Annex-C Frequently Asked Questions

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Frequently Asked Questions ver 2

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Contents

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Introduction:

In this new version of the report, additional Frequently Asked Questions (FAQs) have been added. These FAQs were generated as a result of farmer queries to the helpline. The first version of the report produced FAQs on the designated target crops: Wheat, Cotton, Citrus and Rice only. When the help line was launched in March 2013, the farmers asked questions related to all their farming needs. As the helpline workflow was designed to provide and generate information, it resulted in generation of over 220 FAQs on other crops such as sugar cane, maize, sunflower etc. These new FAQs have been added to annex 3 of this report.

This report covers the Frequently Asked Questions (FAQs) by the farmers. The aim of this activity is twofold:

1. Develop a protocol whereby the first set of FAQs are developed
2. Develop the first set of FAQs to provide standard information to the extension workers and the farmers.

The FAQs are proposed to be part of the knowledge database that will be used to respond to the queries of the farmers through the help desk. The FAQs will further inform and form the basis for the text/messages that will be sent to the farmers.

FAQ Development Methodology:

The FAQs are informed by:

- Three workshops conducted in the target districts with the public and private extension workers.
- The base line survey conducted in the three target districts (1)
- Review of Agriculture Extension advisories issued by the extension department for the three target districts.

Once the FAQs are developed these are further reviewed by the Adoptive Research department of the Directorate of Agriculture Extension and Adoptive Research Punjab.

Farmer Knowledge Needs Assessment Workshops with Extension Workers in Target Districts:

One workshop each was conducted in the target districts with the public and private sector extension workers in July 2012. The objective of the workshops was:

1. To document the FAQs/information that the local Extension workers believe farmers ask them most about.
2. To document information the local Extension workers believe farmers should have in order to increase the quality and quantity of their produce.

In order to achieve above, extension workers from eight disciplines of agriculture were agriculture participated in the workshops i.e. 1) agronomy, 2) soil science, 3) plant entomology, 4) plant pathology, 5) plant breeding and genetics, 6)

Farmer Knowledge Needs Assessment Workshop-Sialkot

horticulture, 7) agricultural economics and 8) agricultural extension. Furthermore, it was ensured that extension providers from both public and private sector participated in the workshops so at to obtain the overall view from both the sectors. Attendance lists of the participants of the three workshops are attached as Annex - 1

Each workshop was divided into two sessions, morning session covering the cash crop of the district and the afternoon session covering wheat.

In Vehari the morning session was focussed on Cotton, in Sialkot it was dedicated to Rice and in Sargodha the focus of the morning session was Citrus.

The participants were divided into groups (based on their area of specialization) and each group was assigned a particular area of the target crop.

Farmer Knowledge Needs Assessment Workshop-Sargodha

The topic distribution for Cotton was:

- Land Preparation / Selection of Seed / Seed Treatment / Sowing / Irrigation Practices / Water Analysis
- Soil Analysis / Nutrition Deficiency / Fertilizer selection and application practices
- Plant Protection – Diseases, Pests / Viral/Fungal / Insect Attacks: Pest scouting / Symptoms/ Diagnosis, Preventive and Curative Measures / Weeds Control
- Picking / Harvesting / Storage / Marketing Practices / Others

The topic distribution for Rice in Sialkot was:

- Land Preparation for nursery / Selection of Seed / Seed Treatment / Sowing of Nursery / Rice Nursery Management / Transplantation / Land Preparation for Rice Fields
- Water Analysis / Irrigation Practices / Soil Analysis / Nutrition Deficiency / Fertilizer selection and application practices
- Plant Protection – Diseases, Pests/Viral/Fungal/Insect Attacks: Symptoms/Diagnosis, Preventive and Curative Measures / Weeds Control
- Harvesting / Husking / Storage / Marketing Practices / Others

The topic distribution for Citrus in Sargodha was:

- Land Preparation, Nursery Management, Selection / Purchase of Nursery Plants / Designing Orchard Layout, Preparing pits, Plantations etc.
- Water Analysis / Irrigation Practices / Soil Analysis / Nutrition Deficiency / Fertilizer selection and application practices / Grafting etc.
- Plant Protection – Diseases, Pests/Viral/Fungal/Insect Attacks: Symptoms/Diagnosis, Preventive and Curative Measures / Weeds Control.
- Harvesting / Picking / Storage / Marketing Practices / Others

The topic distribution for Wheat was:

- Land Preparation / Selection of Seed Treatment / Sowing / Irrigation Practices / Nutrition Deficiency / Fertilizer selection and application practices
- Plant Protection / Weeds Control / Harvesting / Threshing / Storage / Marketing / others

The groups were asked to list the queries related to their assigned topics and then present their group work. The FAQs were transcribed using a computer while the presentations were being made. This final list of questions was printed at the end of the presentation sessions. This was then circulated amongst the workshop participants to rate the questions for importance on a scale of 1-5, where 5 was the most important and 1 the least important. Thus a consensus of all workshop participants on validity and importance of the questions was obtained.

Though it was not a direct objective of the workshops, the workshops resulted in capacity building of the extension workers as well. Apparently, these workshops were a first in the line of participatory workshops with such a mix of agriculture expertise focussed on farmer knowledge needs. The FAQs developed and vetted during the workshops helped build the capacity of the participants as well, who received exposure to agriculture areas other than their immediate expertise and to farmers' problems/queries in those areas.

Base Line Survey; Vehari, Sargodha and Sialkot (1)

An extensive baseline survey of the three target districts: Vehari, Sargodha and Sialkot was conducted in June-August 2012. The objectives of the research were:

- To determine the profile of farmers in the project areas.
- To evaluate the infrastructure available to the rural areas in terms of road network, educational facilities, health network, access to various TV channels, landline and mobile phone coverage
- To gauge the existing knowledge base of farmers and sources thereof.
- To probe for a deep understanding of their current agricultural practices for each and every farming stage of major crops in the project region i.e. from land preparation; to seed selection; seed treatment; use of fertilizers, weedicides and pesticides; water management; harvesting; post harvesting, and so on.
- To evaluate the role of women in the household, level of financial empowerment, access to mobile phones and their familiarity with usage of various functions, participation in agricultural matters, financial gains from work, etc.

The information obtained regarding the existing knowledge base of the farmers, their understanding of the agriculture practices was used to guide the development of the FAQs.

Review of Agriculture Extension advisories Issued by the Directorate of Agriculture Extension and Adoptive Research

The directorate of Agriculture Extension and Adoptive research issues crop advisories for the extension workers. These advisories are in Urdu language. A sample advisory is attached as Annex-2. The advisories for the target crops were reviewed in detail to develop FAQs and answers thereof.

FAQ Validation:

The FAQs were validated within the Farmer Needs Assessment Workshops. At a second level these were sent to the Department of Adoptive & Adaptive Research of the Directorate of Agriculture Extension and Adoptive Research for final validation. The Frequently Asked questions for Cotton, Rice, Citrus and Wheat are attached as Annex-3

Additional Sources Consulted for Preparing FAQs

Besides above, following additional sources were also consulted for preparing FAQs:

- Zaraat Nama (2), a fortnightly official publication of the Department of Agriculture Information,, Government of Punjab
- Journals of agriculture:
  - Pakistan Journal of Agricultural Research (3)
  - The Journal of Agricultural Research (4)
- Meetings with:
  - University of Agriculture Faisalabad
  - Arid Agriculture University, Rawalpindi
  - University of Sargodha
  - PARC, (Pakistan Agriculture Research Council)
  - National Fertilizer Development Centre (NFDC)
- Web resources, especially http://www.pakissan.com/
- Interviews with farmers

References:

1. **Rehman, Atiq ur, Siddique, A and Siraj, M.** *Baseline Survey Report-Vehari, Sargodha and Sialkot. An interim output for 'ICT based services for Agriculture Extension'.* 2012.

2. **Miscellaneous.** *Zaraat Nama, a fortnightly publication.* s.l. : Directorate of Agriculture Information, Governement of Punjab, Pakistan, 2012.

3. —. *Pakistan Journal of Agriculture Sciences.* s.l. : Pakistan Agriculture Research Council, 2012.

4. *Journal of Agriculture Research.* s.l. : Directorate of Agriculture Information, Department of Agriculture, Govt. of Punjab, 2011-2012.

Annex-1 ~ Attendance Sheets:

Attendance Sheet. Farmers'Knowledge Needs Assessment Workshop 9-07-2012
Vehari

Sr.#	Name of Officer	Designation	Cell No.	Signature	Email
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Annex-2 ~ An Advisory Issued by the Directorate General of Agriculture Extension & Adoptive Research

13-02-2012

فروری کے دوسرے پندھرواڑے میں گندم کی بہتر نگہداشت کے لیے حکمت عملی

- گندم کو دوسرا پانی بھائی کے 80 تا 90 دن بعد یعنی گوبھ کے وقت لگائیں۔ اس وقت سٹہ پودے کے اندر بن کر باہر نکلنے کے مراحل میں ہوتا ہے اگر اس مرحلے پر پانی نہ دیا جائے یا تاخیر سے دیا جائے تو سٹے چھوٹے رہ جاتے ہیں اور سٹوں میں دانوں کی تعداد کم ہو جاتی ہے۔
- اس موسم میں گندم کی فصل پر ست تیلے کا حملہ بھی ہو سکتا ہے۔ اس لیے ست تیلے کے مربوط انسداد کے لیے درج ذیل سفارشات پر عمل کریں۔

(i) ست تیلے کا حملہ گندم کی فصل پر سب سے پہلے ٹکڑیوں کی شکل میں ہوتا ہے۔ لہٰذا کسان اپنی فصل کا باقاعدگی سے معائنہ کرتے رہیں۔ جیسے ہی حملہ نظر آئے متاثرہ کھیت کے حصوں میں پودوں کو رسّی سے ہلا کر تیلے کو نیچے گرا دیں۔

(ii) کھالوں اور کھیت کے اردگرد اُگی ہوئی جڑی بوٹیاں بھی تیلے کی افزائش میں مدد کرتی ہیں۔ اُن کی تلفی اشد ضروری ہے۔ اس کے لیے آلات کشاورزی کا استعمال کر کے ان کی تلفی یقینی بنائیں۔ مزید برآں کیمیائی زہر Glyphosate بھی سفارش کردہ مقدار میں استعمال کیا جا سکتا ہے۔

(iii) تیلے کا حملہ شروع ہونے پر گندم کی فصل کو سادہ پانی سے پاور سپریئر کے ساتھ پریشر سے وقفہ وقفہ سے سپرے کرتے رہیں۔

(iv) مفید کیڑے مثلاً لیڈی برڈ بیٹل، کرائی سوپا، مکڑی، سرفڈ فلائی اور طفیلی کیڑے اس کی تعداد کو بڑھنے نہیں دیتے۔ ایسے کھیت جہاں پر مفید کیڑوں کی تعداد کم ہو وہاں پر دوسرے کھیتوں سے فائدہ مند کیڑے اکٹھے کر کے چھوڑیں تا کہ ان کھیتوں میں تیلے کا حملہ کنٹرول کیا جا سکے۔

(v) ان مفید کیڑوں کی پرورش محکمہ زراعت کی وہاڑی، پاکپتن، ساہیوال، اوکاڑہ، ٹوبہ ٹیک سنگھ اور فیصل آباد میں قائم کردہ بیالوجیکل لیبارٹریوں میں بھی کی جا رہی ہے۔ یہاں مفید کیڑے کاشتکاروں کو مفت فراہم کیے جاتے ہیں۔ کاشتکار اس سہولت سے فائدہ اٹھائیں۔

(vi) گندم کی فصل پر زرعی زہریں ہرگز استعمال نہ کریں کیونکہ ہماری خوراک پر ان کے بہت بُرے اثرات مرتب ہوتے ہیں۔ اس کے علاوہ ماحول کا آلودہ ہونا، صحت کے مسائل اور مفید کیڑوں کا ختم ہونا اضافی مسائل ہیں۔

(vii) ست تیلے کے مؤثر کنٹرول کے لیے کچھ کاشتکار محکمہ زراعت کی سفارش کے مطابق گندم کے کھیت کے ایک طرف کنولہ کی چند قطاریں کاشت کرتے ہیں تا کہ ان پر حملہ آور تیلے کے خلاف دوست کیڑے پیدا ہوں۔ جس سے گندم پر حملہ کرنے والے ست تیلے کو ختم کیا جا سکے۔ دوسرے کاشتکار بھی تیلے کے مؤثر کنٹرول کے لیے اس طریقہ کار کو اپنائیں۔ زرعی توسیعی کارکنان ست تیلے کی پہچان، نقصانات اور اس کے مؤثر کنٹرول کے لیے کاشتکاروں کی بروقت راہنمائی کریں۔

Annex-3 ~ Frequently Asked Questions ~ Cotton

Table A: Land Preparation, Soil Analysis and Water Analysis

1.	What is best method of land preparation for cotton crop?
2.	Do we need to get precision land leveling after every two years or so?
3.	What are most critical weeds of cotton crop?
4.	What is recommended quantity of sulfuric acid to be used for treating cotton seed?
5.	In case of But cotton it has been observed that weeds attack is less as 2compared to traditional cotton. Why?
6.	How can we control weeds?
7.	Is there any natural method to control weeds?
8.	Why land leveling is necessary?
9.	What is cost of soil analysis?
10.	What is cost of water analysis
11.	Why should we get soil analyzed?
12.	Why should we get water analyzed?
13.	At the stage of land preparation, can we take some proactive measures to prevent attack of insects and pests?
14.	When should be apply first irrigation in case of Bt-cotton sown on beds?
15.	What is recommended interval of irrigation for Bt cotton varieties in case of bed sowing?
16.	

Table B: Irrigation

17.	When should be apply first irrigation after sowing of Bt cotton in lines?
18.	What is recommended interval of irrigation for Bt cotton varieties in case of sowing in lines?
19.	What is recommended timing of last irrigation for But cotton sown in lines?
20.	When should be apply first irrigation in case non-Bt cotton sown through drills?
21.	What should be interval of irrigation for non-Bt cotton sown through drill?
22.	What is recommended timing of last irrigation for non-Bt cotton sown through drill?
23.	What is optimal timing of last irrigation for cotton sowing on beds?
24.	Why should we get soil water analyzed?
25.	From where we should get water analyzed?
26.	Should we take sample along with us when we plan to visit the lab?
27.	Any effects of over-irrigation?
28.	How can we reduce water use without effecting health of the crop?

Table C: Seed selection, seed treatment and sowing method/practices

29.	What service does Cotton Research Institute provide?
30.	Which variety should we select?
31.	Which variety? BT cotton or non- Bt cotton?
32.	Which Bt varieties of cotton are available in the market?

