATION

PLANTING MATERIAL

The predominant variety in the Khairpur area, main date production cluster, is Aseel. About 97% of farmers plant this variety covering 86% of the total area under dates. The remaining 14% area is under other varieties namely Fasli, Karbalain, and Kupro. Farmers prefer growing Aseel as its yield is higher than other cultivars and is an early maturing variety.

Farmers prefer their own planting material (suckers) as they are sure of the varieties and their performance. Therefore, the majority of farmers (66%) select planting material (suckers) from their own plantation. They select healthy suckers after culling out stunted and weaker ones. About 34% of farmers' supplement shortages in suckers, if any, from neighboring farmers on gratis. About 91% of farmers are satisfied with the quality and performance of suckers from their own field, while six percent consider that the suckers from their own plantation are of inferior quality. These respondents prefer getting suckers from other progressive farmers. A few farmers also bought suckers. Of these, 90% expressed their satisfaction about the quality.

CROP PRODUCTIVITY

The per acre average yield of dates by sampled farmers is about 3.4 MT. About 10% of farmers are satisfied with their yield levels, while 83% of farmers consider their production to be reasonable, given the interrupted canal supplies and system shortages, and damage from the untimely excessive rains and its delayed evacuation.

About 78% of farmers feel that introduction of improved high yielding varieties can significantly increase productivity, while 22% feel that judicious and balanced use of fertilizer would also improve the productivity.

SOIL FERTILITY MANAGEMENT

The soils in the date growing areas are generally low in organic matter, affecting nutrients uptake and water holding capacity. FYM is applied to trees soon after fruit harvest.

The date farmers tend to follow blanket recommendations irrespective of soil fertility status of their farms. The nutrients used (combination of N, P, K) is not often balanced. Also, most farmers are not aware if their soils are short of micronutrients. Only one percent of respondents had their soil tested and applied fertilizer doses accordingly. About 64% of farmers mentioned that they decide on the fertilizers regimen based on their own and/or other farmers' experience and knowledge. Only 2% of farmers solicited advice from the agriculture extension agents, while 4% also consulted sales representatives of the fertilizer companies.

Farmers purchase their fertilizers from multiple sources, depending on availability of stocks. About 48% of respondents mentioned that they buy fertilizers from sub dealers, while 48% buy from shopkeepers/retailers. Only four percent buy from the authorized company dealers. About 40% of farmers reported using micronutrients which seems quite high given the general practices.

PEST MANAGEMENT

Date palm trees are prone to many pests and diseases, particularly the beetle and red palm weevil are the main insects that weaken the plant. This leads ultimately to sudden death of the date palm tree.

WEED CONTROL

A wide range of unwanted weeds are observed in the date fields that need periodic removal. Farmers reported use of weedicide in addition to manual removal of weeds. Those who purchased weedicide expressed satisfaction about its efficacy.

IRRIGATION

Date is a low delta crop and has the capacity to withstand drought conditions. In Khairpur, canals are the main source of irrigation. However, about 16% of farmers also have access to tube-well water. As these farms have access to supplementary irrigation, the date crop does not face acute shortage of irrigation supplies. Nonetheless, on farms where tube-well irrigation facility exists, high efficiency irrigation system (drip) could be installed.

MECHANIZATION

Except at the time of planting when tractor plowing is the main requirement, hand tools like spades for digging of pits at the time of planting, and hand weeding, curved-blade knife, and sickles for detaching dates bunches are needed. More recently, mechanical pollen dusters and harvesting stands/platforms have been successfully introduced elsewhere and need to be considered for introduction in the project area.

HARVESTING, GRADING AND PACKING

Date harvesting is done by climbing up the tree with the help of rope tied around the back of the picker. The bunch is cut with the help of sickle or knife and collected on ground. About 88% of farmers felt that experienced harvesting labor is critical for a timely and quality harvest, while 74% of farmers mentioned that it is difficult to find skilled labor. Farmers mentioned that they harvest the crop based on fruit color, thickness/fullness (size), and signs of skin rupture. Harvest maturity also depends on the type of finished product, i.e. cured (fresh) or dried dates. In the former case, fruit is harvested at an advanced maturity level (‘dung’ or ‘rutub’), whereas fruit meant for dried dates is harvested at a slightly earlier stage (‘doka’ or ‘khilal’).

About 62% of farmers mentioned that they grade the produce to fetch better prices. They acknowledged that buyers appreciate grading and therefore they realized a price premium of Rs. 5,000 per MT for the graded dates. About 26% of those who graded dates think that it does not pay off. Similarly, 62% of farmers mentioned that with improved packaging, the price goes up by about Rs. 4,500 per MT.

Of the sampled farmers, 64% used secondhand (used) jute sacks, 48% wooden crates, and 9 percent plastic crates, while 5 percent did not respond. Also, farmers used multiple packaging options.

DATE PROCESSING AND ON FARM STORAGE

Dates are processed into dried (chowara) and cured (fresh, Tamar) dates, and have their respective market domestically and internationally. Dried dates (chowara) involve boiling of fruit for 30-35 minutes to remove bitterness and then drying in the open under the sun. In some cases, chemicals are also used to obtain less dark, slightly yellowish colour of the product. Similarly, date curing involves getting skin ruptured by exposing fruit to sun and reducing moisture level to around 24%. About 90% of farmers reported converting their produce into dried dates and 14% of farmers into cured dates using conventional method of maturation in open under the sun, as well as used solar dryers and plastic tunnels. Though much easier and convenient, curing/maturation in open under the sun exposes the fruit to contamination in the form of insects, dust, and other inert matter, adversely affecting its quality and marketability.

At present, only 30% of farmers’ store dates on farm after drying and/or curing, though 70% would like to do so. The main reason for not storing is lack of proper storage facility at the farm, as in case of rain the crop is damaged.

TRANSPORTATION

Dates involve multiple types of transportation to local markets and other destinations. The baseline data revealed that 45% of farmers used Mazda pick-ups and 43% tractor-trolley. Similarly, 6% of respondents used Shehzore trucks, 5% truck, and 3% other means of transport.

MARKETING SYSTEM

As illustrated through the value chain maps, more than one selling options are exercised. About 27% of farmers prefer selling the standing crop to pre-harvest contractors, 47% of farmers sell the crop through commission agents, and 9% of farmers sell their crop directly to wholesalers, bypassing the commission agents. About 13% of farmers sell the produce at the farm gate to itinerant dealers. About 94% of farmers indicated that they are satisfied with the prices received, while 1% of farmers expressed their dissatisfaction. The remaining 5% of farmers had no opinion.

When sold through the commission agents, farmers prefer to get sale proceeds immediately paid. However, 22% of farmers reported to have received their payments after adjusting advances obtained from the commission agent while 11% of farmers reported delays in payments.

KNOWLEDGE ABOUT SANITARY AND PHYTOSANITARY (SPS) STANDARDS

Although 29% of farmers claim having awareness regarding SPS, it seems that they have superficial understanding of the standards.

SOURCE OF FINANCING

Only 12% of farmers mentioned that they get cash advance from the commission agents, while the rest invest from their own resources/savings. When borrowed from the commission agent, the farmer is obliged to sell his output through the commission agent. About 7% of farmers mentioned that they have to pay interest, which seems a misstatement. The commission agents charge a commission of 10% on the gross value of sales. They lock their money to ensure that the produce is sold through them. The commission agents give a rebate of 2% to non-borrowers.

Out of 479 dates growers, 417 (83%) mentioned that they prefer to avoid external financing and use their own resources, while only 3 farmers (0.63%) reported borrowing from the bank. Information about borrowing is a bit tricky. Most farmers prefer not to borrow from commission agents or banks, as it gives them options to sell to other potential buyers including the pre-harvest contractor.

SOURCE OF KNOWLEDGE ABOUT DATES PRODUCTION

Most of the farmers (88%) mentioned that they have reasonable knowledge and expertise to grow dates, which they learnt by observing the elders in the family and neighboring farmers. About 28% of farmers also get their knowledge refreshed/updated through listening and/or watching electronic media. Whereas 23% of farmers claim that they have received training in the Farmer Field Schools (FFS), but that may pertain to some other crops like cotton. There is no agency that has established or conducted FFS for date farmers.

MARKET INFORMATION

The main source of information about market price is fellow farmers. About 63% of farmers mentioned that the farmers exchange information on prevailing prices and price trends, while 14% rely on the information supplied by market functionaries. Similarly, 19% of farmers claim that they receive updated market information from the farmers' association, which does not seem plausible as only one farmer is reportedly aware of the farmers' association. Nonetheless, 92% of the date growers consider that the market information received through these resources is reliable and dependable.

POSTHARVEST LOSSES

Produce losses reportedly are associated with a number of factors. The baseline study revealed that 90% of respondents reported that losses are caused by pest and disease attacks, while 30% think that poor transportation results in produce losses. About 18% believe losses are linked to poor grading/quality, 9% poor packaging, and 7% others.

FARMERS PERCEIVED TRAINING NEEDS

Over 75% of farmers assigned a high priority to training in improved planting methods, as well as pest and disease management; 35% of the farmers desired training in improved fertilizer application and irrigation management, while 16% mentioned harvesting and field handling as an important training requirement.

AWARENESS ABOUT GROWERS ASSOCIATION

Out of 479 sampled date growers, only 20 farmers (4.2%) knew about the association. However, they were neither members of any of the mentioned association nor did they know other members nor the mandate and objective of the association.

OVERALL FARMERS SUGGESTIONS/COMMENTS

The main suggestion with regards to dates is capacity building in production, post-harvest management, and marketing. Other suggestions, such as, controlling water shortages, can be addressed both through training and improvised/improved irrigation techniques/methods like basin and drip irrigation. Similarly, financial constraints can be addressed through grants and improved access to institutional credit (MFBs & MFIs).

TOMATO CROP

PLANTING MATERIAL

Tomato nursery is raised by farmers as per their requirements. However, 12% of farmers purchase the seedlings from other farmers. Similarly, 20% of farmers use their own seed, 55% purchase from the seed merchants and the remaining 13% from the commission agents for raising nursery. Surplus nursery products, after meeting own requirement, is sold to other farmers. There is a high likelihood that seeds retained from previous crops may be infested. Farmers generally use pesticides while the use of fungicides to control fungal infestation is not very common.

The seeds available in the market include locally produced seed (without any brand name), seeds produced and marketed by local registered seed companies, and imported hybrid seeds. The varieties that are mostly grown include: dominators (26%), Sindhi tomato (16%), Pishri (13%), Keyara (11%), Super (9%), Hybrid (7%), Fonto (7%), 2565 (7%), DP (5%), Roni-K (3%), and others (nondescript) (36%)[24]. Most farmers mentioned that they are satisfied with the quality of seed in terms of germination percentage and mortality rate. About 37% of farmers establish nursery on raised beds, bordered with channels to drain off excess water, while 52% of farmers mentioned raising nursery on flat beds. Initially the nursery is covered with thatched materials to protect the crop from intense sun exposure. Later, the covering is removed when seedlings gain some height. About 25% of farmers reported raising nursery in trays.

CROP PRODUCTIVITY

[24] As farmers are growing more than one varieties, the percentages showing their responses may not add to 100%

The average per acre yield of tomato of the sampled farmers is about 5.6 metric ton. About 13% of farmers are satisfied with their yield levels, while 75% of farmers consider their production to be reasonable. Twelve percent of farmers do not consider their yields are lower than their potential. About 59% of farmers opine that the yields can be increased if high yielding varieties are identified and good quality seed is available, while 13% feel that better fertilizer management is the key to higher productivity.

SOIL FERTILITY MANAGEMENT

The soils are generally low in organic matter, adversely affecting nutrients uptake and water holding capacity. Of the respondent farmers, 19% used FYM; about 47% of farmers reported using green manuring before planting while 60% of farmers reported using micronutrients. However, unbalanced use of fertilizer regime (N,P,K) was generally observed which tended to keep crop productivity low.

Farmers mentioned that they decide on the fertilizer regimes based on advice from multiple sources, such as experience and knowledge of farmers in the area, dealers of fertilizer companies, and agriculture extension agents. About 60% of farmers buy fertilizer requirements from shop keepers/retailers, while remaining 40% from the dealers.

About eight percent respondents had their soil tested and applied fertilizers accordingly. Of those who got their soil tested, about half of them availed government soil testing facility, while remaining half accessed fertilizer company facilities.

PEST AND DISEASE MANAGEMENT

The incidence of pest and disease infestation is quite high, as the main growing season is humid which offers conducive conditions for multiplication. These include: Folding–Moor (30%), Boot (14%), Canker (14%), Leaf Folder (13%), Dryness of Plant (12%), Virus (10%), Gadri (10%), Blight - Burning of Leaf (9%), Koodh (8%), Pan Waro (7%), Leaf Black (6%), Sawari (6%), and others (49%). Farmers generally get advice for pest and disease management from multiple sources (neighboring farmers, franchisees, dealers, and shopkeepers). Farmers are predominantly satisfied with the quality and efficacy of the pesticides[25]. This is contrary to general belief and what was expressed in the FGDs.

WEED CONTROL

A wide range of unwanted weeds are observed in the tomato fields that need periodic removal. The main weeds that infest the fields are: Base, Bathu (Lamb's quarters), Gunwari, Margi, Jekk, Luk. About 76% of farmers mentioned that they initially use weedicide, followed by periodic hand weeding. Similar to pesticides, farmers generally get advice from multiple sources (neighboring farmers, franchisees, dealers, and shopkeepers). Similar to pesticides, farmers are predominantly happy with the quality and efficacy of the weedicides. However, they think the prices are too high. This too is contrary to the general belief and what was expressed in the FGDs.

IRRIGATION

Tomato is a short duration but high delta crop and needs frequent irrigation. Canal supply is the main source of irrigation; 85% of farmers have their crop in perennial canal command area, and 15% in non-perennial command area. About 24% of farmers' supplement canal irrigation with tube-wells.

MECHANIZATION

Tomato is a labor-intensive crop. Except at the time of planting, tractor plowing is the main requirement. About 90% of farmers reported having Knapsack (hand operated) sprayers, while only 10% have power sprayer and 4% have both.

HARVESTING, GRADING AND PACKING

Tomato is harvested in several passes. About 87% of farmers mentioned that they start harvesting as soon the color starts yellowing. Both men and women harvest. However, they are generally not careful in sifting-out

[25] Same as above.

healthy from infected fruits. Tomato, irrespective of its physical appearance like healthy and infected, are put into the same basket.