33.	When should be sow Bt cotton?
34.	Is there any effect of sowing crop before time?
35.	Yield of Bt cotton is relatively very high. Should not we stop cultivating non-Bt varieties?
36.	What is recommended distance between two lines of plants when drill is used for sowing?
37.	What is optimal seed germination rate?
38.	What should be the source of reliable seed?
39.	When should we treat seed with fungicide and when with pesticide?
40.	Merits and demerits of early sowing?
41.	Merits and demerits of seasonal sowing?
42.	When should we sow which variety?
43.	Which method of sowing? Bed sowing or flat sowing?
44.	What should be optimal plant to plant distance for a Bt cotton variety?
45.	What should be optimal plant to plant distance for a non-Bt cotton variety?
46.	What is importance of seed treatment?
47.	From where we can get seed of any cotton variety?
48.	What should be optimal distance from plant to plant?

Table D: Agronomic practices

49.	What is cost of leveling?
50.	Should time span for sowing and harvesting be standardized?
51.	When should be perform the activity of thinning?
52.	How thinning should be performed?

Table E: Plant Protection

53.	How to effectively control the insects?
54.	What are sucking pests?
55.	What is thrips?
56.	How to identify thrips attack?
57.	What are alternate host plants of thrips?
58.	What is magnitude of damage by thrips?
59.	How to identify mealybug?
60.	How to control mealybug?
61.	What are recommended chemicals and their doses for controlling mealybug attack?
62.	Is there non-chemical method of controlling mealybugs?
63.	What is a useful insect?
64.	What is American Sundi?
65.	And how to control American sundi (American bollworm)?
66.	What is aphid? (susttaila)
67.	When does susttailaattack cotton?

68.	How can we identify susttaila?
69.	How does sust taila (aphids) damage cotton plants?
70.	How can we identify whitefly?
71.	How does it cause damage to cotton plants?
72.	What are host plants of whitefly?
73.	What is magnitude of damage by whitefly?
74.	How can we control whitefly?
75.	What is chatkabri sundi (Spotted bollworm)?
76.	When does gulabi sundi (pink bollworm) attack?
77.	Is there any alternate host plant for gulabi sundi.(Pink bollworm) ?
78.	How can we control gulabi sundi. (Pink bollworm)?
79.	What is lashkari sundiand (army worm) how to control it?
80.	What are mites?
81.	What are the factors which lead to attack of mites?
82.	How do mites attack?
83.	Any advice for protecting the crop from attack of termites?
84.	What is sabztaila (Jassids)?
85.	Is there any alternate host plant for Sabztaila?
86.	Will CLCV affect the growth of variety?
87.	What are host plants of leaf curl virus?
88.	What weedicides should be used for controlling weeds in flat sowing?
89.	What weedicides should be used for controlling weeds in flat sowing?
90.	What weedicides should be used for controlling weeds in bed sowing?
91.	What is post-emergence weedicides and their recommended dose?
92.	Is there any stress on crop by these weedicides?
93.	Is there any special weedicides for Deela, (Purple nutsedge), Itsit (Horse purslane), and grasses.
94.	At what stage, post-emergence weedicides be applied?
95.	Pest management in early crop to handle leaf curling?
96.	Why cotton turn black?
97.	Why cotton crop wilt suddenly?
98.	What are reasons of fruit shedding?
99.	Why old pesticides have become ineffective?
100.	Is there any new pesticide available for different pests?
101.	Is there any Bt variety which is resistant against all pests?
102.	Why thrips and mites are becoming regular pests?
103.	What are new plant protection products / new pesticides?
104.	What are recommended pre-emergence weedicides?
105.	What are recommended post-emergence weedicides?
106.	Is there any alternate non-chemical means of controlling pests?
107.	What is Integrated Pest Management (IPM)?
108.	What are benefits of IPM?

Table F: Nutrition Deficiency and Fertilizer Application

109.	Why soil sampling is necessary?
110.	What and how much fertilizer should be used at the time of sowing?

111.	From where soil can be analyzed?
112.	What procedure we can adopt for collecting soil samples? – Separate for Crops, problem soils and Orchards
113.	Who will take soil samples?
114.	What is cost of soil analysis?
115.	What is best time for taking sample?
116.	What is recommended dose of fertilizer for Bt cotton sown early (Mar-Apr)?
117.	What is recommended dose of fertilizer for Bt cotton sown in May?
118.	When should we apply Phosphorus and Potassium for Bt Cotton?
119.	When should we apply Nitrogen for Bt Cotton sown early?
120.	When should we apply Nitrogen for Bt Cotton sown in May?
121.	What is recommended dose of fertilizer for non-Bt cotton?
122.	When should we apply Phosphorus and Potassium for non-Bt Cotton?
123.	When should we apply Nitrogen for non-Bt Cotton?
124.	Is there any other method for improving fertility of soil?
125.	What is nutrition deficiency for cotton?
126.	What are effects of nutrition deficiency?
127.	What are symptoms of nutrition deficiency? How to know?
128.	What are symptoms of nitrogen deficiency for cotton crop?
129.	What are symptoms of phosphorus deficiency for cotton crop?
130.	What are symptoms of potassium deficiencies for cotton crop?
131.	What is role of micro-nutrients in enhancing crop yield?
132.	What are symptoms of magnesium deficiency for cotton crop?
133.	How can we cover magnesium deficiency?
134.	What are symptoms of zinc deficiency for cotton crop?
135.	How can we cover zinc deficiency?
136.	What are symptoms of iron deficiency for cotton crop?
137.	What are symptoms of boron deficiency for cotton crop?
138.	How can we cover boron deficiency?
139.	What is best time for application of NPK?
140.	What are critical stages of NPK application?
141.	What are causes of fruit shedding?
142.	What is effect of soil pH (hard soils/problem soil) on nutrients availability?
143.	What are critical stages of nutrients application of cotton?
144.	What is nutrients fixation in soil? [Which combination zinc + Fe… Zinc + Phos…]
145.	What is soil conditioner?
146.	What is benefit of soil conditioner?
147.	What is antagonistic effect of nutrition on crop?
148.	Which fertilizer should be selected for sandy soil?
149.	In high pH soil, what kind of fertilizers should be used?
150.	Can we flood commercial Sulfuric Acid (H2SO4) in standing crop?
151.	What is best method of fertilizer application?
152.	Can we apply PK fertilizer at later stages of crop?
153.	What is best timing of fertilizer application in relay cropping?
154.	Can we apply Potash and Zinc together?
155.	How can we deal with problem of high cost of fertilizers?
156.	What is use of humic acid?
157.	What is benefit of the use of potassium in foliar application?

158.	How many foliar sprays are required to get optimal yield?
159.	What is benefit of foliar application?
160.	What is benefit of the application of Farm Yard Manure (FYM)?
161.	How to get maximum benefit out of the use of FYM, GFYM and compost?
162.	Is there any negative effect of the application of Farm Yard Manure (FYM)?
163.	Does the use of fertilizer help in minimizing effect of insects/pests?

Table G: Picking, storage and marketing practices

164.	When should we start cotton picking?
165.	Do we need to observe any timing for cotton picking?
166.	Any other recommendation for cotton picking?
167.	Can we do picking in cloudy or rainy weather?
168.	What is recommended interval between two cotton pickings.
169.	Why cotton clothes are necessary for picking and transportation of cotton?
170.	Can we use Polypropylene or patsan (jute) bags for packing cotton?
171.	What should be level of moisture in the room where cotton is stocked?
172.	Can we keep Bt and non-Bt cotton together?
173.	Can cotton obtained in last picking be mixed with cotton obtained through earlier pickings?
174.	What is market rate of seed cotton?
175.	How can we store cotton for longer period of time?
176.	Why the market rates of seed cotton are is not stable?
177.	How to sell produce?
178.	What should we do with leftover bolls on the cotton sticks?
179.	If deep plough or Rotavator is not run, is there any negative effect?
180.	Is there any deadline before which cotton sticks should be removed?
181.	If cotton sticks are not used as fuel, then what should be done?

Table H: Others

182.	From where we can get cheap loans?
183.	From where we can get fertilizer on timely basis?
184.	How to deal with middlemen?
185.	From where we can get reliable weather forecasts?
186.	Please suggest recommendations for boosting yield.

Annex 3 ~ Frequently Asked Questions ~ Wheat

Table A: Land Preparation, Soil Analysis and Water Analysis

1.	What is cost of soil analysis?
2.	What is cost of water analysis?
3.	Why should we get soil and water analyzed?
4.	Why land leveling is necessary?
5.	What is the cost of soil analysis?
6.	What is the cost of water analysis
7.	Why should we get soil analyzed?
8.	Why should we get water analyzed?
9.	At the stage of land preparation, can we take some proactive measures to prevent growth of weeds?
10.	Some people say land preparation is less important for wheat. Is it so? If yes why?
11.	What are benefits of Rotavation of cotton sticks?
12.	Which techniques of seedbed preparation should be used?
13.	How many ploughings we should apply?
14.	Why do we need land leveling?
15.	Why zero tillage should be practiced?

Table B: Irrigation

16.	Why should we get underground water analyzed?
17.	How should be take samples of underground water?
18.	What is criterion of fitness of water?
19.	From where we should get water analyzed?
20.	Is there any variety of wheat which requires less water to avoid shortage of water?
21.	Is there any negative effect of over-irrigation?
22.	Level of underground water (water table) is falling? How to deal with problem?
23.	How should we adjust time of first irrigation according to type of previous crop and time of sowing?
24.	How many number of irrigations should be apply to a wheat crop?
25.	Does number of required irrigations vary with type of previous crop and time of sowing?
26.	What is optimal time for last irrigation? Does it depend upon weather and sowing time?
27.	What are critical stages of irrigation for wheat crop?
28.	What are the benefits irrigation at crown root development stage?
29.	What are the benefits of irrigation at tillering stage?
30.	What the advantages of irrigation at booting stage?
31.	Should we irrigate at milky stage?

Table C: Seed selection, seed treatment and sowing method/practices

32.	Which variety of wheat should we select?
33.	What is yield potential of the recommended variety?

34.	What will be seed rate of the recommended variety of wheat?
35.	What will be benefits of seed treatment? What is importance of seed treatment?
36.	Which chemicals should we use for treating wheat seed?
37.	What should be the dose of treatment?
38.	Is there any seed treatment for controlling diseases in wheat?
39.	Is there any specific method of treatment of the wheat seed?
40.	Should we go for early sowing or late sowing?
41.	What are advantages and disadvantages of early sowing?
42.	What are advantages and disadvantages of late sowing?
43.	Which varieties more resistant to diseases?
44.	Does sowing time differ from variety to variety?
45.	If sowing time differs from variety to variety, then what are the recommendations?
46.	How should we maintain quality of seed?
47.	Should we get certified seed?
48.	Quantity of seed rate according to sowing time?
49.	What is reliable source of quality seed?
50.	Which fungicide should be used?
51.	What dose of fungicide should we apply?
52.	What is recommended method of applying fungicides?
53.	What is recommended method of sowing?
54.	What is a basal fertilizer?
55.	Why should we apply basal fertilizer?
56.	How should we apply basal fertilizer?
57.	Which variety has less lodging?

Table D: Agronomic practices

58.	What is cost of leveling of land?
59.	Should time span for sowing and harvesting be standardized?

Table E: Plant Protection

60.	What is a weed?
61.	What are types of weeds in wheat crop?
62.	What is the magnitude of damages caused by weeds to wheat crop?
63.	Which weeds are more lethal for the wheat crop?
64.	What are different methods of weed control?
65.	What is weed scouting?
66.	When to apply weedicide?
67.	What is pest management?

68.	Does aphid cause any damage to wheat crop?
69.	Are there any beneficial insects for wheat crop?
70.	How to promote beneficial insects?
71.	Which are the important diseases of wheat crop?
72.	What are symptoms of diseases?
73.	What are preventive measures for wheat diseases?
74.	Is there any effect of fungicide on disease control?
75.	Which weedicides should be used to control weeds of narrow leaf and broad leaf wheat?
76.	What are benefits of fumigation?
77.	What are damages caused by termites and rats?
78.	How to control termites and rats attack?

Table G: Harvesting, threshing, storage and marketing practices

79.	What is market rate of wheat?
80.	How to sell produce to get maximum returns?
81.	Where should we sell our wheat produce?
82.	How to deal with marketing problems?
83.	Where can we get bardana (bags) from?
84.	How to deal with storage grain pests?
85.	Which pests attack at storage stage?
86.	Is there any effect of moisture contents on the quality of wheat grains?
87.	What is fumigation?
88.	How to control attack of rats on wheat stored in the building?
89.	Which types of pesticides are used for stored grain pests? (rat proofing)

Table H: Others

90.	From where we can get cheaper loans?
91.	From where we can get fertilizer on timely basis?
92.	How can we identify fake fertilizers?
93.	How can we identify fake weedicides?
94.	Where to report cases of suspicious/faked fertilizers?
95.	Where to report cases of suspicious/fake weedicides and other products?
96.	How to deal with problems created by middlemen?
97.	From where can we get reliable weather forecasts?

Annex 3 ~ Frequently Asked Questions ~ Citrus

Table A: Nursery Management

1.	**Where are good citrus nursery plants available?**
2.	What is rate (price) for nursery plants?
3.	Are less-seeded (or seed free) nursery plants available?
4.	Where is a disease free citrus nursery available?
5.	Is it necessary to treat the seed with fungicides for preparation of a nursery?
6.	In what conditions and how is a nursery raised in a pot/ media or soil?
7.	Whether mother plants are available at the nursery owner's farm or not?
8.	What is a certified nursery?
9.	Where are the certified nurseries?
10.	Why should I purchase nursery plants from certified nursery?
11.	What are the benefits of getting nursery from the certified nurseries?
12.	What is a dwarf root stock of kinnow (a type of Mandarin, main citrus fruit of Pakistan)?
13.	Is dwarf root stock for high density plantation available?
14.	Why should a proper timing for plantation of nursery plants be followed?
15.	What is recommended timing of plantation of nursery plants?
16.	Why should bed be prepared for nursery plantation?
17.	What measures should we take, at the stage of transplantation, to protect citrus plants from fungal attack?
18.	Why should we dip tap root of nursery plants in anti-fungal liquid before transplantation?
19.	Which variety or cultivar of citrus should we select?