Farmers use different packaging depending upon destination. Of the sampled farmers, 29% used ordinary plastic bags, 19% wooden crates, and 11% net sacks. Farmers used more than one packaging option in tomato as well. About 70% of farmers feel that experienced harvesting labor is critical for timely and quality harvest. About 38% of farmers mentioned that they grade the produce to fetch better prices.

TRANSPORTATION

Tomatoes are transported to local or nearby city markets, as well distant markets about 10 to 50 km, in mostly small and medium size pickups. About 73% of farmers used single or combination of Suzuki, Datsun, and Mazda pick-ups; 14% auto-rikshaw, 2% tractor trolley and 6% others[26].

MARKETING SYSTEM

About 52% of farmers preferred selling the produce through commission agents, while 29% of farmers sold the crop to contractors (thekedars), and 15% of farmers bypassed the commission agents and sold directly to wholesalers. About 1% of farmers sold the crop directly to exporters. About 87% of farmers indicated that they are satisfied with the market rates, while 13% of farmers expressed their dissatisfaction.

When sold through commission agents, farmers prefer to get sale proceeds paid as soon as the sale completes. However, 84% receive their payments after adjusting cash advances received from the commission agent, while 14% of farmers prefer getting some money in advance.

KNOWLEDGE ABOUT SANITARY AND PHYTOSANITARY (SPS) STANDARDS

Although 13% of farmers mentioned that they are aware of SPS, it seems that they have superficial understanding of these standards.

SOURCES OF FINANCING

About 86% of farmers mentioned that they use their own funds, while the rest acknowledged getting advances from the commission agents. Those who borrowed from the commission agents were obliged to sell their output through them. The commission agents charge a commission of 10% on the gross value of sales. The commission agents give a rebate of 2% to non-borrowers.

SOURCE OF KNOWLEDGE ABOUT TOMATO PRODUCTION

Farmers acquired production knowledge from multiple sources. About 86% of farmers mentioned that they have reasonable knowledge and expertise to grow tomato, about 45% double checked and updated their information from electronic media, while 21% mentioned that they got tips from the input suppliers. About 19% of farmers claim that they have received training in the Farmer Field Schools. However, it was not directly related to tomato production.

MARKET INFORMATION

The main source of information about market prices is fellow farmers. About 87% of respondents mentioned that the farmers exchange information on prevailing prices and price trends, while 8% rely on the information from electronic media, and the remaining on other sources including traders.

POSTHARVEST LOSSES

The farmers surveyed reported that produce losses in tomatoes occur both during the production and post-harvest handling. About 96% of respondents consider that pests are the cause of produce losses followed by poor quality/grade 43%, poor transportation 34%, poor packaging 21% and others 3% .

[26] Due to multiple modes, the percentages total does not add to 100%

AWARENESS ABOUT GROWERS' ASSOCIATION

Out of 711 tomato growers surveyed, only 14 farmers (2%) knew about the tomato grower's associations. When asked would they like to join the association, 86% respondents showed their willingness.

OVERALL FARMERS' SUGGESTIONS/COMMENTS

The main suggestion with regards to tomato production is provide training in good agricultural practices (GAP) such as seed selection, nursery raising, balanced use of fertilizers, improved harvesting methods and packaging, irrigation scheduling, etc. Others include improving farmers' financial literacy so that they may benefit from the existing sources of lending like micro finance banks (MFBs) and micro finance institutions (MFIs), etc.

RECOMMENDATIONS

BANANA

- Conduct demonstration of improved harvesting, washing, de-handing, grading, packing of banana, and proper ripening protocol;
- Commission a study to assess the viability of tissue culture in private sector;
- Provide soil testing kits on matching grant basis, and training to use it and adjusting and blending balanced fertilizers;
- Commission a study to Agriculture University to ascertain critical level of NPK, Ca, and Mg in leaves to adjusting fertilizer doses;[27]
- Commission a case study to assess the relative profitability of Australian variety vis-à-vis traditional varieties, and ascertain the incremental cost and incremental benefit of each intervention;
- It is recommended that one of the districts in Sindh Matiari, which was till recently part of Hyderabad district grows a little over three thousand ha, producing about 7.3 thousand MT, merits inclusion in the project area

CHILI

- Provide training to women in harvesting and postharvest handling;
- Strengthen the Chili Growers Association, make it broad base through revision of charter and rules of business;
- Provide support to establish aflatoxin testing laboratory, and handheld aflatoxin testing kits

DATE

- Promote replacing of old and low yielding trees through phased attrition;
- Provide mechanical pollen dusting machines on matching grants to farmers group for custom hiring to member farmers;
- Provide training to women in harvesting and postharvest handling;
- Introduce high efficiency irrigation water management;
- Introduction of de bunching, grading, and packing in corrugated cartons

TOMATO

- Promote processing type varieties, and create linkage between growers of processing type varieties and processors 'contract farming arrangements on predetermined agreed prices;[28]
- Provide training to women in harvesting and postharvest handling;
- Introduction of plastic boxes for marketing of tomato;

[27] Husaini, Syed A. Yield and quality of banana in relation to NPK, Ca and Mg levels in leaf. MSc thesis, Sindh Agriculture College Tandojam, 1974

[28] Similar contract farming arrangements is working well between farmers and potato processing industry.

- Commission a study to ascertain the incremental cost and incremental benefit of each intervention, especially of the replacement of traditional table varieties with processing varieties

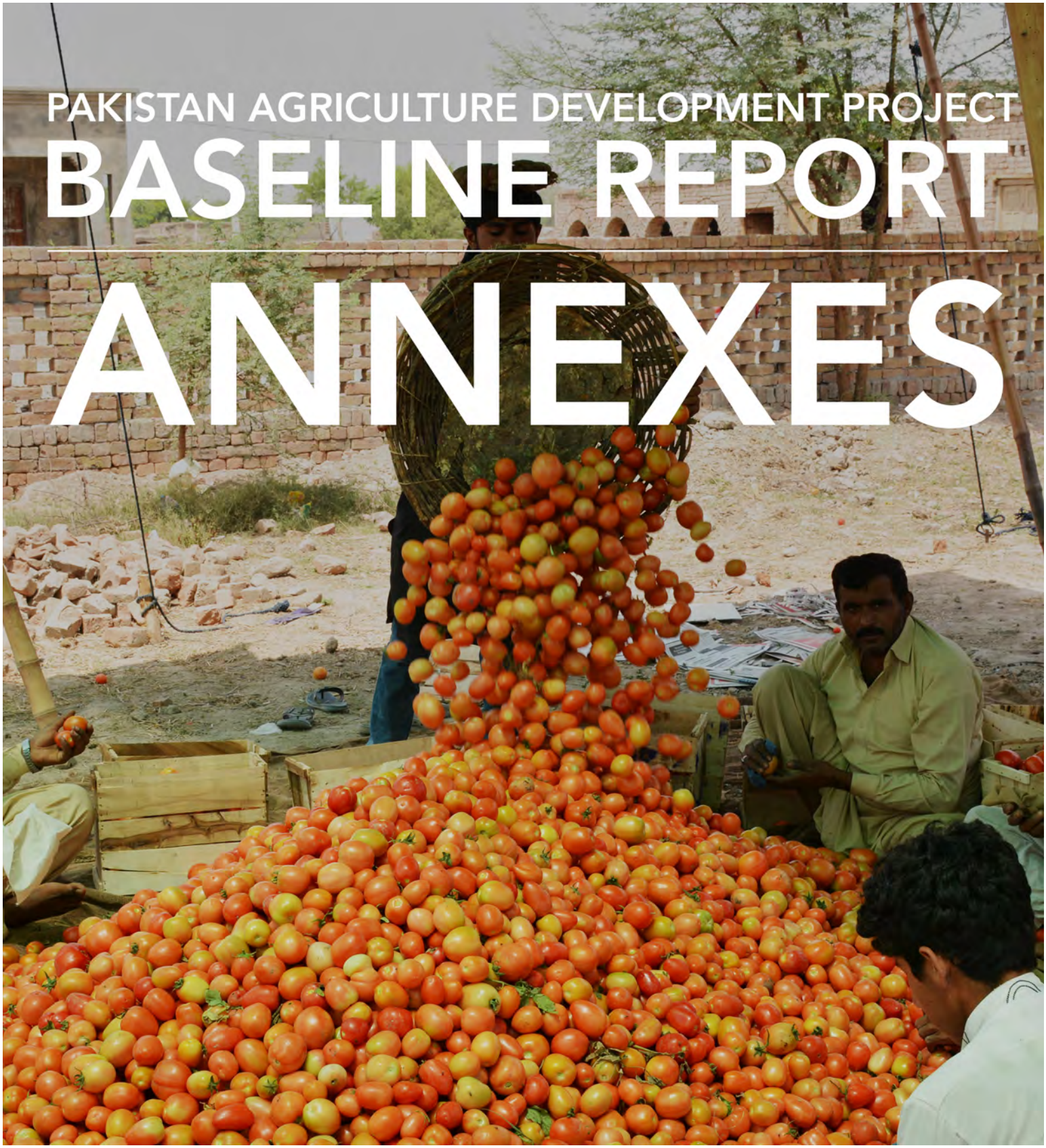
GENERAL/CROSS CUTTING INTERVENTIONS

- Support agriculture department soil testing laboratories to provide services to project farmers;
- Introduce recently marketed motorized small weeding machines, particularly in the labor short area;
- Provide soil testing kits on matching grant basis, and training to use it and adjusting and blending balanced fertilizers;
- Provide training to farmers and youth in farm management related book keeping and encourage farmers to hire trained youth on retainer basis to maintain farm records and tracking farm/crop profitability;
- Establish linkage between farmers and formal credit institutions to facilitate easy access to financial markets;
- It is recommended that in association with agricultural universities, students are encouraged to undertake annual impact assessment studies which would help the project management to assess the efficacy of and cost effectiveness of interventions, and to fine tune the focus on various interventions.

PAKISTAN AGRICULTURE DEVELOPMENT PROJECT

BASELINE REPORT

ANNEXES



ANNEX TABLE 1: AREA, PRODUCTION, AND PER ACRE YIELD OF THE SELECTED FOUR CROPS IN PAKISTAN29

Description	Banana	Chili	Date	Tomato	Total
Province	**476**	**5,850**	**5,806**	**7,177**	**19,308**
% share in Pakistan	1.7%	9.3%	6.5%	11.8%	8.0%
Sindh	**25,476**	**52,179**	**32,467**	**24,748**	**134,869**
% share in Pakistan	92.4%	82.6%	36.2%	40.9%	56.0%
KPK	**682**	**421**	**1,571**	**13,793**	**16,466**
% share in Pakistan	2.5%	0.7%	1.8%	22.8%	6.8%
Balochistan	**937**	**4,731**	**49,784**	**14,847**	**70,298**
% share in Pakistan	3.4%	7.5%	55.5%	24.5%	29.2%
Pakistan	**27,570**	**63,180**	**89,627**	**60,563**	**240,940**
	100.0%	**100.0%**	**100.0%**	**100.0%**	**100.0%**
Punjab	**1,964**	**9,323**	**24,713**	**47,033**	**83,032**
% share in Pakistan	1.8%	6.4%	8.0%	14.8%	9.4%
Sindh	**98,499**	**129,723**	**150,715**	**100,885**	**479,821**
% share in Pakistan	90.2%	88.5%	49.1%	31.7%	54.4%
KPK	**6,875**	**486**	**6,302**	**72,528**	**86,191**
% share in Pakistan	6.3%	0.3%	2.1%	22.8%	9.8%
Balochistan	**1,823**	**6,974**	**125,404**	**98,046**	**232,247**
% share in Pakistan	1.7%	4.8%	40.8%	30.8%	26.4%
Pakistan	**109,161**	**146,506**	**307,133**	**318,491**	**881,290**
	100.0%	**100.0%**	**100.0%**	**100.0%**	**100.0%**
Punjab	4.1	1.6	4.3	6.6	4.3
Sindh	3.9	2.5	4.6	4.1	3.6
KPK	10.1	1.2	4.0	5.3	5.2
Balochistan	1.9	1.5	2.5	6.6	3.3
Pakistan	4.0	2.3	3.4	5.3	3.7

Source: Computed from data downloaded from: http://www.amis.pk/Agristatistics/DistrictWise/2012-2014/Dates.html

[29] Note: Area and production are two year averages (2012/13 and 2013/14)

TABLE 2-A: AREA UNDER FOUR CROPS IN THE TARGET DISTRICTS (HECTARE)

S.No	Districts	Banana		Chili		Date		Tomato	
		Area (has)	% Share	Area (has)	% Share	Area (has)	% Share	Area (has)	% Share
1	Bahawalpur	-	0.0%	343	1.1%	324	1.1%	308	2.1%
2	Khanewal	97	0.7%	334	1.1%	8	0.0%	273	1.9%
3	Lodhran	1	0.0%	344	1.1%	31	0.1%	57	0.4%
4	Multan	26	0.2%	729	2.3%	114	0.4%	112	0.8%
5	Sheikhupura	39	0.3%	172	0.6%	-	0.0%	931	6.4%
6	Hyderabad	322	2.4%	325	1.0%	-	0.0%	70	0.5%
7	Khairpur	5,525	41.0%	143	0.5%	28,311	98.2%	85	0.6%
8	Mirpurkhas	1,356	10.1%	10,534	33.8%	23	0.1%	3,392	23.4%
9	Tando Allah Yar	881	6.5%	923	3.0%	6	0.0%	170	1.2%
10	Thatta	5,175	38.4%	3,484	11.2%	7	0.0%	8,320	57.5%
11	Umerkot	66	0.5%	13,801	44.3%	-	0.0%	753	5.2%
	Total	**13,487**	**100.0%**	**31,130**	**100.0%**	**28,824**	**100.0%**	**14,468**	**100.0%**

Source: Computed from data downloaded from: http://www.amis.pk/Agristatistics/DistrictWise/2012-2014/Dates.html

Note: Area and production are two year averages

ANNEX TABLE 2-B: PRODUCTION OF THE FOUR SELECTED CROPS IN THE PROJECT AREA (MT)