Table B: Land preparation / Layout

20.	What is best time of land preparation for citrus orchard?
21.	What types of implements are required for preparation of land for orchards?
22.	What is best type of soil for citrus?
23.	Why should we get soil analyzed?
24.	From where we can get soil analyzed to know whether soil is suitable or not?
25.	What assistance can be available from extension department in land preparation?
26.	What will be cost of nursery plants / acre?
27.	Which layout of orchard is ideal?
28.	Is there any technical help available to layout the orchard?
29.	What is suitable time for preparation and laying out the orchard?
30.	How many pits should we have in an acre of an orchard?
31.	What will be the expenditure for pits preparation in one acre?
32.	What should be size of a pit?
33.	What is the appropriate plant to plant distance?

Table C: Transplantation

34.	What material should be used for filling the pit?
35.	What is best timing of transplantation?
36.	How can we take care of plants after transplantation?
37.	What is normal/acceptable mortality rate?
38.	How can we transplant nursery plants with minimized damages?
39.	How can mortality rate be reduced?

Table D: Water Analysis

40.	Can we use tube well water for citrus?
41.	Why is it necessary to get underground water samples analyzed?
42.	Where is the facility/lab available for water analysis/testing?
43.	How can we use tube well water for citrus?
44.	How can we improve the quality of ground water?
45.	What is the ideal time for first water application?
46.	How many water applications are required by a citrus orchard in a year?
47.	What are critical stages for water application in citrus orchards?
48.	How can we conserve water to reduce water losses?
49.	What is the importance of drip irrigation?

Table E: Fertilizer Application

50.	What is the significance of balanced use of fertilizers?
51.	Why is organic fertilizer important?
52.	What is suitable time for fertilizer application?
53.	Does soil type (Karwi ya mithi) matter in selection of fertilizer?
54.	What is the appropriate method of fertilizer application?
55.	Why should we use liquid fertilizer
56.	What is foliar spray?
57.	Why should foliar spray be used?
58.	What is importance of soil analysis for fertilizer application?
59.	How can we select fertilizer based on the soil analysis report?
60.	How can we reclaim soil using the information from soil analysis?
61.	What are symptoms of nutrient deficiency?
62.	Why should we get the leaves of citrus trees/plants analyzed?
63.	What is the cost of citrus leaves analysis?
64.	How can we decide upon the quantity of different nutrients required based on leaves analysis report?

65.	What is the importance of micro-nutrients for citrus plants/trees?
66.	What is the recommended dose of each fertilizer / nutrient for citrus orchards?
67.	When and how much FYM should we apply in orchards?
68.	When and how much green manuring should we apply in orchards?
69.	What is EM technology?
70.	Can we use EM technology in citrus orchards?

Table F: Grafting

71.	What factors should be considered when selecting a cultivar?
72.	What are drawbacks using kinnow root stock instead of lemon root stock?
73.	What factors should be considered when selecting a scion?
74.	What factors should be considered when selecting a root stock?
75.	What is the best time for grafting?
76.	What is the appropriate method of grafting?
77.	What is the importance of disease free and healthy grafting material?
78.	Why should we use anti-septic solutions?
79.	What is the recommended height (point on the plant stem) where the bud grafting should be done?

Table G: Plant Protection

80.	How can we protect our nursery from disease/pest attack? What should be done?
81.	Why leaves of my orchard are turning cup like / Curling? What should be done?
82.	Why are leaves dropping or getting yellow? What should be done?
83.	Why branches of my orchard plants/trees are dying back? What should be done?
84.	Why branches of my orchard plants are drying? What should be done?
85.	Plants of my orchards are dying back. What is the reason? What should be done?
86.	Plants of my orchards are quickly dying. What is the reason? What should be done?
87.	Plants of my orchards are slowly dying. What is the reason? What should be done?
88.	Brown dots (citrus canker) are emerging on the leaves of my orchard plants. What is the reason? What should be done?
89.	Brown dots (citrus canker) are emerging on fruits. What is the reason?
90.	Some fruits of my orchard remain green (greening / HLB). They do not gain true colour? What should be done?
91.	Leaves of my orchard plants are turning blackish. What is the reason? What should be done?
92.	Leaves of my orchard plants are turning blackish due to sucking insects. What should be done?
93.	Why my plants are infested with leaf-miners attack? What should be done?
94.	Some fruits are decaying and dropping (due to fruit fly) on the plants? What should be done?
95.	Some leaves are torn – look like someone has eaten some parts of leaves. What should be done?
96.	Gummosis (gum/goond) is oozing out of the stem and from branches? What should be done?
97.	How to control weeds in the orchards?

98.	Fruits have blemishes. Why? What should be done?
99.	What are the symptoms for scab and melanose disease?
100.	How can we control scab and melanose?
101.	Why and when should we prune/trim the plants/trees?

Table H: Harvesting / picking of fruits

102.	What are maturity indices?
103.	What is degreening of citrus fruits?
104.	How can we change color of fruits early (degreening of citrus)?
105.	What is recommended way of harvesting fruits?
106.	What is best time of harvesting of citrus fruits?
107.	What equipment should we use for harvesting of citrus fruits?
108.	How can we solve the problem of labour shortage?
109.	How can we minimize harvesting losses?
110.	How to solve the problem of capacity/training in picking / packing?
111.	Why do we need trained labour for picking?
112.	What are differences among A, B and C Grades of citrus fruits?
113.	Why should we go for initial grading / sorting?
114.	How can we appropriately handle the fruits after picking?
115.	What picking tools should be used?
116.	Where are such tools available?
117.	How can we de-contaminate buckets?

Table I: Post-harvest management

118.	How can we minimize losses while transportation?
119.	What is best means for transportation of citrus fruit?
120.	How early should we transport to factory?
121.	Why should sorting be done in the factory?
122.	Why and how should we treat fruits in the factory?
123.	Why washing should be done in factory?
124.	Why waxing is needed?
125.	How can shelf-life of fruits be improved?
126.	What material should we use in packing of citrus plants?
127.	Why chilling is needed after processing and packing before shifting to cold storages?
128.	Where is the cold storage facility available?
129.	How can we handle logistic problems?

Table J: Export management

130.	How can we export our produce ourselves?
131.	How to get an export firm registered?
132.	How to deal with custom clearance?
133.	What are the documents involved in the export?
134.	How can we prepare documents on timely basis?

135.	How can we quickly go through custom clearance at destination?
136.	How to deal with issues of pricing and recoveries?
137.	Why Global GAP Certification is needed? Why is it important for farmers?

Annex 3 ~ Frequently Asked Questions ~ Rice

Table A: Nursery management

1.	What type of soil is suitable for rice nursery?
2.	Should we make any consideration for the previous crop grown in a field, before growing rice nursery there?
3.	What is suitable location (like shady tree) for growing rice nursery?
4.	What are recommended varieties of rice for our area?
5.	What is a suitable variety and time of sowing?
6.	What is the best method of sowing?
7.	Is it necessary to treat seed before sowing in field?
8.	What is the method of seed treatment?
9.	What is reliable source of good seed of rice for nursery?
10.	What are suitable fungicides for seed treatment?
11.	What are reliable sources of fungicides?
12.	What should be seed rate /marla (272 ft^2)?
13.	What is optimal germination rate?
14.	What is the magnitude of loss caused by the weeds in the nursery?
15.	What are the common weeds in rice nursery fields?
16.	What are methods of weed control in nursery?
17.	What is the appropriate time for weedicide application?
18.	Which weedicides should we apply?
19.	What is appropriate dose of weedicide?
20.	How to control grasshopper in the nursery fields?
21.	What are common diseases of rice nursery?
22.	What are methods to control diseases of nursery?
23.	What are symptoms of Zn deficiency in nursery? How to control Zn deficiency?
24.	What should be recommended age of rice nursery at the stage of transplantation?
25.	How does stem borer cause damage to rice nursery plants?
26.	How can we control stem borer in the nursery?
27.	How can we control the stem borer of rice nursery?
28.	What is foot rot (bakani) disease of rice nursery plants?
29.	What are symptoms of foot rot (bakani)?
30.	How can we control the foot rot of rice nursery plants?

Table B: Irrigation

31.	Is it useful to get underground water analyzed?
32.	What is correct method of water sample collection?
33.	What are the charges for water analysis?
34.	Why our irrigation water is pale in colour?
35.	By drilling bore sometimes beyond 400 ft, sometimes we find that land becomes hard. Why is it so?
36.	What should be ideal depth of bore in Sialkot?
37.	Why water of some area is considered as unfit?
38.	What are critical stages of irrigation in rice crop?
39.	When to give last irrigation to paddy?
40.	What is role of pucca (lined) watercourse?
41.	What is water harvesting?

42.	How can harvest water in different stages?

Table C: Soil Analysis and Fertilizer Application

43.	What is correct method of soil sampling?
44.	Why has the soil colour become pale?
45.	My soils do not responding to heavy dose of fertilizers?
46.	Can we get the fertilizers tested (fake or genuine) at district level labs? [at divisional level]
47.	Why is balanced use of fertilizer important for rice?
48.	Are soil reclamation measures successful?
49.	What are micro nutrients?
50.	Are micro-nutrients necessary for good production of rice?
51.	Salt-affected soils are common in Pasrur Tehsil. Why?
52.	Why do the leaves of rice crop go pale?
53.	What are benefits of Zn+Boron+Mn?
54.	What is recommended dose of Zn application? [10 kg (21%)/acre]
55.	What are symptoms indicating deficiency of Zn?
56.	What is the significance of iron, copper and sulpher for rice crop?
57.	Can we use visual methods to identify the nutrient deficiencies in crops?
58.	What is best combination of fertilizers for good production?
59.	What are symptoms of nutrition deficiencies?
60.	What are recommendations for the use of micronutrients?
61.	What is humic acid?
62.	Why should one use humic acid in rice fields?
63.	What is recommended dose of humic acid?
64.	From where can we get humic acid?
65.	What is recommended method of fertilizer application?
66.	What is ideal range of major nutrients in terms of ppm?
67.	What should be the colour of healthy rice leaves?
68.	Can we detect nutrition deficiency by examining colour of the rice leaves?
69.	Are organic fertilizers useful for rice production?
70.	What is role of organic matter (OM) in crop production?
71.	How can we improve OM in fields?
72.	Why do rice plants lodge near maturity?

Table D: Agronomic Practices

73.	How should we prepare land for rice production?
74.	What is optimum number of plants/acre?

Table E: Plant Protection

75.	What are the major insects which cause big damage to rice crop?
76.	How can the grasshopper be controlled in rice fields?
77.	What are major diseases of rice plants?
78.	What is phyto-toxicity?
79.	What are the symptoms of phyto-toxicity?
80.	How to control phyto-toxicity?
81.	What is Bacterial leaf blight (BLB)?
82.	What are symptoms of Bacterial leaf blight (BLB)?

83.	What is treatment of Bacterial leaf blight (BLB)?
84.	What are symptoms of Leaf folder / Leaf Roller?
85.	What is treatment for Leaf folder / Leaf Roller?
86.	What are symptoms of Brown plant hopper attack?
87.	How can we control attack of Brown plant hopper?
88.	What are symptoms of brown leaf spot?
89.	How can we control brown leaf spot?
90.	What are symptoms of rice borer?
91.	How can we control attack of rice borer?
92.	What are important weeds of rice crop?
93.	What is the magnitude of loss to rice crop caused by weeds?
94.	What are methods of weed control?
95.	Is cultural practice effective in leaf roller / folder?
96.	What is recommended quantity of water for spraying insecticide / fungicide rice crop?
97.	What is biological control of insects?
98.	How to control stem borer of rice?
99.	How to control moth (parwana) of leaf folder?
100.	What is difference between fungicide and insecticide?
101.	How can we control attack of rice moth?
102.	How can we control attack of rice beetle?
103.	How can we control attack of khapra beetle (cabinet beetle)?

Table F: Harvesting and marketing

104.	Any suggestions for harvesting rice crop?
105.	Is there any way of reducing the high cost of harvesting?
106.	How can we deal with problem of non-availability of labour?
107.	Farmers can't store produce for long time. However, rates offered to them remain quite low at harvesting stage. How can we deal with this problem?
108.	How can we better manage our finances? How can we deal with financial constraints?
109.	How can we deal with black marketing / shortage of inputs in the market?
110.	How can the influence of the middlemen be minimized?
111.	When and how should we fumigate?
112.	Sometimes fumigation does not work. Why?

Annex 3 ~ Frequently Asked Questions ~ Sugarcane

Table A: Seed Sowing & Seed Treatment

1.	What are the sowing seasons for sugarcane crop?
2.	What is the recommended sowing time for sugarcane crop?
3.	What is suggested for selection of suitable seed?
4.	How can we select the best quality seed for sowing?
5.	What should be the ideal age of crop for selection of seed?
6.	What part of sugarcane is considered the best for seed purpose?
7.	Can we use seed of lodged crop?
8.	Is it essential to remove leaf cover on eyes of sugarcane before sowing? If yes, then why?
9.	What is the recommended seed rate of sugarcane for one acre field?
10.	What is the correct seed treatment method?
11.	Is treatment of seed necessary before sowing?
12.	How much standing sugarcane crop results from sowing of one acre?
13.	What are the early sowing varieties?
14.	What are the mid-season sowing varieties?
15.	What are the late sowing varieties?
16.	What are the advantages and disadvantages of early and late sowing?
17.	Which are the prohibited varieties?

Table B: Land Preparation

18.	What is the recommended ploughing?
19.	What is the recommended row x row distance?

Table C: Fertilizer Application

20.	What is the recommended dose of fertilizer for poor quality land?
21.	What is the recommended dose of fertilizer for average quality land?
22.	What is the recommended dose of fertilizer for fertile land?
23.	What are the requirements and timings of fertilizer application?
24.	What are the requirements and timings of phosphatic and potash fertilizers?
25.	What are the requirements and timings of nitrogenous fertilizers?
26.	What is the time of application of fertilizer for autumn sowing?
27.	What is the dose of fertilizer in spring sowing crop?
28.	What is the effect of late fertilizer application?
29.	If nitrogenous fertilizer is applied late will it affect quality and productivity?

Table D: Farmyard Manure (FYM)

30.	Can we use press mud? What will be the dose for one acre?

Table E: Green Manuring

31.	When should green manure be added?
32.	What is the best time of the day for application of manure?

Table F: Irrigation

33.	How many irrigations are required for sugarcane crop?
34.	What will be the total irrigation required for autumn crop?
35.	What will be the total irrigation required for spring crop?
36.	What will be the effect of less irrigation on crop health?

Table G: Irrigation Interval for Spring Cultivated Sugarcane Crop

37.	Does water requirement vary with change in season?
38.	What is the irrigation interval for March-April?
39.	What is the irrigation interval for May-June?
40.	What is the irrigation interval for July-August?
41.	What is the irrigation interval for September –October?
42.	What is the irrigation interval for November –February?

Table H: Weed Control & Hoeing Effect

43.	What are the common weeds of the sugarcane crop?
44.	How and how much damage do weeds cause to the sugarcane crop?
45.	Which weeds are noticed in September-cultivated sugarcane?
46.	When should the first hoeing be done?
47.	How can weeds be eradicated?
48.	Is there any advantage of mechanical hoeing?
49.	When should the 2nd hoeing be done?
50.	When should we carry out ploughing while hoeing?
51.	Which implements should we use for weed eradication?
52.	Is there any other method for weed control?
53.	What are the merits and demerits of hoeing?
54.	Is there any other method to control weeds?
55.	What is the recommended best practice for weed control and enhanced production?

Table I: Weedicide (Herbicide) Spraying & Protective Measures

56.	Should we carry out hoeing after spraying weedicides?
57.	Can we use weeds for fodder?
58.	Should we leave any place as it is, during spraying?
59.	Is there any specific equipment/machinery we should use for spraying?
60.	Should we consider weather conditions before spraying?
61.	What are the precautions we should keep in mind at the time of spraying?
62.	What is the calibration method for spray machines?
63.	What are the pre-emergence crop weedicides?
64.	What are the post-emergence weedicides?

Table J: Insect & Pest

65.	What are the insects which attack the sugarcane crop?
66.	How can pyrilla attack be controlled?
67.	What is chemical control of insects?
68.	What is the recommended chemical control for borer?
69.	How can ant attack on sugarcane crop be controlled?

Table K: Disease & Disease Control

70.	What are the major diseases found in sugarcane crop?
71.	How can red rot be controlled?
72.	Are there any other disease reported in this crop?
73.	How can flag smut be controlled?

Table L: Harvesting of Sugarcane

74.	What is the proper method of sugarcane harvesting?
75.	What is the reason behind sugarcane deep harvesting?

76.	Is there any effect of deep harvesting on stem borer?
77.	Which type of sugarcane is harvested first?
78.	What is the recommended time of harvesting for disease-infected crop?
79.	When should we stop irrigation before harvesting?
80.	What will be the transportation time to mill after sugarcane harvesting?
81.	What is an effective method for controlling sugarcane borer attack?
82.	Is there a more efficient and cost-effective weed control method other than chemical control?
83.	What is suggested for disease management?
84.	What is the average duration of sugarcane crop maturation?
85.	What will be the effect of sugarcane leaf removal on yield?

Annex 3 ~ Frequently Asked Questions ~ Maize

Table A: Seed, Seed Rate, Variety, Time of Sowing

1.	What is the time of sowing for spring-cultivated maize crop?
2.	What is the time of sowing for autumn-cultivated maize crop?
3.	What are the local hybrid varieties for maize?
4.	Which variety of maize should we use for silage purpose after wheat?
5.	What are the recommendations for the selection of seeds?
6.	What are the methods of sowing and which method is recommended?
7.	What is the recommended seed rate for drill sowing?
8.	What is the recommended seed rate for ridge sowing?
9.	What is correct method of sowing?
10.	Is pre-treatment of maize seed necessary? If yes, then why is it needed?
11.	What is the method of dealing with the problem of damping off in maize?
12.	What are the advantages of deep tillage?
13.	How can we carry out deep tillage?
14.	What is the recommended row-to-row distance for spring-cultivated maize?
15.	What is the recommended plant density for maize?
16.	What is the recommended plant-to-plant distance which should be kept in mind while thinning?
17.	What are the major varieties of maize for fodder?
18.	What are the major varieties of maize for seed?

Table B: Irrigation

19.	Is timely irrigation essential for maize crop?
20.	How many irrigation applications are needed by maize crop?
21.	What are the critical stages of irrigation?
22.	What are the effects of delays in irrigation?

Table C: Irrigation Schedule

23.	When should we apply the first irrigation?
24.	When should we apply the second irrigation?
25.	When should we apply the third irrigation?
26.	When should we apply the fourth irrigation?
27.	When should we apply the fifth irrigation?
28.	When should we apply the sixth irrigation?

Table D: Insect Pest Attack in Maize

29.	What insects usually attack the maize crop?
30.	How can insect pest attack be controlled?
31.	What are the reasons for leaf discolouration?
32.	What type of insects cause leaf discolouration?
33.	What is recommended for dealing with the problem of leaf discolouration?

Table E: Weed Control

34.	What pre-emergence weedicides are used for maize plant?
35.	What post-emergence weedicides are used for maize plant?

Table F: Diseases and Disease Control in Maize

36.	Which are the major diseases of maize crop?
37.	What causes drying and dying of maize plants?
38.	What can be done in the case of dying and drying of maize plant?

Table G: Fertilizer Application

39.	What are the nutrient requirements of maize crop?
40.	What are the critical stages for fertilizer application?
41.	Which type of and how much fertilizer should we apply at different stages of the crop?
42.	What will be the fertilizer requirements for 25-day maize crop?
43.	What is most critical stage for fertilizer application in maize?
44.	What is the recommended time for application of DAP?
45.	Is it essential to apply DAP and urea, at the time of sowing?

Annex 3 ~ Frequently Asked Questions ~ Mango Tree

Table A: Disease and Disease Control

1.	What should be done when mango leaves turn brown from the tip?

Annex 3 ~ Frequently Asked Questions ~ Sunflower

Table A: Land Preparation

1.	What type of soil is best for the cultivation of sunflower crop?
2.	How to prepare land for cultivation of sunflower on fallow land?
3.	How to prepare land for cultivation of sunflower on cultivated land?
4.	How to prepare land for cultivation of sunflower on unlevelled lands?

Table B: Varieties and Seed Rate

5.	Where can we get good quality seed?
6.	Which varieties are available for sunflower crop?
7.	Where can we get imported hybrid seed?
8.	Where can we get local hybrid seed?
9.	What is the recommended seed rate for sunflower per acre?
10.	Is it essential to treat seed with fungicide before sowing?
11.	Which fungicide should be used for treatment of seed for sowing?
12.	What is the recommended quantity of fungicide?

Table C: Time of Sowing

13.	What is the time of sowing for spring-cultivated sunflower in central and west Punjab?
14.	What is the time of sowing for autumn-cultivated sunflower in central and west Punjab?
15.	What is the time of sowing in Northern Punjab?
16.	What will be the row-to-row distance while drill sowing?
17.	What will be the plant-to-plant distance recommended in sunflower crop?
18.	What is the plant-to-plant distance which should be maintained while thinning of sunflower?

Table D: Fertilizer Application

Green Manuring

19.	What is the recommended amount of green fertilizer to be applied in sunflower crop?
20.	What is the recommended time of application for green manuring?

Table E: Chemical Fertilizers

21.	What are the recommended fertilizers for sunflower crop?
22.	Which fertilizers should be applied at the time of sowing?
23.	What is the recommended quantity of different fertilizers to be applied at the time of sowing?
24.	Which fertilizer should be applied at the time of flowering?
25.	What is the recommended quantity of fertilizers to be applied at the time of flowering?

Table F: Irrigation

26.	What are the recommended irrigations for spring-cultivated sunflower?
27.	What are the effects of over-irrigation or under-irrigation?
28.	What are the critical stages of the application of irrigation?

Table G: Irrigation Chart for Sunflower

29.	What is the recommended time for the application of first irrigation?
30.	What is the recommended time for the application of second irrigation?

31.	What is the recommended time for the application of third irrigation?
32.	What is the recommended time for the application of fourth irrigation?
33.	What is the recommended time for the application of fifth irrigation?

Table H: Weeds and Weed Eradication

34.	How much damage is caused by weeds in the sunflower crop?
35.	What are the most common weeds in the sunflower crop?
36.	What is the critical time for weed attack on the sunflower crop?
37.	Is it possible to eradicate weeds by using chemicals?
38.	When should we apply chemicals to control the weeds?
39.	What are the recommended weedicides for the sunflower crop?

Table I: Diseases and their Control

40.	What are the most common diseases of sunflower crop?
41.	What are the recommendations for pest control?
42.	How can disease emergence in sunflower crop be controlled?
43.	If disease appears at a later stage of the crop, then what should be done?

Table J: Pest Attack and its Control

44.	What are the common insects which attack sunflower?
45.	What are the common symptoms of termite attack on sunflower?
46.	How do the termites attack sunflower?
47.	How can termite attack be controlled?
48.	When should chemicals be used in case of termite attack? At which stage?
49.	What are the common symptoms of whitefly attack on sunflower?
50.	In case of white fly attack, which pesticide should be used?
51.	What amount of water should we use to dissolve the recommended dose of pesticide?
52.	What are the common symptoms of jassid attack on sunflower?
53.	How can jassid attack be controlled?
54.	Which pesticide should we use for jassid control?
55.	What are the common symptoms of American sundi attack on sunflower?
56.	How can American sundi be controlled?
57.	What are the common symptoms of spotted bollworm attack on sunflower?
58.	What are the common symptoms of American bollworm attack on sunflower?
59.	How can spotted bollworm and American bollworm be controlled?

Table K: Harvesting

60.	What is the recommended time of harvesting the sunflower crop?
61.	What is the recommended method of harvesting the sunflower crop?
62.	Which method of harvesting is advantageous? Manual or mechanical?
63.	What are the recommendations for transportation of seed?
64.	What is the maximum permissible moisture content level before seed storage?
65.	What are other recommendations for storage?
66.	What are three major recommendations to improve sunflower yield?

Annex 3 ~ Frequently Asked Questions ~ Vegetables

Table A: Land Preparation, Seed Availability and Time of Sowing

1.	What type of land is most suitable for vegetable cultivation?
2.	How should we prepare land for the cultivation of vegetables?
3.	Which vegetables should be sown on beds?
4.	Which vegetables should be sown on ridges?
5.	Which vegetables should be sown on flat soil?
6.	What are the reliable sources of quality seeds of vegetables?
7.	What is the recommended seed rate for different vegetables?

Table B: Insect Pest

8.	Which vegetables are susceptible to borers/larvae attack?
9.	Which vegetables are susceptible to sucking insect attack?

Table C: Diseases in Vegetables

10.	Which diseases are commonly observed in peas, cucurbits?
11.	Which diseases are commonly observed in cucurbits, onion?
12.	Which diseases are commonly observed in cucurbits, tomato, potato?
13.	Which diseases are commonly observed in cabbage, cauliflower, chillies, brinjal, onion and tomato?

Table D: Disease Control

14.	What is the recommended pesticide for controlling powdery mildew?
15.	What is the recommended pesticide for controlling downy mildew?
16.	What is the recommended pesticide for controlling late blight?
17.	What is the recommended pesticide for controlling damping off?
18.	What is the recommended pesticide for controlling the purple blotch in onion?
19.	How can jassid or sabztela attack on onion be controlled?
20.	What should be the ETL (economic threshold level) for jassid or sabztela in onion?

Table E: Recommendations for High Productivity

21.	What are three recommendations to get maximize yield of vegetables?
22.	What is the recommended plant population density?
23.	How damage is caused by weeds?
24.	How many irrigations should be applied in vegetables?
25.	What are the critical stages of irrigation application?

Annex-D Training Report

UKaid from the British people
Department for International Development

www.cabi.org

A Model for ICT-based services for Agriculture Extension - Training Report

www.cabi.org
KNOWLEDGE FOR LIFE

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Contents

List of Figures

List of Tables

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Acronyms

AO	Agriculture Officer
DDOA	Deputy District Officer Agriculture
DOA	District Officer Agriculture
DG	Director General
EDO	Executive District Officer
FA	Field Assistant
RD	Regional Director
MIS	Management Information System

1. Introduction

Once the E-Zaraat web portal, mobile application and the help line had been launched, training was held in three target districts and at the Directorate General of Agriculture Extension and Adaptive Research (DG AE & AR) in Lahore to train the Agriculture Extension staff in the use of the applications.

The major objectives of the training were:

- Introduce and demonstrate all three components: Web portal, mobile application and help line to the agriculture extension staff in the target districts and at the provincial headquarters in Lahore
- Give hands-on training to the users in the use of the above applications
- Assess the users' uptake of the training and the training material

1.1. Training Sessions

The training sessions were planned in an identical format and the sessions were organized as:

- Opening of the workshop by the respective Executive District Officer (EDO) or District Officer Agriculture of each district.
- Introduction to e-Zaraat and its three components: the web application, the mobile application and the help line. This presentation is attached as Annex-1
- Demonstration of the e-Zaraat web application and the e-Zaraat mobile application.
- Hands-on training in the use of e-Zaraat mobile application.
- Hands-on training in the use of eZaraat web application.
- Reading and understanding the users' guide.

Each trainee was provided with a copy of the users' guide at the beginning of the training session.

At each district level training session, the Executive District officer (EDO), the District Officer Agriculture (DOA), the Deputy District Officers Agriculture (DDOA) and Agriculture Officers (AOs) were invited. The attendance sheets and schedules of the district level workshops are attached as Annex -7 - 11

1.2. The e-Zaraat Mobile Application

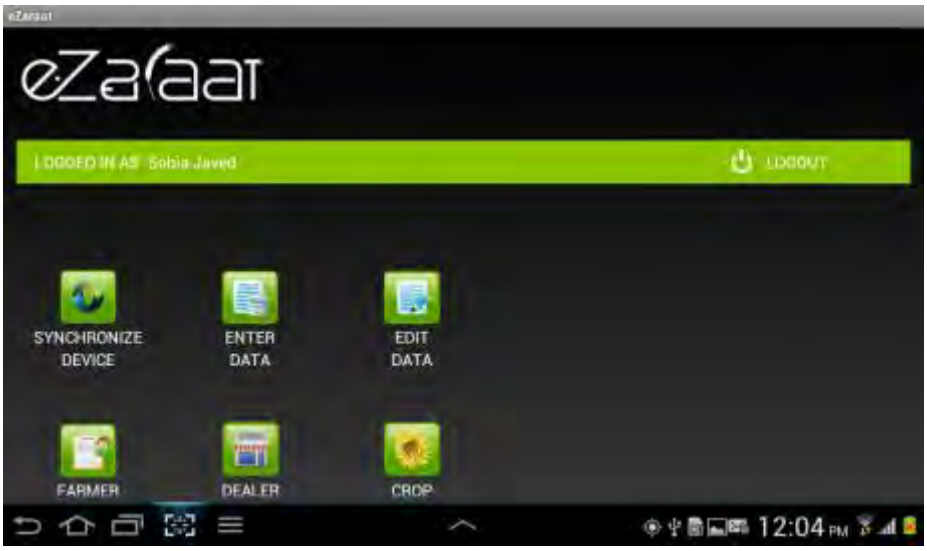

Figure 1: e-Zaraat Mobile Application Dashboard

The E-Zaraat Mobile application is a unique mobile application as this single application serves two purposes:

- Collect data from the field on prescribed forms.