S.No	District	Bananas		Chilie		Date		Tomato	
		Production (MT)	% Share	Production (MT)	% Share	Production (MT)	% Share	Production (MT)	% Share
1	Bahawalpur	-	0.0%	549	0.7%	1,682	1.3%	2,077	3.5%
2	Khanewal	534	1.6%	455	0.6%	34	0.0%	1,597	2.7%
3	Lodhran	2	0.0%	672	0.8%	116	0.1%	403	0.7%
4	Multan	91	0.3%	1,261	1.5%	449	0.3%	848	1.4%
5	Sheikhupura	128	0.4%	287	0.4%	0	0.0%	4,378	7.5%
6	Hyderabad	830	2.5%	749	0.9%	0	0.0%	312	0.5%
7	Khairpur	15,085	45.7%	319	0.4%	131,074	98.2%	340	0.6%
8	Mirpurkhas	1,791	5.4%	27,776	34.0%	88	0.1%	13,414	22.9%
9	Tando Allah Yar	1,902	5.8%	1,647	2.0%	25	0.0%	792	1.4%
10	Thatta	12,561	38.0%	7,545	9.2%	41	0.0%	31,192	53.3%
11	Umerkot	101	0.3%	40,348	49.4%	0	0.0%	3,203	5.5%
	Total	**33,024**	**100.0%**	**81,606**	**100.0%**	**133,509**	**100.0%**	**58,554**	**100.0%**

Source: Computed from data downloaded from: http://www.amis.pk/Agristatistics/DistrictWise/2012-2014/Dates.html

ANNEX TABLE 2-C: AVERAGE YIELD OF THE FOUR SELECTED CROPS IN THE PROJECT AREA (MT/HA)

S.N°	District	Bananas	Chilies	Dates	Tomato
		Production (MT/ha)	Production (MT/ha)	Production (MT/ha)	Production (MT/ha)
1	Bahawalpur		1.6	5.2	6.8
2	Khanewal	5.5	1.4	4.3	5.8
3	Lodhran	4.6	2.0	3.7	7.1
4	Multan	3.5	1.7	3.9	7.6
5	Sheikhupura	3.3	1.7	0.0	4.7
6	Hyderabad	2.6	2.3	0.0	4.5
7	Khairpur	2.7	2.2	4.6	4.0
8	Mirpurkhas	1.3	2.6	3.8	4.0
9	Tando Allah Yar	2.2	1.8	4.5	4.7
10	Thatta	2.4	2.2	5.9	3.7
11	Umerkot	1.5	2.9		4.3
	Total	**2.4**	**2.6**	**4.6**	**4.0**

ANNEX 3

SCOPE OF WORK AND TERMS OF REFERENCE

The baseline study will have four principal functions: i) establishing a baseline as points of comparison to support measurement of program impacts as part of future project evaluation activities; ii) guiding realistic and feasible target setting for performance indicators; iii) Supporting program design through situational analysis relevant to target beneficiaries' knowledge and capacities; access to quality of and utilization of proposed inputs and infrastructure; value chain diagrams; and, organizational capacity; and iv) identifying and recommending responses to risks and constraints that may pose challenges to planned project implementation.

The Specific Indicators for which baselines are needed, as well as Situational Analysis requirements are listed below. Whenever possible and practical, data should be analyzed in the baseline report per priority disaggregates: respondent sex, commodity grown, district of farm or business, and respondent type. Indicate if any of the respondents are potential Master Trainers.

A. INDICATORS REQUIRING BASELINE:[30]

FFPr SI-1:	Number of hectares under improved techniques or technologies as a result of USDA assistance
FFPr SI-2:	Number of individuals who have applied new techniques or technologies as a result of USDA assistance
FFPr SI-3:	Number of individuals who have applied improved farm management practices (i.e. Governance, administration, or financial management) as a result of USDA assistance
FFPr SI-4:	Number of individuals receiving financial services as a result of USDA assistance
FFPr SI-7:	Number of private enterprises, producers' organizations, water user's associations, women's groups, trade & business associations, & community-based organizations (CBO) that applied improved techniques and technologies as a result of USDA assistance
FFPr SI-11:	Total increase in installed storage capacity (dry or cold storage) as a result of USDA assistance
FFPr SI-13:	Value of sales by project beneficiaries in four targeted commodities
FFPr SI-14:	Volume of commodities (metric tons) sold by project beneficiaries
CI-2:	Number of agricultural producers in target region who have access to current agriculture market information
CI-9:	Volume of chilies certified as meeting industry standards
CI-10:	Number of agricultural producers reporting decreases in post-harvest losses

B. SITUATIONAL ANALYSIS AT BASELINE:

1. Map value chains for each of the four commodities (bananas, chilies, dates, tomatoes)
2. Establish level of post-harvest loss along value chain for each commodity
3. Estimate of total number of agricultural producers of each commodity and number of agricultural households per geographic area
4. Identify current and best-in-class approaches on how suppliers can garner higher prices due to increased quality or improved packaging, through interviews with buyers of targeted commodities

[30] See USDA's Food for Progress and McGovern-Dole Indicators and Definitions handbook for full explanations of the Food for Progress (FFPr) Standard Indicators (SI) (updated August 16, 2016).

5. Gaps in agricultural producers' access to and use of key inputs, equipment and infrastructure for the four target commodities[31]

6. Gaps in agricultural producers' knowledge, behaviors and skills relevant to increasing yields and value of four target commodities[32]

7. Baseline status of current processing and storage infrastructure in targeted areas used for the four targeted commodities, including total available and utilized storage/processing capacity, quality of facility, GPS location, and contact information for follow-up[33]

[31] Data will support setting priorities for PAD's in-kind grants.
[32] Data will support setting priorities for PAD training topics.
[33] Data will support opportunities for refurbishing existing infrastructure as well as regional gaps in availability.

SAMPLE DESIGN/FRAME

Considering that the project will extend technical intervention support to about 982,562 farmers in the eleven target districts, to arrive at a sample size for the farmer survey that would ensure 98% confidence level and 2% level of precision, the initial sample size was computed using the following formula.

$SS = [Z^2*(p) * (1-p)]/c^2$

Where,

SS = Initial Sample Size; Z = Z value, which varies with the confidence level; p = a dichotomous probability variable, for p = 50% the formula results in highest sample size; C = level of precision.

Considering 98% of Confidence level and 2% Level of Precision, the initial sample size SS is estimated at 3,381. For calculating the sample size for a finite population (982,562 farmers), the following formula was used: n = SS/ [1 + {SS-1}/Pop]

Where,

n = New sample size for finite sample; SS = Initial sample size for infinite sample;

Pop = population size, which is assumed as 982,562 farmers.

Considering 98% of Confidence level and 2% Level of Precision, the new sample size against 982,562 farmers is computed as 3,369. Given the homogeneity of the rural farming system, it was considered appropriate to adopt a sample size of 2,200 farmer production system questionnaires to avoid homogeneity, and commonality.

For FGDs, it was considered appropriate that about 48 FGDs as per analysis breakouts i.e. four crops and eleven districts. As this is qualitative research, hence there is no statistic and margin of error but a couple of FGDs in each cell is expected to generate information on general farming system. Similarly, for IDIs, a sample size of 148 was considered adequate to study the marketing system, and other service providers.

Sample Size Distribution for Farmer Survey

A representative sample size of 2,200 farmers was estimated to administer FPSQ on the potential farm household. The number of farmers allocated to different districts for the four crops to be covered during the farm survey was first allocated based on the proportionate distribution of the relevant crops, in terms of production, in the eleven districts. The production data presented in Table A is an average of the production reported for the respective crops during the crop years 2012/13 and 2013/14. The table also shows the share of relevant production across the districts. This will also help in identifying the crop specific clusters during the implementation.

ANNEX TABLE 4-A: AVERAGE PRODUCTION OF SELECTED CROPS IN THE TARGET DISTRICTS

S. No	District	Banana		Chilies		Dates		Tomato	
		MT	% share	MT	% share	MT	% share	MT	% share
1	Bahawalpur	-	0.0%	549	0.7%	3,020	1.3%	3,966	3.4%
2	Khanewal	650	1.3%	455	0.6%	40	0.0%	3,050	2.6%
3	Lodhran	2	0.0%	672	0.8%	204	0.1%	805	0.7%
4	Multan	149	0.3%	1,261	1.5%	779	0.3%	1,740	1.5%
5	Sheikhupura	205	0.4%	287	0.4%	-	0.0%	11,851	10.1%
6	Hyderabad	1,337	2.6%	749	0.9%	-	0.0%	552	0.5%
7	Khairpur	23,534	45.4%	319	0.4%	235,388	98.2%	611	0.5%
8	Mirpurkhas	2,600	5.0%	27,776	34.0%	234	0.1%	23,020	19.6%
9	Tando Allah Yar	3,090	6.0%	1,647	2.0%	48	0.0%	1,356	1.2%
10	Thatta	20,087	38.8%	7,545	9.2%	75	0.0%	64,738	55.2%
11	Umerkot	137	0.3%	40,348	49.4%	-	0.0%	5,519	4.7%

Total	**51,791**	**100.0%**	**81,606**	**100.0%**	**239,786**	**100.0%**	**117,204**	**100.0%**

Source: Computed from data downloaded from:
http://www.amis.pk/Agristatistics/DistrictWise/2012-2014/Dates.html

This distribution shows that some cells contribute very little to the sample which makes the information insufficient for any meaningful estimation. As the production of relevant crops is not uniformly distributed, the number of observations/sample was rationalized to avoid over and or under representation of farmers in the target districts. Hence, for better representation of each district for each crop, some adjustments have been made for getting a final sample size. The district wise and crop wise computed and adjusted allocation of sample is presented in Annex 6 Table A, About 36 additional farmers were surveyed where it was felt that additional observations would represent the farmers relatively better. Annex 6 Table B presents the actual number of farmers interviewed by crops across the districts.[34]

A total number of 48 FGDs were planned. At the time of field work two additional FGDs were conducted, one each for Banana and Dates. With these additions and some reallocation amongst the districts, twelve FGDs were conducted with the farmers growing banana, 15 FGDs with farmers growing chilies, eight FGDs with date farmers, and 15 FGDs with tomato growers. The district and crop wise allocation is presented in Annex 8.

A total number of 152 IDIs were planned, against a target of 138 to describe the activities of the input suppliers, market functionaries, and institutions that are relevant to the value chain. As the most functionaries combine two or more functions, while the role of some of the actors was considered minimal, the crop wise targets were revised accordingly. The distribution of the IDIs planned and accomplished is presented in Annex 10.

[34] It may be noted that sizeable productions of tomatoes have been reported in the districts of Gujranwala, Sargodha and Khushab which are outside the project area. The project management may consider including these districts for the project support.

ANNEX 5

SURVEY INSTRUMENTS

1. Farm Production Survey Questionnaire (FPSQs)
2. Focus Group Discussion Checklist (FGDs)
3. In Depth Interviews of Value Chain Actors (IDIs)

List of FSQs
01.Farm Survey Questionnaires for Banana Farmers
02. Farm Survey Questionnaires for Chili Farmers
03. Farm Survey Questionnaires for Date Farmers
04. Farm Survey Questionnaires for Tomato Farmers

01.FARM PRODUCTION SURVEY QUESTIONNAIRES FOR BANANA FARMERS

Questions	Response (Circle appropriate answer)
Cluster ID and Crop	Banana
Date of Interview	
Name of Farmer:	
Name of Village:	
Name of Union Council:	
District:	
Name of investigator	
Name of supervisor	
Status of Farmer	Single owner Joint holding
Tenurial Status	Owner cultivator Sharecropper Cash tenant
If Leased	If leased: Please mention rate per acre
Farm Size	Size of farm in acres Cultivated area in acres
Source of irrigation:	What are the sources of irrigation? Perennial canal Non-perennial canal Tube well Stream Pond Others (specify)
Method of irrigation	Flood irrigation in acres Drip irrigation in acres Others (specify) Cost of drip irrigation per acre (Rs.....): Water saving (%):

<table>
<tr><td>Area under crops & production</td><td>Obtain information of crop-wise area<table><tr><th>Crop</th><th>Area</th><th>Production</th></tr><tr><td>Specify</td><td></td><td></td></tr><tr><td>Specify</td><td></td><td></td></tr><tr><td>Specify</td><td></td><td></td></tr><tr><td>Banana</td><td></td><td></td></tr></table></td></tr>
<tr><td>Source of suckers</td><td>How do you select a variety for cultivation? On what basis? Whose advice do you seek? Why?
Do you use your own suckers?
Do you purchase suckers from other farmers? If yes, what %age of total requirement</td></tr>
<tr><td>Method of planting</td><td>Do you have high-density plantations? Yes/No
If yes, what are its advantages and disadvantages?</td></tr>
<tr><td>Varieties grown</td><td>Name of varieties and area<table><tr><th>Variety</th><th>Area (acres)</th><th>% share</th></tr><tr><td>Specify</td><td></td><td></td></tr><tr><td>Specify</td><td></td><td></td></tr><tr><td>Specify</td><td></td><td></td></tr></table></td></tr>
<tr><td>Preferred variety</td><td>Names of varieties and reasons for preference:
High yielding
Early in season
Better market acceptance
Pest/disease resistance
Others (specify)</td></tr>
<tr><td>Machinery and Tools</td><td>Do you have power sprayers or manual or both? Give number
Farm machinery & tools [e.g. Rotavator, Leveling machine, Others please specify]- Give list</td></tr>
<tr><td>Soil management practices</td><td>Do you regularly get soils tested and from where?
Do you practice intercropping at initial years of plantation?
Do you use farm yard manure (compost) & what is its source?
Do you practice green manuring & which crop?
Do you use NPK and micronutrients?</td></tr>
<tr><td>Pests, diseases & weeds</td><td>-What is the incidence of pests, diseases & weeds? High, Medium, Low
-What are the main pests?
-What are the main diseases?
-How do you control pest, diseases and weeds
a) Chemical means
b) Biological means
c) Manually (weeding)
What chemicals do you apply for controlling pests, diseases and weeds?
Pesticides/Fungicides/weedicide (Source, Quality)
Are suppliers reliable?
Who advises you on use of pesticides?
Are you satisfied with the price and quality of chemicals available in the market?</td></tr>
<tr><td>Plant nutrition management</td><td>How do you decide on use of fertilizers and micronutrients?
Fertilizer (Source, Quality) – [Chemical fertilizers, bio fertilizers etc.]
Micronutrients (Source, Quality)</td></tr>
<tr><td>Crop productivity</td><td>What is the yield per acre for banana?
Is this low or reasonable?
If low, what are the reasons?</td></tr>
</table>

	What are good agricultural practices for getting high yield?
Harvesting Details	How do you assess crop maturity? At which stage of crop maturity do you start harvesting? Do you use harvesting aids/equipment? List harvesting aids/equipment used Do you have skilled labour for harvesting? Do you face labour shortages?
Grading & Packing Practices	Do you grade & pack the produce before selling? What type of packaging do you use? Does grading fetch better prices: If yes, how much over the normal market price? Does improved packaging fetch better prices? If yes, how much over the normal market price?
Transportation practices	What means of transport do you use & why? Do you transport banana in loose (bunches) or packaged form? What is the cost of transportation?
Mode of sale	How do you sell your crop? To pre-harvest contractors – acreage & sale amount To itinerant traders – quantity & sale amount Through commission agents - quantity & sale amount To wholesalers direct- quantity & sale amount To exporters - quantity & sale amount Others (specify) - quantity & sale amount What is the preferred mode of sale & why? Are you satisfied with the prices received? Yes/No If no, why?
Quality (SPS)	Are you aware of sanitary & phytosanitary issues? What are sanitary & phytosanitary issues in banana? What measures do you adopt to address sanitary & phytosanitary issues? Who advises you on sanitary & phytosanitary issues?
Source of Funding	How do you finance banana farming? a) Own capital b) Advance from commission agents/traders c) Bank borrowing d) Others (specify) What is the amount advanced by commissions agents/traders and its terms and conditions? What is the amount borrowed from banks and its terms and conditions? What is your preferred source of funding and why? Do you face any collateral constraint from borrowing from banks?
Source of Knowledge/ Advisory	-Own experience/inherited/acquired (% of respondents). -Watching/listening to advertisement on TV/radio. % -Observing other farmers (% of respondents). -Advice from input supplier (% of respondents) -Advice from RSP/NGO technical staff (% of respondents) -Advice from agriculture extension staff (% of respondents) -How many of you have received training through FFS? % -What are the sources of market information? -How efficient are these? -What is the preferred & most reliable source?
Crop Losses	Percentage decrease in yield due to pest attack. Percentage of crop loss due to poor quality/grade. Percentage of crop loss due to poor packaging. Percentage of crop loss during transportation. Percentage of any other (specify) postharvest losses.
Capacity building	What trainings do you suggest for improving banana cultivation profitability?

needs	a) Planting (lay out & planting techniques) b) Pest & disease management c) Irrigation & plant nutrition d) Harvesting & field handling e) Marketing f) Others (specify)
Gender	What is the existing role of women in banana farming? How and why can the role of women be increased? What are women training needs?
Membership	Is there a farmer's association, if yes, how many are members of the association? How much is the membership fee? What is the advantage of membership? Would you consider forming a producer group for joint procurement of inputs and marketing of produce?

Indicative Net Farm Income (NFI) from Banana crop					
	Description	Unit	Rate per unit	Amount	Remarks
A	Area (acres)				Variety
B	Expenditure (per acre)				
	Production cost				
1	Tractor plowing and leveling	acre			
2	Bullock plowings leveling	acre			
3	Digging of holes	days			
4	Suckers/acre	Rs.			Source
5	Family labor (sowing/transplanting)	hrs			
6	Hired labor (sowing/transplanting)	Day			
7	Family labor (weeding)	Day			
8	Hired labor (weeding)	Day			
9	Farm Yard manure	carts			
10	Urea	bags			
11	Ammonium sulphate	bags			
12	DAP/NP	bags			
13	Potash	bags			
14	Micronutrients	bags			
15	Weedicide/fungicide/herbicide	liter			
16	Pesticide/insecticide	liter			
17	Purchased irrigation water/acre	Rs.			
18	Family labor (harvesting & packing)	days			
19	Hired labor (harvesting & packing)	days			
20	Permanent labor	month			
21	Water charges & land revenue	Rs.			
22	Others if any (specify)				
C	Revenue (Total production)				
a	Total Production	bunches			
b	Retained for consumption	bunches			
c	Quantity sold in the market	bunches			
d	Price	Rs.			
e	Packing material cost				
f	Transportation cost to market	Per bunch			
g	Unloading & market fee (lump sum)	Rs.			
h	Commission Agent charges	%			
i	Storage Cost (lump sum)	Rs.			
j	Fees for contaminants (like aflatoxin) test if any	Rs.			
k	Other marketing costs	Rs.			

Comments from the respondent	Do you have any specific comments, issues or suggestions regarding problems or issues you (farmers) are facing and what could improve the productivity and quality of crop?

02. FARM PRODUCTION SURVEY QUESTIONNAIRES FOR CHILI FARMERS

<table>
<tr><th>Questions</th><th>Response (Circle appropriate answer)</th></tr>
<tr><td>Cluster ID and Crop</td><td>Chilies</td></tr>
<tr><td>Date of Interview</td><td></td></tr>
<tr><td>Name of Farmer:</td><td></td></tr>
<tr><td>Name of Village:</td><td></td></tr>
<tr><td>Name of Union Council:</td><td></td></tr>
<tr><td>District:</td><td></td></tr>
<tr><td>Name of investigator</td><td></td></tr>
<tr><td>Name of supervisor</td><td></td></tr>
<tr><td>Status of Farmer</td><td>Single owner
Joint holding</td></tr>
<tr><td>Tenurial Status</td><td>Owner cultivator
Sharecropper
Cash tenant</td></tr>
<tr><td>If Leased in</td><td>If leased in: Please mention rate per acre</td></tr>
<tr><td>Farm Size</td><td>Size of farm in acres
Cultivated area in acres</td></tr>
<tr><td>Source of irrigation:</td><td>What are sources of irrigation?
Perennial canal
Non-perennial canal
Tube well
Stream
Pond
Others (specify)</td></tr>
<tr><td>Method of irrigation</td><td>Flood irrigation in acres
Drip irrigation in acres
Others (specify)
Cost of drip irrigation per acre (Rs.....):
Water saving (%):</td></tr>
<tr><td>Area under crops & production</td><td>Obtain information of crop-wise area
<table>
<tr><th>Crop</th><th>Area</th><th>Production</th><th></th></tr>
<tr><td>Specify</td><td></td><td></td><td></td></tr>
<tr><td>Specify</td><td></td><td></td><td></td></tr>
<tr><td>Specify</td><td></td><td></td><td></td></tr>
<tr><td>Chili</td><td></td><td></td><td></td></tr>
</table></td></tr>
<tr><td>Source of seed/seedlings</td><td>Do you use own seed/seedlings?
Do you purchase seed/seedlings from other farmers?
Do you purchase seedlings from a commercial nursery?
Do you purchase seed from seed merchants?
Do you purchase seed from commission agent?
Are you satisfied with the quality of seed/seedling purchased from different sources?
Which are the most reliable sources?</td></tr>
</table>

<table>
<tr><td>Method of sowing / transplanting</td><td>Which method of sowing/transplanting do you use? Why?
What are other methods? Why don’t you use them? Reasons?
From where have you learned this method? Who advised you?
Time of sowing.
Nursery Raising:
Sowing techniques used:
Flat beds
Raised beds
Seedling trays</td></tr>
<tr><td>Varieties grown</td><td>Name of varieties and area<table><tr><th>Variety</th><th>Area (acres)</th><th>% share</th></tr><tr><td>Specify</td><td></td><td></td></tr><tr><td>Specify</td><td></td><td></td></tr><tr><td>Specify</td><td></td><td></td></tr></table></td></tr>
<tr><td>Preferred variety</td><td>Names of varieties and reasons for preference:
High yielding
Early in season
Better market acceptance
Pest/disease resistance
Others (specify)</td></tr>
<tr><td>Machinery and Tools</td><td>Do you have power sprayers or manual or both? Give number
Farm machinery & tools [e.g. Rotavator, Leveling machine, Others please specify]- Give list</td></tr>
<tr><td>Soil management practices</td><td>Do you regularly get soils tested and from where?
Do you practice intercropping at initial years of plantation?
Do you use farm yard manure (compost) & what is its source?
Do you practice green manuring & which crop?
Do you use NPK and micronutrients?</td></tr>
<tr><td>Pests, diseases & weeds</td><td>-What is the incidence of pests, diseases & weeds? High, Medium, Low
-What are the main pests?
-What are the main diseases?
-How do you control pest, diseases and weeds?
a) Chemical means
b) Biological means
c) Manually (weeds)
What chemicals do you apply for controlling pests, diseases and weeds?
Pesticides/Fungicides/weedicide (Source, Quality)
Are suppliers reliable?
Who advises you on use of pesticides?
Are you satisfied with the price and quality of chemicals available in the market?</td></tr>
<tr><td>Plant nutrition management</td><td>How do you decide on the use of fertilizers and micronutrients?
Fertilizer (Source, Quality) – [Chemical fertilizers, bio fertilizers etc.]
Micronutrients (Source, Quality)</td></tr>
<tr><td>Crop productivity</td><td>What is the yield per acre of chilies?
Is this low or reasonable?
If low, what are the reasons?
What are good agricultural practices for getting high yield?</td></tr>
<tr><td>Harvesting Details</td><td>How do you assess crop maturity?
At which stage of crop maturity do you start harvesting?
Do you use harvesting aids/equipment?
List harvesting aids/equipment used
Do you have skilled labour for harvesting?
Do you face labour shortages?</td></tr>
</table>

Drying	How do you dry chili? a) On ground under the sun: % b) Under cover/shade: % c) Use of soil covers (mesh/Tyvek)? % d) Use of produce covers (mesh/Tyvek) to check sun radiation? % e) Use of both for soil and produce cover (mesh/Tyvek)? % f) Other technique (specify). % What is your preferred technique & why? How much does your preferred technique add value (better quality, better price; reduced wastage, etc.)?
Storage	Do you store chilies after drying? What type of storage is used? What is the usual storage period? What issues do you face in chili storage?
Grading & Packing Practices	Do you grade & pack the produce before selling? What type of packaging do you use? Does grading fetch better prices: If yes, how much over the normal market price? Does improved packaging fetch better prices? If yes, how much over the normal market price?
Transportation practices	What means of transport do you use & why? What is the cost of transportation?
Mode of sale	How do you sell your produce? To pre-harvest contractors – acreage & sale amount To itinerant traders – quantity & sale amount Through commission agents - quantity & sale amount To wholesalers direct- quantity & sale amount To exporters - quantity & sale amount Others (specify) - quantity & sale amount What is the preferred mode of sale & why? Are you satisfied with the prices received? Yes/No If no, why?
Quality (SPS)	Are you aware of sanitary & phytosanitary issues? What are sanitary & phytosanitary issues in chilies? What measures do you adopt to address sanitary & phytosanitary issues? Who advises you on sanitary & phytosanitary issues?
Source of Funding	How do you finance chilies farming? a) Own capital b) Advance from commission agents/traders c) Bank borrowing d) others (specify) What is the amount advanced by commission agents/traders and what are the terms and conditions? What is the amount borrowed from banks and the related terms and conditions? What is your preferred source of funding and why? Do you face any collateral constraint while borrowing from banks?
Source of Knowledge/ Advisory	-Own experience/inherited/acquired (% of respondents). -Watching/listening to advertisements on TV/radio. % -Observing other farmers (% of respondents). -Advice from input supplier (% of respondents) -Advice from RSP/NGO technical staff (% of respondents) -Advice from agriculture extension staff (% of respondents) -How many of you have received training through FFS? % -What are the sources of market information? -How efficient are they? -What is the preferred & most reliable source?

Crop Losses	Percentage decrease in yield due to pest attack. Percentage of crop loss due to poor quality/grade. Percentage of crop loss due to poor packaging. Percentage of crop loss during transportation. Percentage of any other (specify) postharvest losses.
Capacity building needs	What trainings do you suggest for improving chilies farming profitability? a) Planting (lay out & planting techniques) b) Pest & disease management c) Irrigation & plant nutrition d) Harvesting & field handling e) Marketing f) Others (specify)
Gender	What is the existing role of women in chilies farming? How and why can the role of women be increased? What are women training needs?
Membership	Is there a farmer's association, if yes, how many are members of the association? How much is the membership fee? What is the advantage of membership? Would you consider forming a producer group for joint procurement of inputs and marketing of produce?

Indicative Net Farm Income (NFI) from Chilies					
	Description	Unit	Rate per unit	Amount	Remarks
A	Area (acres)				Variety
B	Expenditure (per acre)				
	Production cost				
1	Tractor plowing and leveling	acre			
2	Bullock plowings leveling	acre			
3	Ridges and furrows	days			
4	Seed/nursery seedlings/acre	Rs.			Source
5	Family labor (sowing/transplanting)	hrs			
6	Hired labor (sowing/transplanting)	day			
7	Family labor (weeding)	day			
8	Hired labor (weeding)	day			
9	Farm Yard manure	carts			
10	Urea	bags			
11	Ammonium sulphate	bags			
12	DAP/NP	bags			
13	Potash	bags			
14	Micronutrients	bags			
15	Weedicide/fungicide/herbicide	liter			
16	Pesticide/insecticide	liter			
17	Purchased irrigation water/acre	Rs.			
18	Family labor (harvesting & packing)	days			
19	Hired labor (harvesting & packing)	days			
20	Permanent labor	month			
21	Labor for drying	days			
22	Water charges & land revenue	Rs.			
23	Others if any (specify)				
C	Revenue (Total production)				
A	Total Production	maunds			
B	Retained for seed/consumption	maunds			

Indicative Net Farm Income (NFI) from Chilies					
	Description	Unit	Rate per unit	Amount	Remarks
C	Quantity sold in the market	maunds			
D	Price	Rs.			
E	Packing material cost	maunds			
F	Transportation cost to market	maunds			
G	Unloading & market fee (lump sum)	Rs.			
H	Commission Agent charges	%			
I	Storage Cost (lump sum)	Rs.			
J	Fees for contaminants (like aflatoxin) test if any (lump sum)	Rs.			
K	Other marketing costs	Rs.			
Comments from the respondent	Do you have any specific comments, issues or suggestions regarding problems or issues you (farmers) are facing and what could improve the productivity and quality of crop?				