  Types of data collected via e-Zaraat Mobile Application are available as Annex-2

- Provide up to date local information to the Agriculture Extension staff to facilitate their work

Type of information provided by the e-Zaraat Mobile Application is available as Annex-3

1.3. The e-Zaraat Web application

Figure 2: e-Zaraat Web Application Dashboard

e-Zaraat web application contains all forms that are available through the e-Zaraat mobile application and some additional forms where data is entered at provincial level. This interface has been provided so as to ensure that even if the mobile tablet malfunctions or if the officer responsible for data entry is not available (sick/on leave etc.) the data may still be entered via the web application. The web interface also ensures that e-Zaraat may be implemented in districts where mobile tablets are not yet available.

Types of data collected via e-Zaraat web application are available as Annex-4

Type of configuration data information provided/collected the e-Zaraat Mobile Application is available as Annex-5, finally Annex-6 contains a list of all the reports that are generated by the web application.

1.4. e-Zaraat Help Line

The e-Zaraat help line has three distinct features. The users of the service can call the help line where their call is answered by a call service agent (CSA). The help line is backed by FAQs. In case the CSA does not have an answer to the user's query the call is directed to a designated Agriculture Extension Officer in the district from where the user is calling. The call now becomes a conference call and the CSA follows up on the answer given by the Agriculture Expert. This usually generates a new FAQ, thus the help line is designed to provide information and to also generate FAQs.

The registered farmers are also provided localized text and voice-based agro-advisory messages.

1.5. E-Zaraat Users' Guide

This is a detailed user guide on the use of the web and mobile application. A printed guide has been provided to all the trainees from all districts of Punjab. The participants were guided on how to use the user's guide and how to apply the instructions available therein. The user guide is also available at the E-Zaraat website www.e-Zaraat.org under the 'Help' option in the top menu bar.

2. E-Zaraat Training Workshops

Initially four training workshops had been planned in the project. One training workshop was to be held at each of the three target districts and one training workshop was to be held at the provincial headquarters for the staff of the Directorate General of Agriculture Extension and Adaptive Research. The workshops were organized on the basis of the availability of the Agriculture Extension staff for participation in the training at the district headquarters. There are few female extension workers in the department. The Directorate provides motor bikes to the Agriculture officers to carry out their field activities. It is not conventionally acceptable in Pakistan for women to ride motor bikes as drivers of the

bikes or ride behind on a motor bike with someone who is not family. Hence inspite of having a special quota for recruitment of women staff, the Directorate is unable to fill these posts as it cannot provide adequate travel facilities to women. The following tables give the summary of the training events conducted.

Training Conducted for e-Zaraat Project- Dec 2012 to May 2013					
Sr. No.	Date		Location	Training For	No. of Participants
	From	To			
Training					
1.	11-Dec-12	13-Dec-12	CABI Rawalpindi	Agriculture Extension Personnel from Vehari	4
2.	17-Jan-13	18-Jan-13	Vehari	Agriculture Extension Personnel from Vehari	36
3.	5-Apr-13	5-Apr-13	Agriculture Extension Headquarters Lahore	Agriculture Extension Personnel from Lahore	8
4.	11-Apr-13	11-Apr-13	Agriculture Extension Office Sailkot	Agriculture Extension Personnel from Sialkot	19
5.	15-May-13	15-May-13	Vehari	Practice of Data entry through tablets in field locations i.e. outside of office environment using Mobile Data connection	19
6.	17-May-13	17-May-13	Agriculture Extension Office Sargodha	Agriculture Extension Personnel from Sargodha	13
7.	20-May-13	21-May-13	Agriculture Extension headquarters Lahore	Agriculture Extension Personnel from 36 Districts of Punjab (102 trainees)& Provincial HQs Lahore (11 trainees)	113
Supervised Data Entry Sessions					
8.	26-Mar-13	29-Mar-13	Agriculture Extension Office Vehari	Agriculture Extension Personnel from Vehari	4
9.	14-May-13	14-May-13	Agriculture Extension Office Vehari	Agriculture Extension Personnel from Vehari (AOs)	19

Table 1: Trainings Conducted for e-Zaraat project from Dec 2012 to May 2013

The following table gives the trainees by districts and gender.

S. No.	District	Male Trainees	Female Trainees	Total
1	Vehari	36	0	36
2	Sargodha	13	0	13
3	Sialkot	18	1	19
4	Lahore	8	0	8
5	All 36 districts	96	6	102
	Office of DGA(EXT & AR) Lahore	10	1	11

Table 2: District & Gender Wise Distribution of Trainees

A picture story of the workshop is given below

2.1. First Workshop at Vehari

The first workshop was organized at Vehari - Agriculture extension office from January 17th-18th, 2013.

Figure 3: Workshop for end-user training of Agriculture Extension Vehari

The schedule and participant list of the workshop is attached as Annex-7

2.2. Second Workshop at Lahore

The second workshop was organized at Lahore at the provincial Headquarters of the Agriculture Extension office on April 5th, 2013.

Figure 4: Workshop for end-user training of Agriculture Extension -Lahore

The schedule and participant list is attached as Annex-8

2.3. Third Workshop at Sialkot

The third workshop was organized at Sialkot – Agriculture extension office on April 11th, 2013.

Figure 5: Workshop for end-user training of Agriculture Sialkot

The schedule and participant list is attached as Annex-9

2.4. Fourth Workshop at Sargodha

The fourth workshop was organized at Sargodha –Agriculture extension office on May 7th, 2013.

Figure 6: Workshop for End-User Training of Agriculture Extension Sargodha

The schedule and participant list is attached as Annex-10

2.5. Fifth Workshop - Extra Training Session at Vehari

Upon the request of the DG Agri Ext & AR and the DO Vehari an extra training session was held in Vehari on May 14th and 15th, 2013. The main purpose of this training was to conduct supervised data entry sessions for the staff in Vehari.

Hence an extra exercise took place in Vehari where the agriculture officers were guided on data entry using the web application and generation of reports therefrom. On the next day they were supervised on actual data entry in field locations outside the office using a 3G network.

Figure 7: Agriculture Extension staff in Vehari being trained by CABI in the use of tablets in outdoor field environment

2.6. Sixth Workshop at Lahore

Due to the positive feedback on the training workshops and on the E-Zaraat pilot project the Director General AR & AE asked CABI to provide orientation and training to all 36 districts of Punjab with a view to launching the project in all of Punjab. This workshop, a sixth one, was conducted in two sessions on May 20th and 21st, 2013 at the provincial headquarters of the Directorate General of AE & AR in Lahore. On May 20th, 22 districts were trained and on May 21st the rest of the 14 districts were trained.

Figure 8: Dr. Rana M. Shafique, RD (CABI) & Dr. M. Anjum Ali, DG Agri Ext and AR opening the event

Figure 9: Dr. Muhammad Anjum Ali, DG (Agriculture Extension), giving his views on the future vision of e-Zaraat

Figure 10: Participants of the workshop on end-user training of Agriculture Extension staff from all districts of Punjab at Agriculture Extension headquarters in Lahore

The schedule and participant list is attached as Annex-11

3. User Feedback from the Training Workshops

After training, a feedback form was distributed among the attendees with regards to the training held. A copy of the feedback form is attached as Annex-12. Following is the scale on which the trainees rated their feedback

Rating Scale				
1	2	3	4	5
Not Confident	**A little Confident**	**Somewhat confident**	**Confident**	**Extremely confident**

The workshop wise results of the survey are displayed below:

3.1. Sialkot

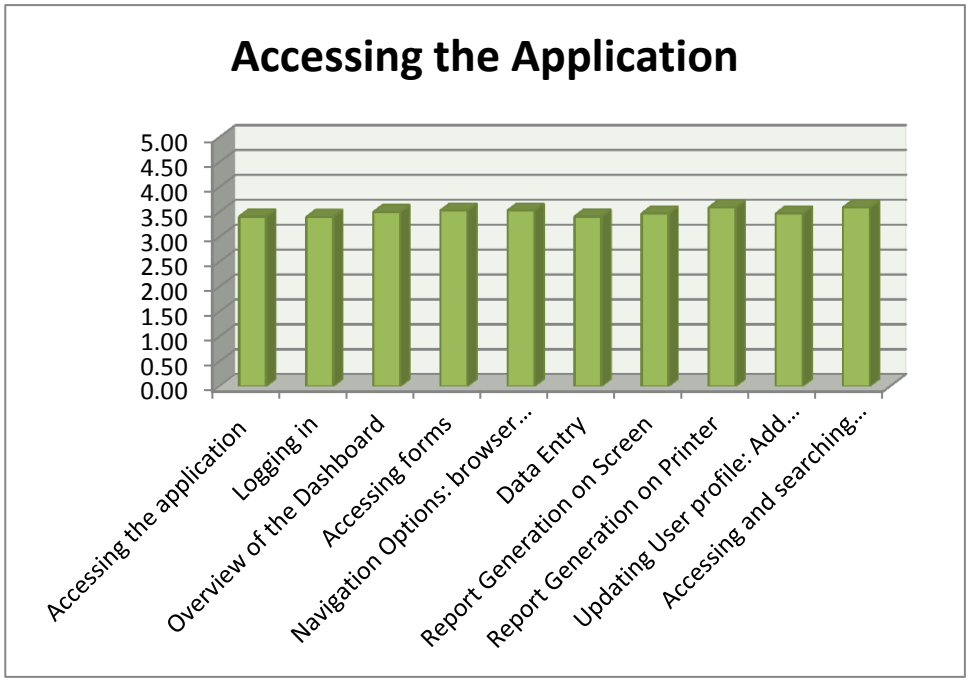

Figure 11: Training Evaluation Feedback Responses – Sialkot - Accessing the Application

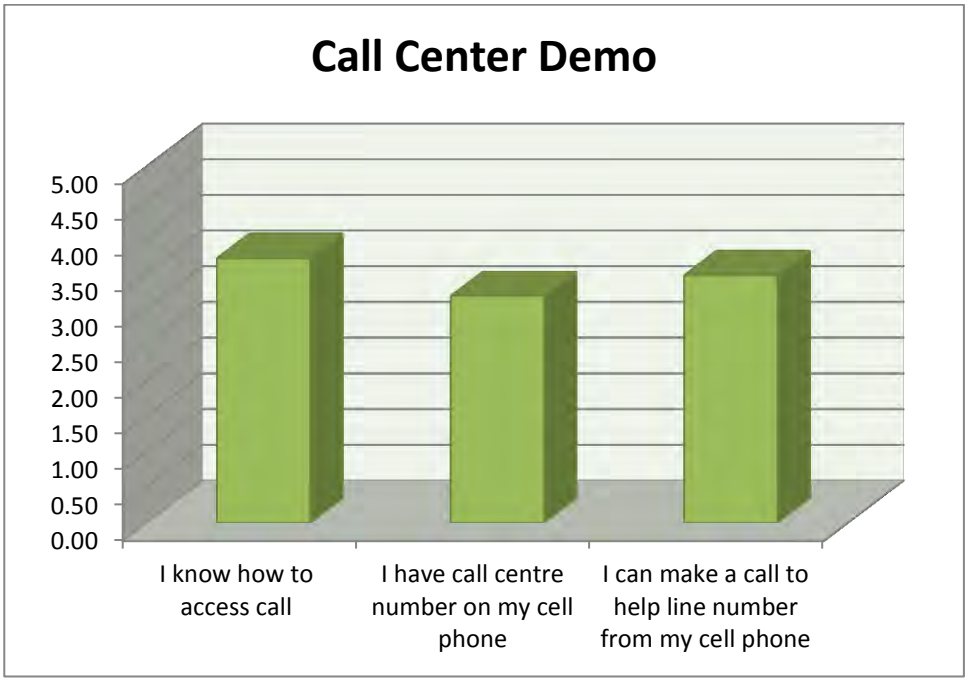

Figure 12: Training Evaluation Feedback Responses – Sialkot - Call Centre

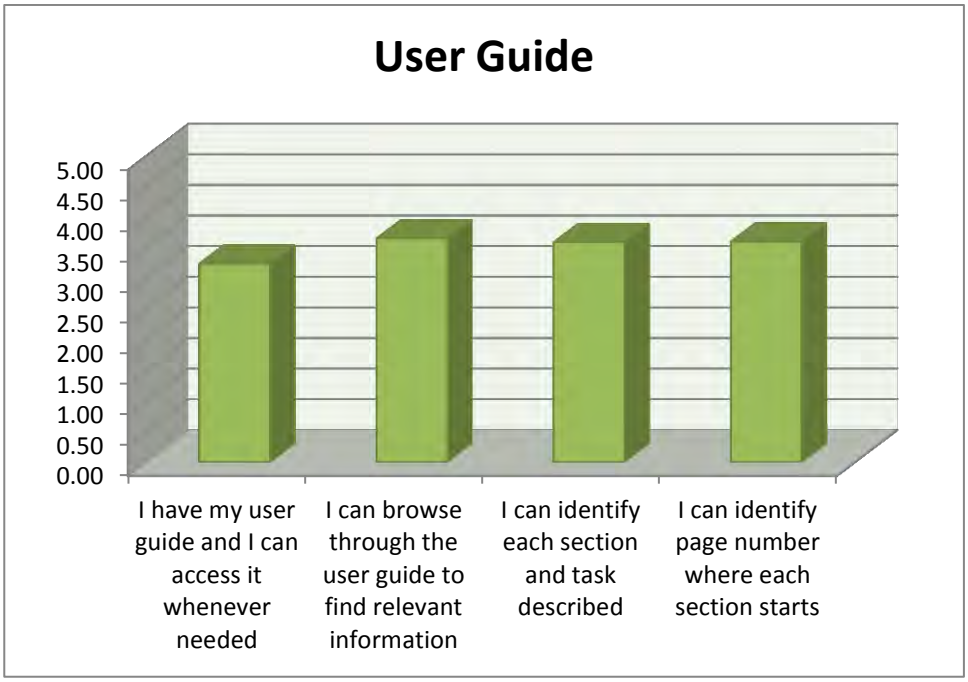

Figure 13: Training Evaluation Feedback Responses – Sialkot - User Guide

Figure 14: Training Evaluation Feedback Responses – Sialkot - Trainer and Training Management