03. FARM PRODUCTION SURVEY QUESTIONNAIRES FOR DATE FARMERS

Questions	Response (Circle appropriate answer)
Cluster ID and Crop	Dates
Date of Interview	
Name of Farmer:	
Name of Village:	
Name of Union Council:	
District:	
Name of investigator	
Name of supervisor	
Status of Farmer	Single owner Joint holding
Tenurial Status	Owner cultivator Sharecropper Cash tenant
If Leased in	If leased in: Please mention rate per acre
Farm Size	Size of farm in acres Cultivated area in acres
Source of irrigation:	What are sources of irrigation? Perennial canal Non-perennial canal Tube well Stream Pond Others (specify)
Method of irrigation	Flood irrigation in acres Drip irrigation in acres Others (specify) Cost of drip irrigation per acre (Rs.....): Water saving (%):
Area under crops & production	Obtain information of crop-wise area

Crop	Area	Production

	<table><tr><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td></tr><tr><td>Dates</td><td></td><td></td><td></td></tr></table>
Source of suckers	How do you select a variety for cultivation? On what basis? Whose advice do you seek? Why? Do you use your own suckers? Do you purchase suckers from other farmers? If yes, what %age of total requirement
Method of planting	Do you have high-density plantation? Yes/No If yes, what are its advantages and disadvantages?
Varieties grown	Name of varieties and area <table><tr><th>Variety</th><th>Area (acres)</th><th>% share</th><th></th></tr><tr><td>Specify</td><td></td><td></td><td></td></tr><tr><td>Specify</td><td></td><td></td><td></td></tr><tr><td>Specify</td><td></td><td></td><td></td></tr></table>
Preferred variety	Names of varieties and reasons for preference: High yielding Early in season Better market acceptance Pest/disease resistance Others (specify)
Machinery and Tools	Do you have power sprayers or manual or both? Give number Farm machinery & tools [e.g. Rotavator, Leveling machine, Others please specify]- Give list
Soil management practices	Do you regularly get soils tested and from where? Do you practice intercropping at initial years of plantation? Do you use farm yard manure (compost) & what is its source? Do you practice green manuring & which crop? Do you use NPK and micronutrients?
Pests, diseases & weeds	-What is the incidence of pests, diseases & weeds? High, Medium, Low -What are the main pests? -What are the main diseases? -How do you control pest, diseases and weeds? a) Chemical means b) Biological means c) Manually (weeds) What chemicals do you apply for controlling pests, diseases and weeds? Pesticides/Fungicides/weedicide (Source, Quality) Are suppliers reliable? Who advises you on the use of pesticides? Are you satisfied with the price and quality of chemicals available in the market?
Plant nutrition management	How do you decide on the use of fertilizers and micronutrients? Fertilizer (Source, Quality) – [Chemical fertilizers, bio fertilizers etc.] Micronutrients (Source, Quality)
Crop productivity	What is the yield per acre of dates? Is this low or reasonable? If low, what are the reasons? What are good agricultural practices for getting high yield?
Harvesting Details	How do you assess crop maturity? At which stage of crop maturity do you start harvesting? Do you use harvesting aids/equipment?

	List harvesting aids/equipment used Do you have skilled labour for harvesting? Do you face labour shortages?
Curing (Ripening)	How do you cure/ripen dates? a) Open under the sun: % b) Curing tunnel (plastic, solar): % What are the qualities issues in curing dates open under the sun? Does a curing tunnel (plastic, solar) have positive effects on the quality of dates? Do you prefer a curing tunnel (plastic, solar)? What are the constraints in having curing tunnel (plastic, solar)?
Grading & Packing Practices	Do you grade & pack the produce before selling? What type of packaging do you use? Does grading fetch better prices: If yes, how much over the normal market price? Does improved packaging fetch better prices? If yes, how much over the normal market price?
Transportation practices	What means of transport do you use & why? What is the transportation cost?
Mode of sale	How do you sell your crop? To pre-harvest contractors – acreage & sale amount To itinerant traders – quantity & sale amount Through commission agents - quantity & sale amount To wholesalers direct- quantity & sale amount To exporters - quantity & sale amount Others (specify) - quantity & sale amount What is the preferred mode of sale & why? Are you satisfied with the prices received? Yes/No If no, why?
Quality (SPS)	Are you aware of any sanitary & phytosanitary issues? What are sanitary & phytosanitary issues in dates? What measures do you adopt to address sanitary & phytosanitary issues? Who advises you on sanitary & phytosanitary issues?
Source of Funding	How do you finance dates farming? a) Own capital b) Advance from commission agents/traders c) Bank borrowing d) others (specify) What is the amount advanced by commissions agents/traders and its terms and conditions? What is the amount borrowed from banks and its terms and conditions? What is your preferred source of funding and why? Do you face any collateral constraint from borrowing from banks?
Source of Knowledge/ Advisory	-Own experience/inherited/acquired (% of respondents). -Watching/listening to advertisements on TV/radio. % -Observing other farmers (% of respondents). -Advice from input supplier (% of respondents) -Advice from RSP/NGO technical staff (% of respondents) -Advice from agriculture extension staff (% of respondents) -How many of you have received training through FFS? % -What are sources of market information? -How efficient are these? -What is the preferred & most reliable source?
Crop Losses	Percentage decrease in yield due to pest attack. Percentage of crop loss due to poor quality/grade. Percentage of crop loss due to poor packaging.

	Percentage of crop loss during transportation. Percentage of any other (specify) postharvest losses.
Capacity building needs	What trainings do you suggest for improving dates farming profitability? a) Planting (lay out & planting techniques) b) Pest & disease management c) Irrigation & plant nutrition d) Harvesting & field handling e) Marketing f) Others (specify)
Gender	What is the existing role of women in date farming? How and why can the role of women be increased? What are women training needs?
Membership	Is there a farmer's association, if yes, how many are members of the association? How much is the membership fee? What is the advantage of membership? Would you consider forming a producer group for joint procurement of inputs and marketing of produce?

Indicative Net Farm Income (NFI) from Date Plantation					
	Description	Unit	Rate per unit	Amount	Remarks
A	Area (acres)				Variety
B	Expenditure (per acre)				
	Production cost				
1	Tractor plowing and leveling	acre			
2	Bullock plowings leveling	acre			
3	Digging of holes	days			
4	Suckers/acre	Rs.			Source
5	Family labor (sowing/transplanting)	hrs			
6	Hired labor (sowing/transplanting)	day			
7	Family labor (weeding)	day			
8	Hired labor (weeding)	day			
9	Farm Yard manure	carts			
10	Urea	bags			
11	Ammonium sulphate	bags			
12	DAP/NP	bags			
13	Potash	bags			
14	Micronutrients	bags			
15	Weedicide/fungicide/herbicide	liter			
16	Pesticide/insecticide	liter			
17	Purchased irrigation water/acre	Rs.			
18	Family labor harvesting & packing	days			
19	Hired labor harvesting & packing	days			
20	Family labor curing/ripening				
21	Hired labor curing/ripening				
22	Family labor packing	days			
23	Permanent labor	month			
24	Water charges & land revenue	Rs.			
25	Others if any (specify)				
C	Revenue (Total production)				
a	Total Production	maunds			
b	Retained for consumption	maunds			
c	Quantity sold in the market	maunds			
d	Price	Rs.			
e	Packing material cost	bag/carton			
f	Transportation cost to market	maunds			

Indicative Net Farm Income (NFI) from Date Plantation					
	Description	Unit	Rate per unit	Amount	Remarks
g	Unloading & market fee (lump sum)	Rs.			
h	Commission Agent charges	%			
i	Storage Cost (lump sum)	Rs.			
j	Fees for contaminants (like aflatoxin) test if any (lump sum)	Rs.			
k	Other marketing costs	Rs.			

Comments from the respondent	Do you have any specific comments, issues or suggestions regarding problems or issues you (farmers) are facing and what could improve the productivity and quality of crop?

04. FARM PRODUCTION SURVEY QUESTIONNAIRES FOR TOMATO FARMERS

Questions	Response (Circle appropriate answer)
Cluster ID and Crop	Tomatoes
Date of Interview	
Name of Farmer:	
Name of Village:	
Name of Union Council:	
District:	
Name of investigator	
Name of supervisor	
Status of Farmer	Single owner Joint holding
Tenurial Status	Owner cultivator Sharecropper Cash tenant
If Leased in	If leased in: Please mention rate per acre
Farm Size	Size of farm in acres Cultivated area in acres
Source of irrigation:	What are sources of irrigation? Perennial canal Non-perennial canal Tube well Stream Pond Others (specify)
Method of irrigation	Flood irrigation in acres Drip irrigation in acres Others (specify) Cost of drip irrigation per acre (Rs.....): Water saving (%):
Area under crops & production	Obtain information of crop-wise area

Crop	Area	Production
Specify		
Specify		

<table>
<tr><td></td><td>
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<tr><td>Specify</td><td></td><td></td></tr>
<tr><td>Tomatoes</td><td></td><td></td></tr>
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</td></tr>
<tr><td>Source of seed/seedlings</td><td>Do you use own seed/seedlings?
Do you purchase seed/seedlings from other farmers?
Do you purchase seedlings from a commercial nursery?
Do you purchase seed from seed merchants?
Do you purchase seed from commission agent?
Are you satisfied with the quality of seed/seedling purchased from different sources?
Which are the most reliable sources?</td></tr>
<tr><td>Method of sowing / transplanting</td><td>Which method of sowing/transplanting do you use? Why?
What are the other methods? Why don’t you use them? Reasons?
From where have you learned this method? Who advised you?
Time of sowing.
Nursery Raising:
Sowing techniques used:
Flat beds
Raised beds
Seedling trays</td></tr>
<tr><td>Varieties grown</td><td>Name of varieties and area
<table>
<tr><th>Variety</th><th>Area (acres)</th><th>% share</th></tr>
<tr><td>Specify</td><td></td><td></td></tr>
<tr><td>Specify</td><td></td><td></td></tr>
<tr><td>Specify</td><td></td><td></td></tr>
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</td></tr>
<tr><td>Preferred variety</td><td>Names of varieties and reasons for preference:
High yielding
Early in season
Better market acceptance
Pest/disease resistance
Others (specify)</td></tr>
<tr><td>Machinery and Tools</td><td>Do you have power sprayers or manual or both? Give number
Farm machinery & tools [e.g. Rotavator, Leveling machine, Others please specify]- Give list</td></tr>
<tr><td>Soil management practices</td><td>Do you regularly get soils tested and from where?
Do you practice intercropping at initial years of plantation?
Do you use farm yard manure (compost) & what is its source?
Do you practice green manuring & which crop?
Do you use NPK and micronutrients?</td></tr>
<tr><td>Pests, diseases & weeds</td><td>-What is the incidence of pests, diseases & weeds? High, Medium, Low
-What are the main pests?
-What are the main diseases?
-How do you control pest, diseases and weeds?
a) Chemical means
b) Biological means
c) Manually (weeds)
What chemicals do you apply for controlling pests, diseases and weeds?
Pesticides/Fungicides/weedicide (Source, Quality)
Are suppliers reliable?
Who advises you on use of pesticides?
Are you satisfied with the price and quality of chemicals available in the market?</td></tr>
<tr><td>Plant nutrition management</td><td>How do you decide on the use of fertilizers and micronutrients?
Fertilizer (Source, Quality) – [Chemical fertilizers, bio fertilizers etc.]
Micronutrients (Source, Quality)</td></tr>
</table>

Crop productivity	What is the yield per acre for tomatoes? Is this low or reasonable? If low, what are the reasons? What are good agricultural practices for getting high yield?
Harvesting Details	How do you assess crop maturity? At which stage of crop maturity do you start harvesting? Do you use harvesting aids/equipment? List harvesting aids/equipment used Do you have skilled labour for harvesting? Do you face labour shortage?
Storage	Do you store tomatoes on-farm? If yes, under which conditions? How long do you store tomatoes?
Grading & Packing Practices	Do you grade & pack the produce before selling? What type of packaging do you use? Does grading fetch better prices: If yes, how much over the normal market price? Does improved packaging fetch better prices? If yes, how much over the normal market price?
Transportation practices	What means of transport do you use & why? What is the cost of transportation?
Mode of sale	How do you sell your produce? To pre-harvest contractors – acreage & sale amount To itinerant traders – quantity & sale amount Through commission agents - quantity & sale amount To wholesalers direct- quantity & sale amount To exporters - quantity & sale amount Others (specify) - quantity & sale amount What is the preferred mode of sale & why? Are you satisfied with the prices received? Yes/No If no, why?
Quality (SPS)	Are you aware of sanitary & phytosanitary issues? What are sanitary & phytosanitary issues in tomatoes? What measures do you adopt to address sanitary & phytosanitary issues? Who advises you on sanitary & phytosanitary issues?
Source of Funding	How do you finance tomato farming? a) Own capital b) Advance from commission agents/traders c) Bank borrowing d) others (specify) What is the amount advanced by commissions agents/traders and its terms and conditions? What is the amount borrowed from banks and its terms and conditions? What is your preferred source of funding and why? Do you face any collateral constraint from borrowing from banks?
Source of Knowledge/ Advisory	-Own experience/inherited/acquired (% of respondents). -Watching/listening to advertisement on TV/radio. % -Observing other farmers (% of respondents). -Advice from input supplier (% of respondents) -Advice from RSP/NGO technical staff (% of respondents) -Advice from agriculture extension staff (% of respondents) -How many of you have received training through FFS? % -What are the sources of market information? -How efficient are these? -What is the preferred & most reliable source?
Crop Losses	Percentage decrease in yield due to pest attack.

	Percentage of crop loss due to poor quality/grade. Percentage of crop loss due to poor packaging. Percentage of crop loss during transportation. Percentage of any other (specify) postharvest losses.
Capacity building needs	What trainings do you suggest for improving tomato farming profitability? a) Planting (lay out & planting techniques) b) Pest & disease management c) Irrigation & plant nutrition d) Harvesting & field handling e) Marketing f) Others (specify)
Gender	What is the existing role of women in tomato farming? How and why can the role of women be increased? What are women training needs?
Membership	Is there a farmer's association, if yes, how many are members of the association? How much is the membership fee? What is the advantage of membership? Would you consider farming a producer group for joint procurement of inputs and marketing of produce?

Indicative Net Farm Income (NFI) from Tomatoes					
	Description	Unit	Rate per unit	Amount	Remarks
A	Area (acres)				Variety
B	Expenditure (per acre)				
	Production cost				
1	Tractor plowing and leveling	acre			
2	Bullock plowings leveling	acre			
3	Ridges and furrows	days			
4	Seed/nursery seedlings/acre	Rs.			Source
5	Family labor (sowing/transplanting)	hrs			
6	Hired labor (sowing/transplanting)	day			
7	Family labor (weeding)	day			
8	Hired labor (weeding)	day			
9	Farm Yard manure	carts			
10	Urea	bags			
11	Ammonium sulphate	bags			
12	DAP/NP	bags			
13	Potash	bags			
14	Micronutrients	bags			
15	Weedicide/fungicide/herbicide	liter			
16	Pesticide/insecticide	liter			
17	Purchased irrigation water/acre	Rs.			
18	Family labor (harvesting & packing)	days			
19	Hired labor (harvesting & packing)	days			
20	Permanent labor	month			
21	Water charges & land revenue	Rs.			
22	Others if any (specify)				
C	Revenue (Total production)				
a	Total Production	maunds			
b	Retained for seed/consumption	maunds			
c	Quantity sold in the market	maunds			
d	Price	Rs.			
e	Packing material cost	Crate/carton			
f	Transportation cost to market	maunds			
g	Unloading & market fee (lump sum)	Rs.			

Indicative Net Farm Income (NFI) from Tomatoes					
	Description	Unit	Rate per unit	Amount	Remarks
h	Commission Agent charges	%			
i	Storage Cost (lump sum)	Rs.			
j	Fees for contaminants (like aflatoxin) test if any (lump sum)	Rs.			
k	Other marketing costs	Rs.			

Comments from the respondent	Do you have any specific comments, issues or suggestions regarding problems or issues you (farmers) are facing and what could improve the productivity and quality of crop?

ANNEX 6, TABLE A: COMPUTED AND ADJUSTED FPSQ SAMPLE ALLOCATION IN TARGET DISTRICTS

S.#	Districts	Banana		Chilies		Dates		Tomato		All Crops	
		Computed	Adjusted	Computed	Adjusted	Computed	Adjusted	Computed	Adjusted	Computed	Adjusted
1	Bahawalpur	0	0	5	30	4	0	24	30	33	60
2	Khanewal	6	0	4	30	0	0	18	30	28	60
3	Lodhran	0	0	6	30	0	0	5	30	11	60
4	Multan	1	0	11	30	1	0	10	30	23	60
5	Sheikhupura	2	0	2	30	0	0	71	70	75	100
6	Hyderabad	13	30	6	30	0	0	3	30	22	90
7	Khairpur	227	200	3	30	294	300	4	30	528	560
8	Mirpurkhas	25	40	238	190	0	0	137	140	400	370
9	T'AllahYar	30	40	14	30	0	0	8	30	52	100
10	Thatta	194	190	65	70	0	0	387	250	646	510
11	Umerkot	1	0	346	200	0	0	33	30	380	230
	Total	**499**	**500**	**700**	**700**	**299**	**300**	**700**	**700**	**2,198**	**2,200**

Source: Computed by Consultants

ANNEX 6 TABLE B: ACTUAL NUMBER OF FARMERS INTERVIEWED

S.No	Name of District	Banana	Chili	Date	Tomato	Total
1	Bahawalpur	.	22	.	27	49
2	Khanewal	.	29	.	28	57
3	Lodhran	.	30	.	27	57
4	Multan	.	27	.	27	54
5	Sheikhupura	.	29	.	69	98
6	Hyderabad	167	46	.	44	257
7	Khairpur	175	0	317	3	495
8	Mirpurkhas	9	178	.	149	336
9	Tando Allah Yar	76	50	.	29	155
10	Thatta	52	116	.	274	442
11	Umerkot	.	202	.	34	236
	Total					

01. DISCUSSION GUIDELINES (CHECKLIST FOR FGDS WITH BANANA FARMERS)

Questions	Response (Circle appropriate answer)
Cluster ID and Crop	Banana
Date of FGD	
Location	District, tehsil (Taluka), village
Name of the investigator	
Name of Supervisor	
List of persons present	Number (Please record names of attendees, their farm size, and acreage of crops, contact details on a separate sheet)
Experience	Number of years
Cropping pattern	Total farm area of your village. Total cropped area of your village What are the main crops grown in the village? What is the area under all vegetables in Kharif and Rabi season? What is the crop wise area in Kharif and Rabi season? Number of famers growing the above mentioned Kharif and Rabi crops? Average area under banana crop and range (Min – Max). What is 'Ratoon' crop? Experience of 'Ratoon' crop. Intercropping – Advantages & disadvantages of intercropping
Source of seed/seedlings	How do you select a variety for cultivation? On what basis? Whose advice do you seek? Why? How many farmers use their own suckers? How many farmers purchase suckers from other farmers?
Method of sowing / transplanting	How do you plant the suckers? Any special consideration? Do you do high-density planting? Why? Why not? What are the advantages / disadvantages of high-density planting?
Varieties grown	1) Name of variety and area 2) Name of variety and area 3) Name of variety and area 4) Name of variety and area
Preferred variety	Preferred varieties grown. Names and reason (high yielding, early in season, better market acceptance, pest/disease resistance, etc.)
Machinery and Tools	How many of you have power sprayers? How many of you have manual sprayers? How many of you have other machinery/tools for land preparation? [e.g. Rotavator, Levelling machine, Others please specify]

Soil management practices	How many of you get soils tested and from where? How many of you practice intercropping at an early crop stage? How many of you use farmyard manure (compost)? How many of you practice green manuring? How many of you soil cover (crops)? How many of you use NPK and micronutrients?
Irrigation Details	-Sources of irrigation -Quality of water (sweet, brackish) -How many of you use water-conserving techniques like basins, mulching? -How many of you have a high efficiency irrigation system (drip)? -Reasons for not using water conservation techniques -Reasons for not using high efficiency irrigation system (drip)
Pests, diseases & weeds	-What is the incidence of pests, diseases & weeds? High, Medium, Low -What are the main pests? -What are the main diseases? -How do you control pest, diseases and weeds? a) Chemical means b) Biological means c) Manually (weeds) What chemicals do you apply for controlling pests, diseases and weeds? Pesticides/Fungicides/weedicide (Source, Quality) Are suppliers reliable? Who advises you on use of pesticides? Are you satisfied with the price and quality of chemicals available in the market?
Plant nutrition management	How do you decide on use of fertilizers and micronutrient? Fertilizer (Source, Quality) – [Chemical fertilizers, bio fertilizers etc.] Micronutrients (Source, Quality)
Crop productivity	What is the banana yield per acre? Is this low or reasonable? If low, what are the reasons? What are good agricultural practices for getting a high yield?
Harvesting Details	How do you assess crop maturity? At which stage of crop maturity do you start harvesting? Do you use harvesting aids/equipment? List harvesting aids/equipment used Do you have skilled labour for harvesting? Do you face labour shortages?
Grading & Packing Practices	Do you grade & pack the produce before selling? What type of packaging do you use? Does grading fetch better prices: If yes, how much over the normal market price? Does improved packaging fetch better prices? If yes, how much over the normal market price?
Transportation practices	What means of transport do you use & why? Do you transport banana in loose (bunches) or packaged form? What is the cost of transportation?
Mode of Disposal	How many of you sell the crop to itinerant traders? How many sell crop to pre-harvest contractors? How many of you sell crop through commission agents? If yes place of sale. How many of you sell the crop to wholesalers directly? If yes, place of sale.

	How many of you sell the crop directly to exporters? If yes, place of sale What is the preferred mode of sale & why? Are you satisfied with the prices received? Yes/No If no, why?
Income	What is the average gross income from an acre of banana crop? Give range in case of significant variation? What is the cost of production for an acre of banana crop? Give range in case of significant variation?
Quality (SPS)	Are you aware of sanitary & phytosanitary issues? What are sanitary & phytosanitary issues with banana? What measures do you adopt to address sanitary & phytosanitary issues? Who advises you on sanitary & phytosanitary issues?
Source of Funding	How do you finance banana farming? a) Own capital b) Advance from commission agents/traders c) Bank borrowing d) others (specify) What is the amount advanced by commissions agents/traders and its terms and conditions? What is the amount borrowed from banks and its terms and conditions? What is your preferred source of funding and why? Do you face any collateral constraint from borrowing from banks?
Source of Knowledge/ Advisory	-Own experience/inherited/acquired (% of respondents). -Watching/listening advertisement on TV/radio. % -Observing other farmers (% of respondents). -Advice from input supplier (% of respondents) -Advice from RSP/NGO technical staff (% of respondents) -Advice from agriculture extension staff (% of respondents) -How many of you have received training through FFS? % -What are sources of market information? -How efficient are these? -What is the preferred & most reliable source?
Crop Losses	Percentage decrease in yield due to pest attack. Percentage of crop loss due to poor quality/grade. Percentage of crop loss due to poor packaging. Percentage of crop loss during transportation. Percentage of any other (specify) postharvest losses.
Capacity building needs	What trainings do you suggest for improving banana cultivation profitability? a) Planting b) Pest & disease management c) Irrigation & plant nutrition d) Harvesting & field handling e) Marketing f) Others (specify)
Gender	What is the existing role of women in banana farming? How and why can the role of women be increased? What are women training needs?
Membership	Is there a farmer's association, if yes, how many are members of the association? How much is the membership fee? What is the advantage of membership? Would you consider farming a producer group for joint procurement of

	inputs and marketing of produce?
Comments from the respondent	Do you have any specific comments, issues or suggestions regarding improving the productivity, reduction in postharvest losses, improving the quality of output, quality control and testing services, equipment needs, storage facility, access to production loans, etc.

02. DISCUSSION GUIDELINES (CHECKLIST FOR FGDS WITH CHILI FARMERS)

Questions	Response (Circle appropriate answer)
Cluster ID and Crop	Chilies
Date of FGD	
Location	District, Tehsil (Taluka), village
Name of the investigator	
Name of Supervisor	
List of persons present	Number (Please record name of attendees, their farm size, and acreage of crop, contact details on a separate sheet)
Experience	Number of years
Cropping pattern	Total farm area of your village. Total cropped area of your village What are the main crops grown in the village? What is the area under all vegetables in Kharif and Rabi season? What is the total area under chili crop? Number of famers growing the chili crop? Average area per farmer under chili crop? Give a range if variation in area is significant?
Source of seed/seedlings	How do you select a variety for cultivation? On what basis? Whose advice do you seek? Why? How many farmers use their own seed/seedlings? How many farmers purchase seed/seedlings from other farmers? How many farmers purchase seedlings from a commercial nursery? How many farmers purchase seed from seed merchants? How many farmers purchase seed from a commission agent? Are you satisfied with the quality of seed/seedling purchased from different sources? Which are the most reliable sources?
Method of sowing / transplanting	Which method of sowing/transplanting do you use? Why? What are the other methods? Why don't you use them? Reasons? From where have you learnt this method? Whose advice? Time of sowing. Nursery Raising: Sowing techniques used: Flat beds, Raised beds, Seedling trays
Varieties grown	1) Name of variety and area 2) Name of variety and area 3) Name of variety and area 4) Name of variety and area
Preferred variety	Preferred varieties grown. Names and reason (high yielding, early in season, better market acceptance, pest/disease resistance, etc.)
Machinery and Tools	How many of you have power sprayers? How many of you have manual sprayers? How many of you have other machinery/tools for land preparation?

	[e.g. Rotavator, Leveling machine, Others please specify]
Soil management practices	How many of you get soil tested and from where? How many of you use farm yard manure (compost)? How many of you practice green manuring? How many of you soil cover (crops)? How many of you use NPK and micronutrients?
Irrigation Details	-Sources of irrigation -Quality of water (sweet, brackish) -Do you use water-conserving techniques? Yes/No If yes, what water conservation techniques are common? -How many of you have high efficiency irrigation system (drip)? -Reasons for not using water conservation techniques -Reasons for not using high efficiency irrigation system (drip)
Pests, diseases & weeds	-What is the incidence of pests, diseases & weeds? High, Medium and Low -What are the main pests? -What are the main diseases? -How do you control pest, diseases and weeds? a) Chemical means b) Biological means c) Manually (weeds) What chemicals do you apply for controlling pests, diseases and weeds? Pesticides/Fungicides/weedicide (Source, Quality) Are suppliers reliable? Who advises you on use of pesticides? Are you satisfied with the price and quality of chemicals available in the market?
Plant nutrition management	How do you decide on use of fertilizers and micronutrients? Fertilizer (Source, Quality) – [Chemical fertilizers, bio fertilizers etc.] Micronutrients (Source, Quality)
Crop productivity	What is the yield per acre for chili? Is this low or reasonable? If low, what are the reasons? What are good agricultural practices for getting high yield?
Harvesting Details	How do you assess crop maturity? At which stage of crop maturity do you start harvesting? Do you use harvesting aids/equipment? List harvesting aids/equipment used Do you have skilled labour for harvesting? Do you face labour shortages?
Drying	How do you dry chili? a) On ground under the sun: % b) Under cover/shade: % c) Use of soil covers (mesh/Tyvek)? % d) Use of produce covers (mesh/Tyvek) to check sun radiation? % e) Use of both for soil and produce cover (mesh/Tyvek)? % f) Other technique (specify). % What is your preferred technique & why? How much preferred technique adds value (better quality, better price; reduced wastage?
Storage	Do you store chilies after drying? What type of storage is used? What is the usual storage period? What issues do you face in chili storage?
Grading & Packing	Do you grade & pack the produce before selling?

Practices	What type of packaging do you use? Does grading fetch better prices: If yes, how much over the normal market price? Does improved packaging fetch better prices? If yes, how much over the normal market price?
Transportation practices	What means of transport do you use & why? What are the costs of transportation?
Mode of Disposal	How many of you sell the crop to itinerant traders? How many sell crop to pre-harvest contractors? How many of you sell crop through commission agents? If yes place of sale. How many of you sell the crop to wholesalers directly? If yes, place of sale. How many of you sell the crop directly to exporters? If yes, place of sale What is the preferred mode of sale & why? Are you satisfied with the prices received? Yes/No If no, why?
Income	What is the average gross income from an acre of chili crop? Give a range in case of significant variation? What is the cost of production for an acre of chili crop? Give a range in case of significant variation?
Quality (SPS)	Are you aware of aflatoxin contamination? Is an aflatoxin testing facility available in your area? Would you like to check aflatoxin contamination for realizing better prices? Are you willing to pay for the aflatoxin contamination test?
Source of Funding	How do you finance chili farming? a) Own capital b) Advance from commission agents/traders c) Bank borrowing d) others (specify) What is the amount advanced by commissions agents/traders and its terms and conditions? What is the amount borrowed from banks and its terms and conditions? What is your preferred source of funding and why? Do you face any collateral constraint from borrowing from banks?
Source of Knowledge/ Advisory	-Own experience/inherited/acquired (% of respondents). -Watching/listening advertisement on TV/radio. % -Observing other farmers (% of respondents). -Advice from input supplier (% of respondents) -Advice from RSP/NGO technical staff (% of respondents) -Advice from agriculture extension staff (% of respondents) -How many of you have received training through FFS? % -What are sources of market information? -How efficient are these? -What is the preferred & most reliable source?
Crop Losses	Percentage decrease in yield due to pest attack. Percentage crop loss due to rains. Percentage of crop loss due to poor quality/grade. Percentage of crop loss due to poor packaging. Percentage of crop loss during transportation. Percentage of any other (specify) postharvest losses.
Capacity building needs	What trainings do you suggest for improving banana cultivation profitability?

	a) Planting b) Pest & disease management c) Irrigation & plant nutrition d) Harvesting & field handling e) Marketing f) Others (specify)
Gender	What is the existing role of women in chili farming? How and why can the role of women be increased? What are women training needs?
Membership	Is there a farmer's association, if yes, how many are members of the association? How much is the membership fee? What is the advantage of membership? Would you consider forming a producer group for joint procurement of inputs and marketing of produce?
Comments from the respondent	Do you have any specific comments, issues or suggestions regarding improving the productivity, reduction in postharvest losses, improving the quality of output, quality control and testing services, equipment needs, storage facility, access to production loans, etc.