3.2. Sargodha

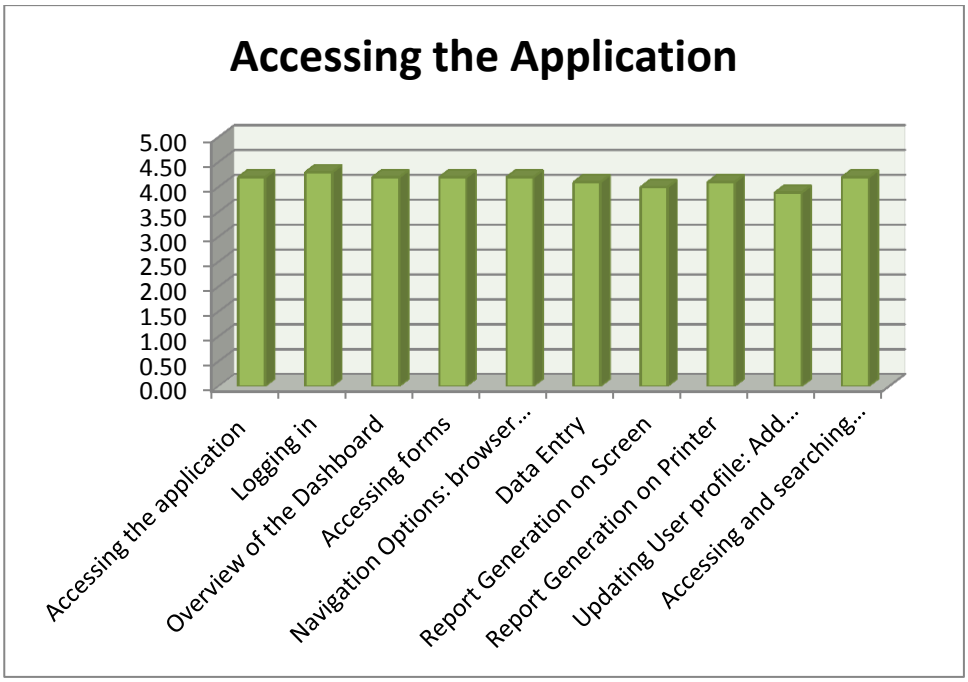

Figure 15: Training Evaluation Feedback Responses – Sargodha - Accessing the Application

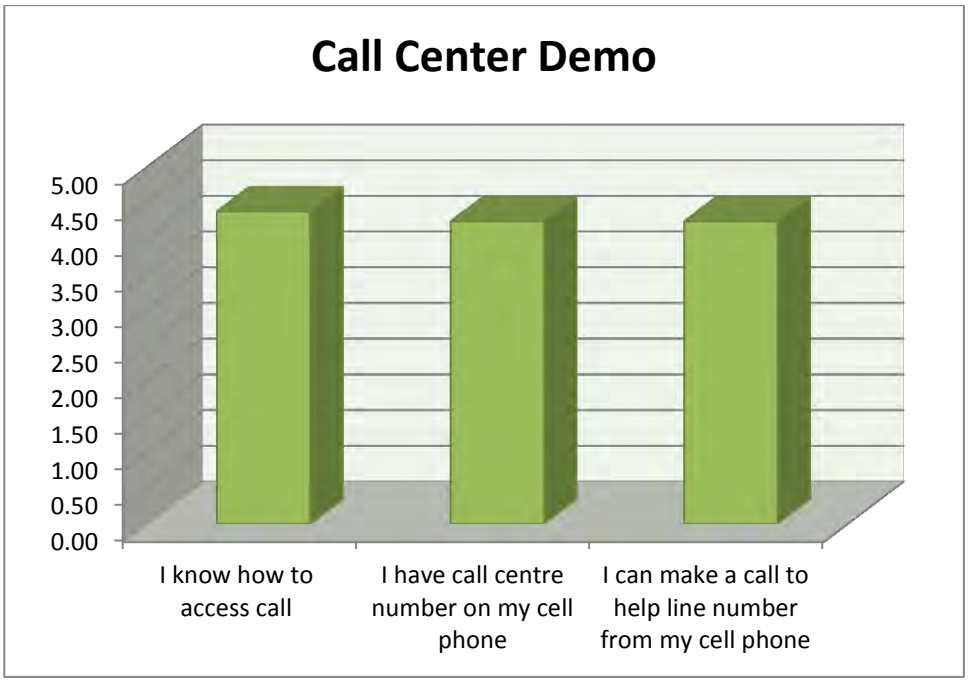

Figure 16: Training Evaluation Feedback Responses – Sargodha - Call Centre

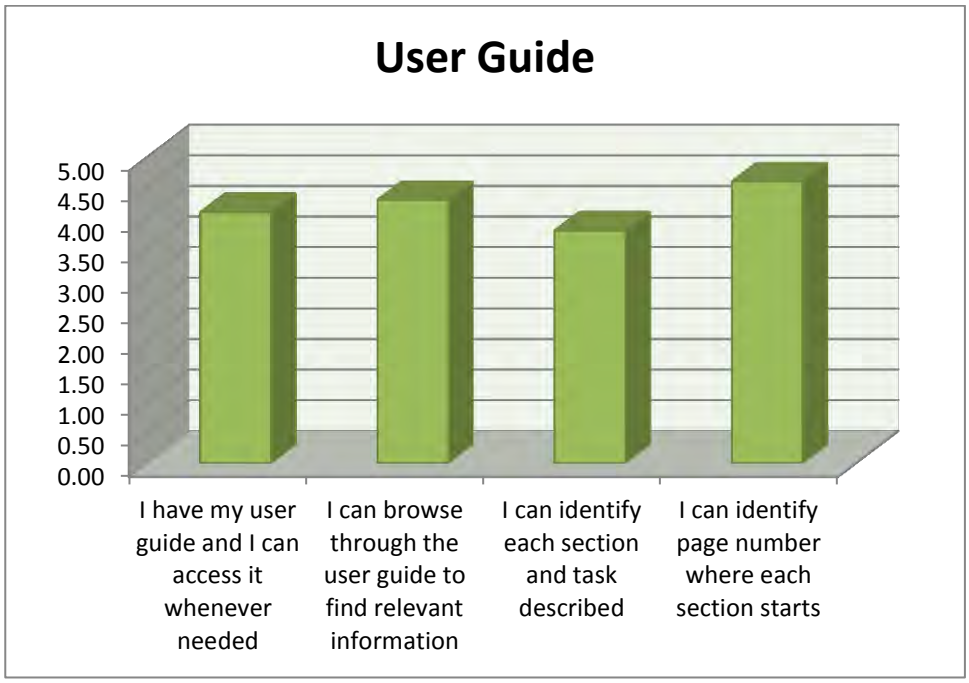

Figure 17: Training Evaluation Feedback Responses – Sargodha - User Guide

Figure 18: Training Evaluation Feedback Responses – Sargodha - Trainer and Training Management

3.3. Vehari

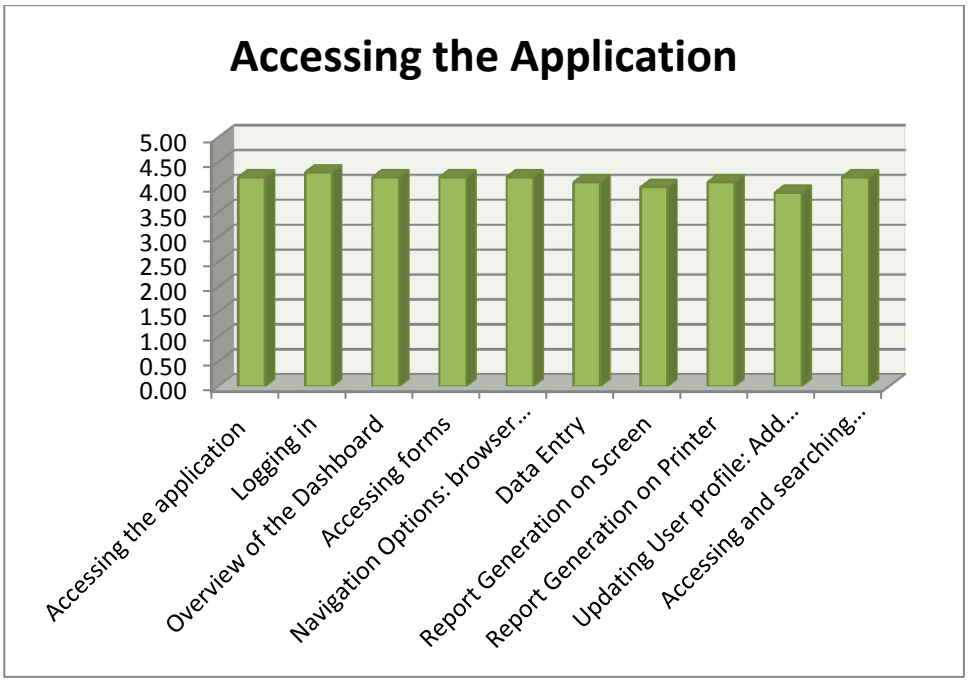

Figure 19: Training Evaluation Feedback Responses – Vehari - Accessing the Application

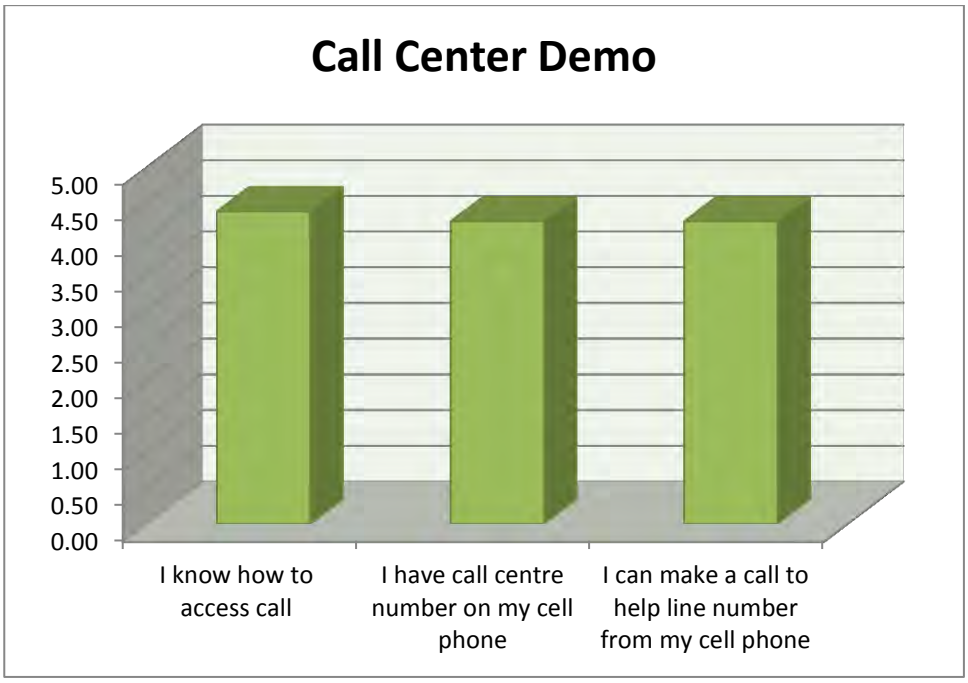

Figure 20: Training Evaluation Feedback Responses – Vehari - Call Centre

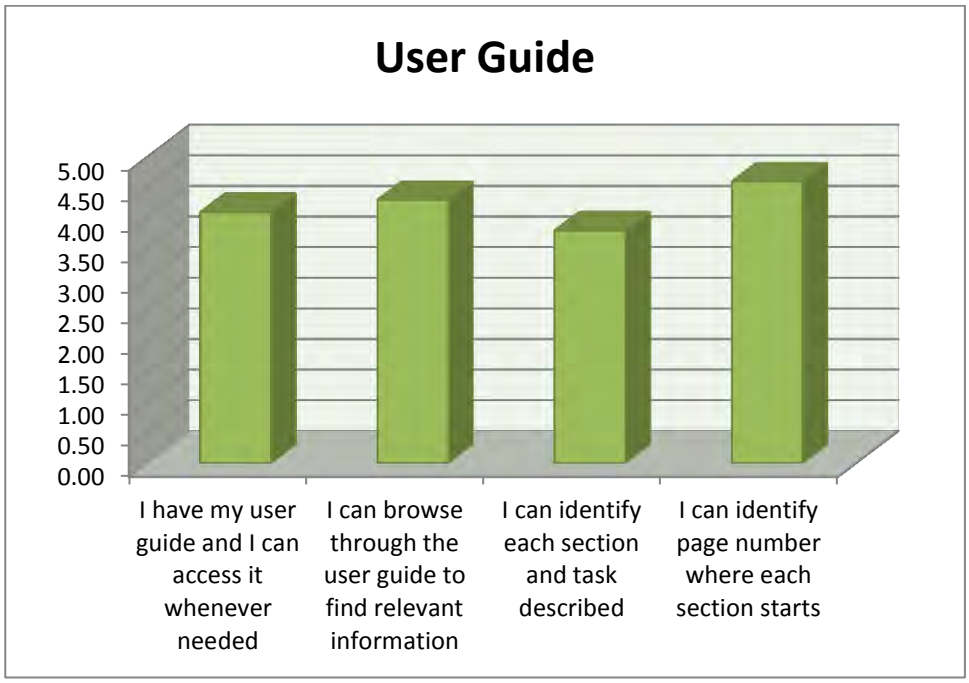

Figure 21: Training Evaluation Feedback Responses – Vehari - User Guide

Figure 22: Training Evaluation Feedback Responses – Vehari - Trainer and Training Management

3.4. Lahore – Training workshop for the 36 districts of Punjab

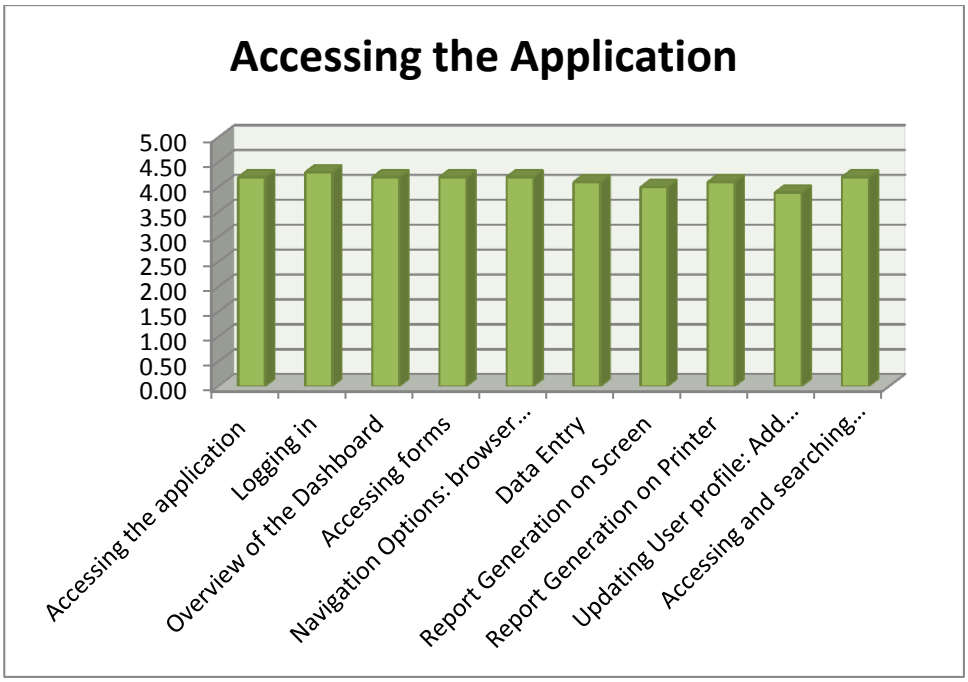

Figure 23: Training Evaluation Feedback Responses – Lahore - Accessing the Application

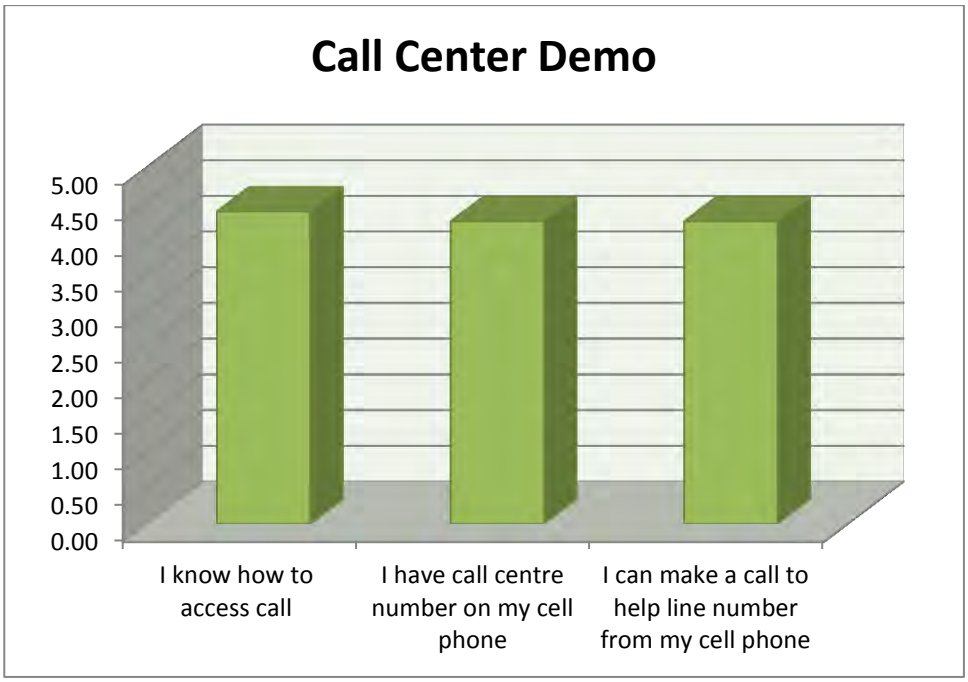

Figure 24: Training Evaluation Feedback Responses – Lahore - Call Centre

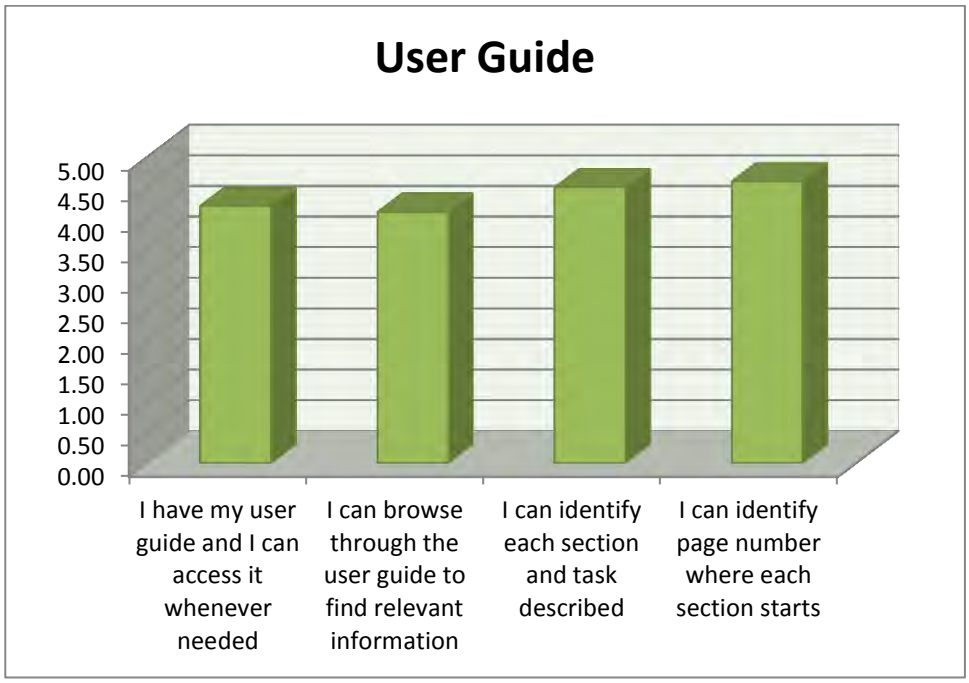

Figure 25: Training Evaluation Feedback Responses – Lahore - User Guide

Figure 26: Training Evaluation Feedback Responses – Lahore - Trainer and Training Management

4. Results

The user feedback on the training has been very good. All criteria on which feedback was sought have been rated as above 80% with the trainees feeling ‘confident’ or ‘extremely confident’ about these. This has exceeded the target of 70% as set in the log frame.

e-Zaraat is considered a very positive step at the Provincial Headquarters and at the districts level. This is demonstrated by the request of the DG to give orientation training to all districts of the Punjab.

However, the requests for more training also indicate that staff in the field requires more guidance and support when using tablets for data entry. Hence more training will be required at the field level to make the project a success at the provincial level.

Annex-1

ICT based Services for Agriculture Extension

Mahrukh Siraj
Coordinator, Knowledge Management

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Participant Introduction

Name

Qualification

Experience

Area where currently working

Piloting ‘ICT based services for Agriculture Extension’ in Punjab with funding from DFID.(2011 – 2013)

Workshop Norms

Use of mobile phones

During the workshop, please keep your mobile phones off. If you must use them please go outside the training room/hall.

Cross-talk

In order to create a congenial environment for learning, please avoid cross-talking or mini-meetings during presentations or discussions.

Interrupting others

You are expected to take your turn when wanting to speak. If somebody is speaking, please wait till s/he has finished and then speak.

Interactive workshop

Our workshops are highly interactive where we learn from each other. Therefore, please feel free to contribute in discussions and group work.

Project Objectives

- Improved reach and monitoring of extension services to the farming community at a lower cost
- Improved capacity of the extension department to collect, collate, analyse and share data
- A system whereby the public can register their level of satisfaction with the provided extension services with the extension managers

What are we doing

- Survey to measure the baseline & to evaluate the outcomes of services
- Meetings with Ext Dept Vehari, Sargodha, Sialkot and provincial headquarters- Lahore to understand the system
- Development of content for mobile/web applications
- Software application development and implementation
- Training of agriculture extension staff
- Services for the farmers through the help line

Surveys

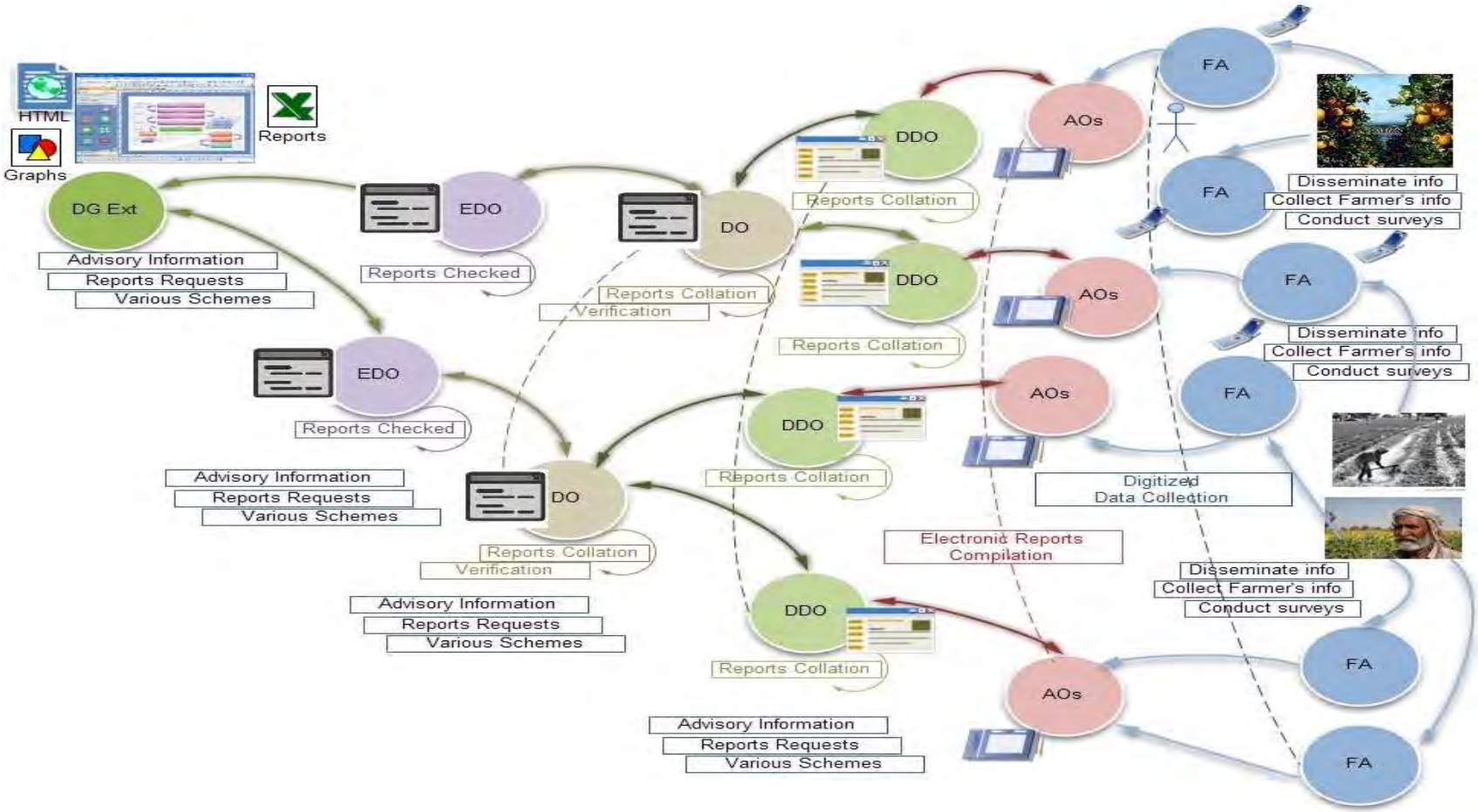
- Collect information on the working of the extension department in the three target districts: Vehari, Sialkot and Sargodha
- Baseline Survey
- Outcomes Survey

Development of Content for mobile/web apps

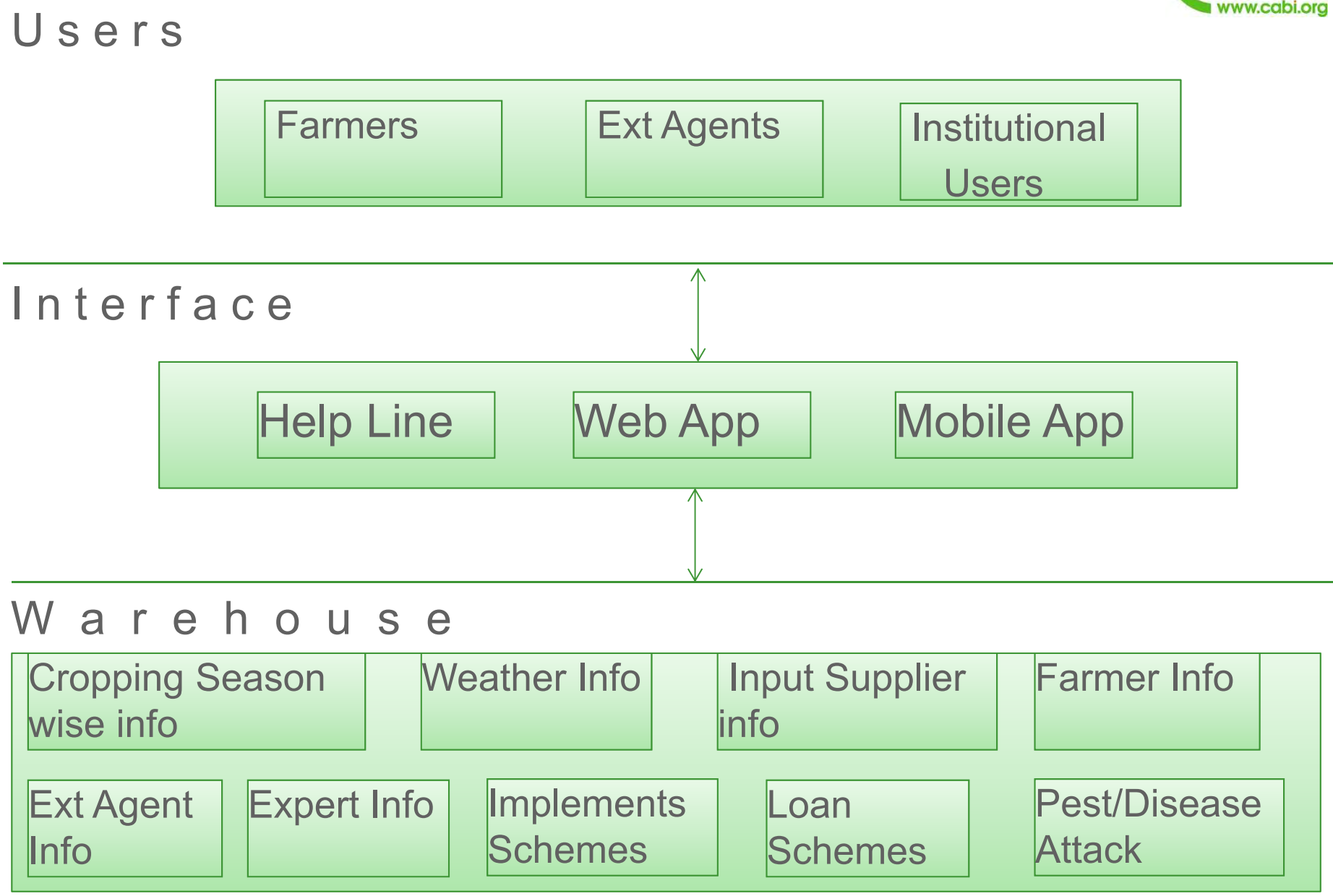
- Baseline survey to inform on current methods/practices & knowledge needs
- Workshops with Extension workers in target districts
- Review of the technology packages developed by Government Extension
- Develop fact sheets, protocols for short messages, voice messages