03. DISCUSSION GUIDELINES: (CHECKLIST FOR FGDS WITH DATES FARMERS)

Questions	Response (Circle appropriate answer)
Cluster ID and Crop	Dates
Date of FGD	
Location	District, tehsil (Taluka), village
Name of the investigator	
Name of Supervisor	
List of persons present	Number (Please record names of attendees, their farm size, contact details, and acreage of crops on a separate sheet)
Experience	Number of years
Cropping pattern	Total farm area of your village? Total cropped area of your village? What are the main crops grown in the village? What is the area under all vegetables in Kharif and Rabi season? What is the crop wise area in Kharif and Rabi season? Number of famers growing the above mentioned Kharif and Rabi crops? Average area under dates crop and range (Min – Max). Intercropping – Advantages & disadvantages of intercropping
Source of suckers	How do you select a variety for cultivation? On what basis? Whose advice do you seek? Why? How many farmers use their own suckers? How many farmers purchase suckers from other farmers?
Method of planting	How do you plant the suckers? Any special consideration. Do you do high-density planting? Why? Why not?
Varieties grown	1) Name of variety and area 2) Name of variety and area 3) Name of variety and area 4) Name of variety and area

Preferred variety	Preferred varieties grown. Names and reason (high yielding, early in season, better market acceptance, pest/disease resistance, etc.)
Machinery and Tools	How many of you have power sprayers? How many of you have manual sprayers? How many of you have other machinery/tools for land preparation? [e.g. Rotavator, Levelling machine, Others please specify]
Soil management practices	How many of you get soils tested and from where? How many of you practice intercropping? What are the advantages / disadvantages of high-density planting? How many of you use farm yard manure (compost)? How many of you practice green manuring? How many of you soil cover (crops)? How many of you use NPK and micronutrients?
Irrigation Details	-Sources of irrigation -Quality of water (sweet, brackish) -How many of you use water-conserving techniques like basins, mulching? -How many of you have high efficiency irrigation system (drip)? -Reasons for not using water conservation techniques -Reasons for not using high efficiency irrigation system (drip)
Pests, diseases & weeds	-What is the incidence of pests, diseases & weeds? High, Medium, Low -What are the main pests? -What are the main diseases? -How do you control pest, diseases and weeds? a) Chemical means b) Biological means c) Manually (weeds) What chemicals do you apply for controlling for controlling pests, diseases and weeds? Pesticides/Fungicides/weedicide (Source, Quality) Are suppliers reliable? Who advises you on use of pesticides? Are you satisfied with the price and quality of chemicals available in the market?
Plant nutrition management	How do you decide on use of fertilizers and micronutrients? Fertilizer (Source, Quality) – [Chemical fertilizers, bio fertilizers etc.] Micronutrients (Source, Quality)
Crop protection against rains	Does rain affect your crop? What measures do you adopt to protect dates from rain? Is protection material easily available? What is cost of protection material per tree? Is it effective? Do you have other suggestions?
Crop productivity	What is the yield per acre of dates? Is this low or reasonable? If low, what are the reasons? What are good agricultural practices for getting high yield?
Harvesting Details	How do you assess crop maturity? At which stage of crop maturity do you start harvesting? Do you use harvesting aids/equipment? List harvesting aids/equipment used Do you have skilled labour for harvesting? Do you face labour shortages?
Curing (Ripening)	How do you cure/ripen dates? a) Open under the sun: % b) Curing tunnel (plastic, solar): % What are the quality issues in curing dates open under the sun? Does a curing tunnel (plastic, solar) have positive effects on date's quality?

	Do you prefer curing tunnel (plastic, solar)? What are the constraints in using a curing tunnel (plastic, solar)?
Grading & Packing Practices	Do you grade & pack the produce before selling? What type of packaging do you use? Does grading fetch better prices: If yes, how much over the normal market price? Does improved packaging fetch better prices? If yes, how much over the normal market price?
Transportation practices	What means of transport do you use & why? What is the costs of transportation?
Mode of Disposal	How many of you sell the crop to itinerant traders? How many sell crop to pre-harvest contractors? How many of you sell crop through commission agents? If yes place of sale. How many of you sell the crop to wholesalers directly? If yes, place of sale. How many of you sell the crop directly to exporters? If yes, place of sale What is the preferred mode of sale & why? Are you satisfied with the prices received? Yes/No If no, why?
Income	What is the average gross income from an acre of date crop? Give a range in case of significant variation? What is the cost of production for an acre of date crop? Give a range in case of significant variation?
Quality (SPS)	Are you aware of any sanitary & phytosanitary issues? What are sanitary & phytosanitary issues in dates? What measures do you adopt to address sanitary & phytosanitary issues? Who advises you on sanitary & phytosanitary issues?
Source of Funding	How do you finance dates farming? a) Own capital b) Advance from commission agents/traders c) Bank borrowing d) others (specify) What is the amount advanced by commissions agents/traders and its terms and conditions? What is the amount borrowed from banks and its terms and conditions? What is your preferred source of funding and why? Do you face any collateral constraint from borrowing from banks?
Source of Knowledge/ Advisory	-Own experience/inherited/acquired (% of respondents). -Watching/listening advertisement on TV/radio. % -Observing other farmers (% of respondents). -Advice from input supplier (% of respondents) -Advice from RSP/NGO technical staff (% of respondents) -Advice from agriculture extension staff (% of respondents) -How many of you have received training through FFS? % -What are the sources of market information? -How efficient are these? -What is the preferred & most reliable source?
Crop Losses	Percentage decrease in yield due to pest attack. Percentage crop loss due to rains. Percentage of crop loss due to poor quality/grade. Percentage of crop loss due to poor packaging. Percentage of crop loss during transportation. Percentage of any other (specify) postharvest losses.
Capacity building	What trainings do you suggest for improving banana cultivation profitability?

needs	a) Planting b) Pest & disease management c) Irrigation & plant nutrition d) Harvesting & field handling e) Marketing f) Others (specify)
Gender	What is the existing role of women in banana farming? How and why can the role of women be increased? What are women training needs?
Membership	Is there a farmer's association, if yes, how many are members of the association? How much is the membership fee? What is the advantage of membership? Would you consider forming a producer group for joint procurement of inputs and marketing of produce?
Comments from the respondent	Do you have any specific comments, issues or suggestions regarding improving the productivity, reduction in postharvest losses, improving the quality of output, quality control and testing services, equipment needs, storage facility, access to production loans, etc.

04. DISCUSSION GUIDELINES (CHECKLIST FOR FGDS WITH TOMATO FARMERS

Questions	Response (Circle appropriate answer)
Cluster ID and Crop	Tomatoes
Date of FGD	
Location	District, Tehsil (Taluka), village
Name of the investigator	
Name of Supervisor	
List of persons present	Number (Please record name of attendees, their farm size, contact details and acreage of crop on a separate sheet)
Experience	Number of years
Cropping pattern	Total farm area of your village. Total cropped area of your village What are the main crops grown in the village? What is the area under all vegetables in Kharif and Rabi season? What is the total area under tomato crop? Number of famers growing the tomato crop? Average area per farmer under tomato crop? Give a range if variation in area is significant?
Source of seed/seedlings	How do you select a variety for cultivation? On what basis? Whose advice do you seek? Why? How many farmers use their own seed/seedlings? How many farmers purchase seed/seedlings from other farmers? How many farmers purchase seedlings from a commercial nursery? How many farmers purchase seed from seed merchants? How many farmers purchase seed from commission agents? Are you satisfied with the quality of seed/seedling purchased from different sources? Which are the most reliable sources?
Method of sowing / transplanting	Which method of sowing/transplanting do you use? Why? What are the other methods? Why don't you use them? Reasons? From where have you learnt this method? Whose advice? Time of sowing.

	Nursery Raising: Sowing techniques used: Flat beds, Raised beds, Seedling trays
Varieties grown	1) Name of variety and area 2) Name of variety and area 3) Name of variety and area 4) Name of variety and area
Preferred variety	Preferred varieties grown. Names and reason (high yielding, early in season, better market acceptance, pest/disease resistance, etc.)
Machinery and Tools	How many of you have power sprayers? How many of you have manual sprayers? How many of you have other machinery/tools for land preparation? [e.g. Rotavator, Leveling machine, Others please specify]
Soil management practices	How many of you get soils tested and from where? How many of you use farm yard manure (compost)? How many of you practice green manuring? How many of you soil cover (crops)? How many of you use NPK and micronutrients?
Irrigation Details	-Sources of irrigation -Quality of water (sweet, brackish) -Do you use water-conserving techniques? Yes/No If yes, what water conservation techniques are common? -Reasons for not using water conservation techniques
Pests, diseases & weeds	-What is the incidence of pests, diseases & weeds? High, Medium, Low -What are the main pests? -What are the main diseases? -How do you control pest, diseases and weeds? a) Chemical means b) Biological means c) Manually (weeds) What chemicals do you apply for controlling pests, diseases and weeds? Pesticides/Fungicides/weedicide (Source, Quality) Are suppliers reliable? Who advises you on use of pesticides? Are you satisfied with the price and quality of chemicals available in the market?
Plant nutrition management	How do you decide on use of fertilizers and micronutrients? Fertilizer (Source, Quality) – [Chemical fertilizers, bio fertilizers etc.] Micronutrients (Source, Quality)
Crop productivity	What is the per acre yield for tomato? Is this low or reasonable? If low, what are the reasons? What are good agricultural practices for getting high yield?
Harvesting Details	How do you assess crop maturity? At which stage of crop maturity do you start harvesting? Do you use harvesting aids? List harvesting aids used Do you have skilled labour for harvesting? Do you face labour shortages?
Storage	Do you store tomatoes on-farm? If yes, under which conditions? How long do you store tomato?

Grading & Packing Practices	Do you grade & pack the produce before selling? What type of packaging do you use? Does grading fetch better prices: If yes, how much over the normal market price? Does improved packaging fetch better prices? If yes, how much over the normal market price?
Transportation practices	What means of transport do you use & why? What is the cost of transportation?
Mode of Disposal	How many of you sell the crop to itinerant traders? How many sell crop to pre-harvest contractors? How many of you sell crop through commission agents? If yes place of sale. How many of you sell the crop to wholesalers directly? If yes, place of sale. How many of you sell the crop directly to exporters? If yes, place of sale What is the preferred mode of sale & why? Are you satisfied with the prices received? Yes/No If no, why?
Income	What is average gross income from an acre of tomato crop? Give a range in case of significant variation? What is the cost of production for an acre of tomato crop? Give a range in case of significant variation?
Quality (SPS)	Are you aware of any sanitary & phytosanitary issues? What are sanitary & phytosanitary issues in tomatoes? What measures do you adopt to address sanitary & phytosanitary issues? Who advises you on sanitary & phytosanitary issues?
Source of Funding	How do you finance tomato farming? a) Own capital b) Advance from commission agents/traders c) Bank borrowing d) others (specify) What is the amount advanced by commissions agents/traders and its terms and conditions? What is the amount borrowed from banks and its terms and conditions? What is your preferred source of funding and why? Do you face any collateral constraint from borrowing from banks?
Source of Knowledge/ Advisory	-Own experience/inherited/acquired (% of respondents). -Watching/listening advertisement on TV/radio. % -Observing other farmers (% of respondents). -Advice from input supplier (% of respondents) -Advice from RSP/NGO technical staff (% of respondents) -Advice from agriculture extension staff (% of respondents) -How many of you have received training through FFS? % -What are sources of market information? -How efficient are these? -What is the preferred & most reliable source?
Crop Losses	Percentage decrease in yield due to pest attack. Percentage crop loss due to rains. Percentage of crop loss due to poor quality/grade. Percentage of crop loss due to poor packaging. Percentage of crop loss during transportation. Percentage of any other (specify) postharvest losses.
Capacity building needs	What trainings do you suggest for improving banana cultivation

	profitability? a) Planting b) Pest & disease management c) Irrigation & plant nutrition d) Harvesting & field handling e) Marketing f) Others (specify)
Gender	What is the existing role of women in tomato farming? How and why can the role of women be increased? What are women training needs?
Membership	Is there a farmer's association, if yes, how many are members of the association? How much is the membership fee? What is the advantage of membership? Would you consider forming a producer group for joint procurement of inputs and marketing of produce?
Comments from the respondent	Do you have any specific comments, issues or suggestions regarding improving the productivity, reduction in postharvest losses, improving the quality of output, quality control and testing services, equipment needs, storage facility, access to production loans, etc.

ANNEX TABLE 8: FGD DISTRIBUTION BY CROPS IN THE TARGET DISTRICTS (ACTUAL)

S.#	District Name	Bananas	Chilies	Dates	Tomatoes	Total
1	Bahawalpur		1		1	2
2	Khanewal		1		1	2
3	Lodhran		1		1	2
4	Multan		1		1	2
5	Sheikhupura		1		2	3
6	Hyderabad	2	2		1	5
7	Khairpur	2		8		10
8	Mirpurkhas	2	2		3	7
9	Tando Allah Yar	4	0		1	5
10	Thatta	2	2		3	7
11	Umerkot		4		1	5
	Total	**12**	**15**	**8**	**15**	**50**

ANNEX 9

LIST OF IN DEPTH INTERVIEWS

DISCUSSION GUIDELINES IDIS (CHECKLIST FOR CHILIES AND TOMATO NURSERIES)

Questions	Response (Circle/record appropriate answer)
Cluster ID and Crop	
Date of interview	
Name of the investigator	
Name of Supervisor	
Name of respondent	
Respondent contact number	

Name of business / shop	
Location / Add	District, city, town, tehsil, village
GPS Location	
Type of Nursery	Type of Nursery Commercial nursery Farmers in the area Sowing Techniques Used Raised beds (Please explain_____) Flat beds, (Please explain_____) Seedling trays (Please explain_____)
Nursery Management Skill	Are you trained in nursery management? (Yes / No) If yes, from where did you receive the training? (Open Ended) In which particular subject/skill/technique did you receive training? (Open Ended)
Source of Technical Advice	From whom do you get technical assistance? What are the most reliable sources? Fellow nursery owners Agriculture extension staff NGO/RSP Private agriculture expert Farmers/nurseries association, Others specify_____
Source of seed	From where do you acquire the seed for raising the nursery? Own seed Purchased from other farmers Purchased from seed merchants/shops/seed companies Other (specify)
Nursery Expenditures – including Labor Cost	Please tell us about your expenditures for raising a nursery: Plot size (acres) – ……..[Own / Rented] Amount of seed used (kg)……Cost (Rs.....)…… Cost of seed bed preparation (Rs.....) Cost of farm yard manure (Rs.....) Cost of fertilizer (Rs.....) Cost of pesticide (Rs.....) Cost of fungicide (Rs.....) Cost of irrigation water (tube-well) (Rs.....) Do you have permanent labor? (Yes/ No) If yes, number of permanent laborers and monthly wages Do you hire casual labor? If yes, number of persons, days & daily wage rate Other cost (specify) Total cost involved
Details of Revenue	Quantity of seedlings produced (number/area)?
	Rate:
	Total Revenue:
Selling – Terms of Payment	Payment Terms - How do the farmers pay? Cash In kind (produce) Credit If sold on credit, what is the period of recovery?
Pests and diseases	Do you face pests and disease problems?

	If yes, what are the main pests and diseases How do you control pests and diseases
Training Needs	What types of training do you suggest are necessary for Chilies and Tomato Nurseries owners? Sowing Techniques, Pest management Fertilizer application Weed control Other, specify_____
Comments from the respondent	Do you have any specific comments, issues, suggestions regarding your business that would improve your services to the farmers? (Open Ended)

DISCUSSION GUIDELINES IDIS (CHECKLIST FOR INPUT AGRO DEALER/INPUTS SUPPLIER)

Questions	Response (Circle/record appropriate answer)
Cluster ID and Crop	
Date of interview	
Name of the investigator	
Name of Supervisor	
Name of respondent	
Respondent contact number	
Name of business / shop	
Location	District, city, town, village
GPS Location	
Education	
Experience	Number of years
Training received	
Type of Inputs	Which type of inputs do you deal in? -Seed -Fertilizers -Pesticides -Weedicides -Others (specify)
Type of Business	Franchise, Authorized Dealership, Without dealership
	If franchise or dealership, name of Company: -Seed -Fertilizer -Pesticide/Weedicide -Agricultural implements/tools -Others (specify)
Quantity of inputs sold in a year	-Seed (MT) -Fertilizer (types, bags) (like Urea, DAP, Nitrophos, Potash, Mixed fertilizers) -Pesticides (liters or kgs) -Weedicides (liters or kgs) -Fungicides ((liters or kgs) -Micronutrients (liters or kgs) -Agricultural implements/tools (type & number) --Others (specify)
Value of Sales (Rupees)	-Seed (MT)

	-Fertilizer (types, bags) (like Urea, DAP, Nitrophos, Potash, Mixed fertilizers) -Pesticides (liters or kgs) -Weedicides (liters or kgs) -Fungicides ((liters or kgs) -Micronutrients (liters or kgs) -Agricultural implements/tools (type & number) -Others (specify
Number of client farmers	
Terms of sale	Percentage sale in cash Percentage sale on credit If on credit, do you recover in cash or in-kind
Training	Have you received training in inputs sale business? If yes, from where? What was the training duration? What topics were covered? Are you interested in training? If yes, what type of training will you be interested in getting? What should be the duration of training?
Extension services	Do you guide farmers on use/application of inputs: Yes/No
Source of funding	Own capital or borrowing? If borrowing, from whom do you borrow?
Bank borrowing	How much do you borrow from banks in a year? What is the mark up rate? Do you have an overdraft limit arrangement with the bank? (Yes/No)
Are you member of any trade association	Yes/No
Comments from the respondent	Do you have any specific comments, issues or suggestions regarding your business that would improve your profitability and services to the farmers?

DISCUSSION GUIDELINES IDI (CHECKLIST FOR PRE-HARVEST CONTRACTORS)

Questions	Response (Circle/record appropriate answer)
Cluster ID and Crop	Cluster ID Name of Crop
Date of interview	
Name of the investigator	
Name of Supervisor	
Name of respondent	
Respondent contact number	
Name of business / shop	
Location	District, city, town, village
GPS Location	
Experience	Number of years
Selection of Farm & Average Area Contracted	How do you select the farm (crop) to be purchased/contracted? Please elaborate the key features considered in selection of a farm. How do you assess the quantity of a crop harvest? Number of farms (also acres) you usually purchase in one crop season? How much area (acres) of (specific) crop was contracted in 2016?
Time of Contract	When do you contract/purchase crops? a) At blossom (b) middle of harvest maturity (c) harvest maturity

	Generally how many months before harvesting?
Value of Contract	How is the purchase value of a crop/produce decided? What factors influence the purchase amount? What is the value of a (specific) crop purchased in 2016- (Per acre or total purchase value? – (Rs.....)

ANNEX 10

ANNEX TABLE 10-A: PLANNED AND ACTUAL IDIS DISTRIBUTION BY STAKEHOLDERS

S.#	Stakeholder	Planned	Actual	Difference
1	Seed/nursery suppliers	9	1	(8)
2	Agro Dealers / Input providers	10	23	13
3	Pre-harvest Contractors	10	10	
4	Itinerant Dealer (Village Beopari)	5	6	1
5	Commission Agents	12	16	4
6	Wholesaler	11	12	1
7	Retailer	11	11	
8	Warehouse owners	8	15	7
9	Cold storages	5	0	(5)
10	Processors	8	7	(1)
11	Exporters	7	4	(3)
12	Ag. Extension staff / Research	4	8	4
13	Growers Associations	6	4	(2)
14	Trade Association	6	5	(1)
15	Equipment Supplier	5	6	1
16	RSPs/NGOs	5	5	
17	Microfinance Banks	6	7	1
18	Commercial Banks	6	8	2
19	MFI/MFB	4	4	
	Total	**138**	**152**	**14**

ANNEX 11

LIST OF FIELD TEAM MEMBERS

#	Name	Region	Edu. In Years	Age In Years	Done MR Projects	Done Agri. Projects
1	Muhammad Aamir (IDI-Rec.)	Punjab	12	27	3	30
2	Rashid Ali	Punjab	14	27	200	30
3	Mudassir Rehman	Punjab	14	28	150	20
4	Rao M. Abid	Punjab	14	26	500	30
5	Farman Ali	Punjab	14	26	500	50
6	M.Zubair	Punjab	12	24	10	0
7	Aqiq Munawwar	Punjab	14	22	50	5
8	Abrar Naveed	Punjab	12	36	15	10
9	M.Ejaz	Punjab	12	24	50	20
10	Ajmal Ghaffar (FGD-Rec.)	Punjab	12	38	100	50
11	Qaiser Abbas	Punjab	14	34	20	0
12	Qaiser Abbas (FGD-Rec.)	Punjab	14	35	100	50
13	Rao Muhammad Aftab (Supervisor)	Punjab	14	33	500	50
14	Mr. Adnan (Supervisor)	Sindh	14	30	100+	10+
15	Bilal	Sindh	12	27	20	2
16	Safdar	Sindh	16	30	20	5
17	Hamid Ali (FGD-Rec.)	Sindh	14	21	10	2
18	Faisal Jan	Sindh	14	22	2	1
19	Muzamil Sharif	Sindh	12	27	20	3
20	Assad	Sindh	12	20	5	0
21	Bashir Hussain	Sindh	12	35	15+	5
22	Shahbaz	Sindh	12	23	5	2
23	Mudasir	Sindh	12	21	10	2
24	Muhammad Ali (Supervisor)	Sindh	14	32	100+	30
25	Mohib Ali	Sindh	16	31	5	2
26	Jamshed Ahmed	Sindh	14	35	50+	2
27	Mr. Ghulam Hussain	Sindh	16	34	150+	15+
28	Usman Ghani (FGD-Rec)	Sindh	16	34	100+	20
29	Nadeem (IDI-Rec)	Sindh	14	35	120	10
30	Muhammad Qasim	Sindh	14	29	28	4

31	Umar Farooque	Sindh	14	37	20	5
32	Ghulam Murtaza	Sindh	16	34	150	10
33	Ishfaque Ahmed	Sindh	16	36	140	10
34	Khalid Bullo	Sindh	14	28	20	4
35	Muhammad Asif	Sindh	16	29	15	3
36	Muhammad Bilal	Sindh	14	25	0	0
37	Kalid Farooque	Sindh	14	29	0	0
38	M Saddique(Supervisor)	Punjab	14	43	200	3
39	Zulfaqar	Punjab	12	45	100	5
40	Ejaz	Punjab	12	37	100	5
41	Sufyan (FGD-Rec.)	Punjab	12	28	100	2
42	M Ishfaq (IDI-Rec.)	Punjab	12	43	80	2
43	Nouman (FGD-Rec.)	Punjab	12	25	20	0
44	Shahid Raza	Punjab	12	45	45	1
45	M. Ashraf	Punjab	12	37	80	20
46	Saqib Ali	Punjab	12	20	20	0
47	Abdul Majeed Khunzada (FE)	Sindh	16	49	300+	20+
48	Wajid Ishaq (FE)	Punjab	14	25	3	2
49	Saad Ullah Hashmi (FGD-Mod)	Sindh	16	42	200+	80+
50	Imran Abbas Lalika (FGD-Mod)	Punjab	16	38	200+	40+
51	Saeed Ahmed (IDI-Mod)	Punjab	16	38	150+	50+
52	Junaid Ahmed (IDI-Mod)	Sindh	16	25	3	0

ANNEX 12

SURVEY SCHEDULE

District Name	IDIs		FGDs		Farmers Survey Interviews	
	Start	End	Start	End	Start	End
Multan	25-Apr-17	28-Apr-17	25-Apr-17	26-Apr-17	25-Apr-17	28-Apr-17
Khanewal	29-Apr-17	3-May-17	29-Apr-17	29-Apr-17	29-Apr-17	3-May-17
Lodhran	4-May-17	7-May-17	28-Apr-17	28-Apr-17	4-May-17	7-May-17
Bahawalpur	8-May-17	11-May-17	27-Apr-17	27-Apr-17	8-May-17	11-May-17
Sheikhupura	25-Apr-17	3-May-17	30-Apr-17	30-Apr-17	25-Apr-17	3-May-17
Mirpurkhas	25-Apr-17	8-May-17	3-May-17	5-May-17	25-Apr-17	8-May-17
Umerkot	9-May-17	16-May-17	30-Apr-17	2-May-17	9-May-17	16-May-17
Tando Allah Yar	17-May-17	20-May-17	6-May-17	7-May-17	18-May-17	20-May-17
Hyderabad	21-May-17	23-May-17	25-Apr-17	27-Apr-17	21-May-17	23-May-17
Khairpur	25-Apr-17	12-May-17	8-May-17	18-May-17	25-Apr-17	12-May-17
Thatta	13-May-17	31-May-17	28-Apr-17	30-Apr-17	13-May-17	31-May-17

ANNEX TABLE 13-A: AREA OF TARGET CROPS IN THE SAMPLE (HECTARE)

S.No	District	Banana	Chilies	Dates	Tomato
		Area	Area	Area	Area
1	Bahawalpur		10		16
2	Khanewal		21		34
3	Lodhran		18		20
4	Multan		25		30
5	Sheikhupura		25		127
6	Hyderabad	731	44		34
7	Khairpur	597		679	7
8	Mirpurkhas	17	103		203
9	Tando Allah Yar	68	44		33
10	Thatta	379	184		899
11	Umerkot		131		47
	Total	**1,790**	**605**	**679**	**1,450**

ANNEX TABLE 13-B: PRODUCTION OF TARGET CROPS IN THE SAMPLE (MT)

S.No	District	Banana	Chilies	Dates	Tomato
		Production	Production	Production	Production
1	Bahawalpur		96		323
2	Khanewal		104		421
3	Lodhran		168		746
4	Multan		125		582
5	Sheikhupura		162		3301
6	Hyderabad	4651	107		250
7	Khairpur	6442		5849	187
8	Mirpurkhas	106	356		1213
9	Tando Allah Yar	240	118		249
10	Thatta	2318	891		6223
11	Umerkot		438		245
	Total	**13,757**	**2,565**	**5,849**	**13,741**

ANNEX TABLE 13-C: PRODUCTION OF TARGET CROPS IN THE SAMPLE (MT)

S.No	District	Banana	Chilies	Dates	Tomato
1	Bahawalpur		9.60		19.94
2	Khanewal		4.95		12.53
3	Lodhran		9.33		36.89
4	Multan		5.00		19.72
5	Sheikhupura		6.48		25.90
6	Hyderabad	6.36	2.43		7.27
7	Khairpur	10.80		8.62	27.13
8	Mirpurkhas	6.44	3.46		5.98
9	Tando Allah Yar	3.54	2.68		7.50
10	Thatta	6.12	4.84		6.92
11	Umerkot		3.34		5.27
11	Umerkot	7.68	4.24	8.62	9.48

ANNEX TABLE 13-D: NUMBER OF FARMERS IN THE SAMPLE (MT)

S.No	District	Banana	Chilies	Dates	Tomato
1	Bahawalpur	-	12	-	8
2	Khanewal	-	25	-	16
3	Lodhran	-	22	-	10
4	Multan	-	30	-	14
5	Sheikhupura	-	30	-	63
6	Hyderabad	196	53	-	17
7	Khairpur	160	-	317	3
8	Mirpurkhas	4	124	-	99
9	Tando Allah Yar	18	53	-	16
10	Thatta	101	222	-	441
11	Umerkot	-	158	-	23
11	**Total**	**479**	**729**	**317**	**711**