Web Application

The interface for the ERP for the Agriculture Ext Department



Complete Application



Mobile Application

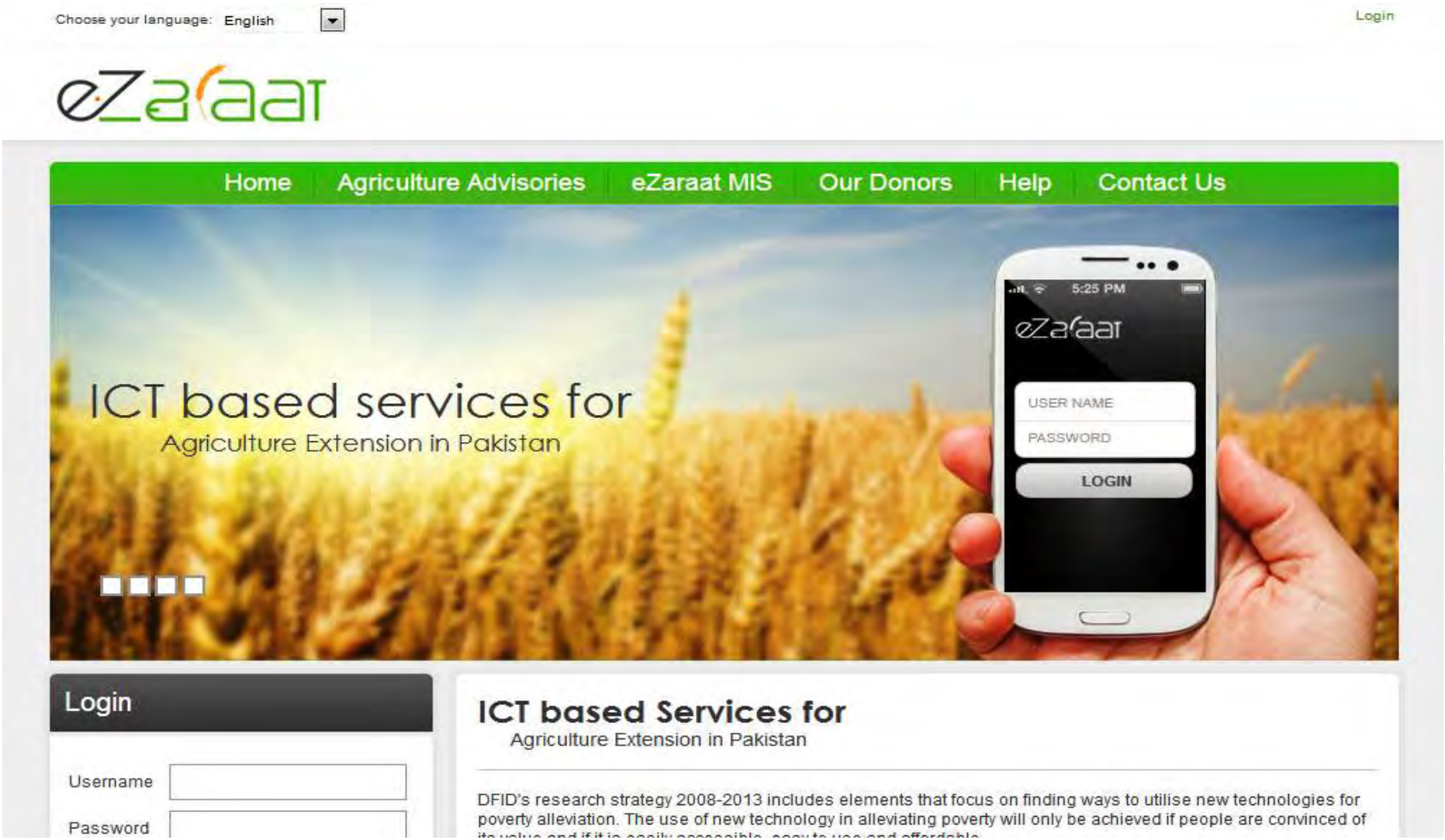
serves to collect data and provide information

Data Collection & Despatch to central repository

- Query Data on the device & from the repository
- Identify what data to place on the device

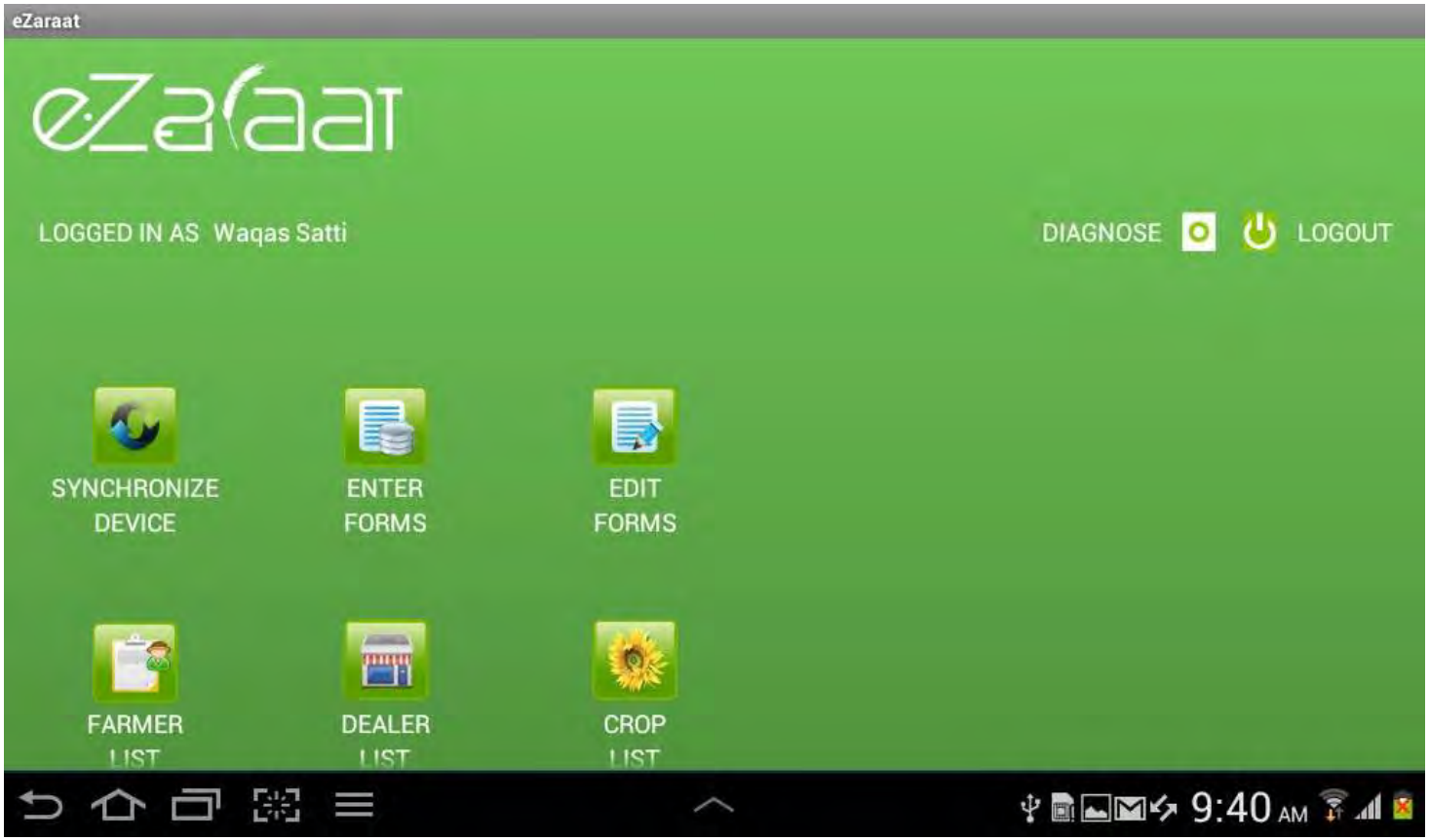
Apps for Farmers : Periodic Voice messages, Text messages

What is e-Zaraat?



E-Zaraat: Mobile Application

- Mobile app to collect survey data



E-Zaraat Help Line

- Each call will first be checked for caller information in the caller profile DB
- The calls will be logged for quality and transcription purposes.
- As a call is picked by a help line agent his/her display will be fed with relative agriculture advisory information.
- The help line may also serve as monitoring facility, as customer feedback can be taken to assess usefulness of the extension agent in caller's vicinity.
- The help line's transactional data will enrich the data warehouse

Deployment & Trainings

- Local Champions
- Training workshops in the three target districts and Lahore

Way Forward …….

- The rest of the districts to use the services so that we have a provincial level impact
- Each district is unique as it has different crops so the application has to be enhanced to cater to these requirements
- Work with the operators to work out a small fee based help line package. Where the fee is shared with the project partners

Thank You

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Annex-2

Type of information collected via the e-Zaraat Mobile Application

Serial No.	Form Name	Description
1.	Biological Control	This form is used for keeping track of the distribution of cards of biological control agents. The details recorded include the details of the beneficiary of this distribution, the number of cards prepared and distributed and the crop treated using these agents.
2.	Canal Status	The canal status form is used to keep a record of the changes in the canal water flow. The details recorded include the name of the canal, the indent and discharge of water, any relevant actions taken and remarks.
3.	CLCV	The CLCV (Cotton Leaf Curl Virus) form is used to record the detail of farmers and the intensity level of and the area affected by CLCV on that farmer's farm.
4.	Cotton Ginning	This form is used to keep record of the cotton ginned in a certain cotton factory. Each factory provides statistics of the cotton they received, ginned and sold. This form provides an input facility to record this data.
5.	Kitchen Gardening	This form is used to record details for the distribution of kitchen gardening kits. The details recorded include the details of the farmer and the number of kits sold.
6.	Micronutrient Records	This form records details of micronutrients from various distributors. The details recorded include the composition details for each of the micronutrients being recorded.
7.	Pesticide/Fertilizer Cases	The pesticide fertilizer cases are integral in producing multiple reports in this system. Therefore, it is the largest form as it records data for various cases that are pitted against a dealer whose pesticide or fertilizer samples have been tested and based on the results, the case goes on, such as the case moving to the police for further investigation, the prosecution executing the case and finally, the court deciding on whether to incarcerate or liberate the accused. The details recorded include the substance batch numbers, substance sampling quantity, sampling dates, dispatch dates, results received, FIR details (if one is filed, owing to nature of the result), challan numbers, prosecution decision, the court's decision, any imprisonment and fine imposed upon the accused by the court etc.
8.	Pest Scouting	The pest scouting form records details for various pests being noticed at a farmer's farm. The details recorded include the details of the farmer, the name of the pest, the number of pests per leaf and its hot spots declared and treated.
9.	Rainfall	The rainfall form simply records the amount of rain (in mm) along with the type of rain for a specific region.
10.	Seed Grader	The seed grader form records the details for the farmer, the seed grading targets defined and grading targets achieved.
11.	Sowing Position	The sowing position form records the farmer's details along with the crop and the sowing

Annex-2

		position for that crop, i.e. the amount of that crop sowed for a given period.
12.	Urea Dispatch	The urea dispatch form records the quantity of urea dispatched by an importer to a dealer. The details for the records include the name of the dealer, the importer, the quantity of urea dispatched, the quantity of urea verified and the date of that verification.
13.	Weather Reporting	The weather form records various meteorological details for a given region. The details include the humidity in the morning and the afternoon and the maximum and minimum temperature.

Annex-3

Type of information provided by the e-Zaraat Mobile Application

The following table contains the list of e-Zaraat mobile application dashboard icons that the data that can be viewed by the extension agent via the mobile tablet.

Icon	Description
 FARMER LIST	In this icon of FARMER LIST user can view and search the farmers of his District and can view the detail for one specific farmer.
 DEALER LIST	By selecting DEALER LIST icon user can view and search all the registered dealers of Pesticides and Fertilizers of the District.
 CROP LIST	CROP LIST icon is used for viewing and searching the seasonal crops of the District.
 USER PROFILE	User can view his profile detail and also changes his password and other account details.
 PESTICIDE LIST	In PESTICIDE LIST icon user can view and search different types of pesticides in the pesticides list. Types of pesticide that the user can view are: 1. Insecticide 2. Fungicides 3. Weedicides 4. Acaricides 5. Fumigants
 FERTILIZER LIST	FERTILIZER LIST icon is used for viewing and searching the list of fertilizers. User can view two types of fertilizers in this list. 1. Micronutrient 2. Macronutrient

 AGRICULTURE ADVISORIES	This is icon is used for viewing the list of Agriculture Advisories; user can search the advisories on the keywords basis and can view the detail of selected advisory.

Annex-4

Type of information collected by e-Zaraat Web application:

Serial No.	Form Name	Description
1.	Biological Control Card Records:	This form is used for keeping track of the distribution of cards of biological control agents. The details recorded include the details of the beneficiary of this distribution, the number of cards prepared and distributed and the crop treated using these agents.
2.	Canal Status	The canal status form is used to keep a record of the changes in the canal water flow. The details recorded include the name of the canal, the indent and discharge of water, any relevant actions taken and remarks.
3.	CLCV (Cotton Leaf Curl Virus) Observations	The CLCV form is used to record the detail of farmers and the intensity level of and the area affected by CLCV on that farmer's farm.
4.	Cotton Ginning Status	This form is used to keep record of the cotton ginned in a certain cotton factory. Each factory provides statistics of the cotton they received, ginned and sold. This form provides an input facility to record this data.
5.	Kitchen Gardening Kits Distribution	This form is used to record details for the distribution of kitchen gardening kits. The details recorded include the details of the farmer and the number of kits sold.
6.	Micronutrient Records	This form records details of micronutrients from various distributors. The details recorded include the composition details for each of the micronutrients being recorded.
7.	Pesticide/Fertilizer Cases	The pesticide fertilizer cases are integral in producing multiple reports in this system. Therefore, it is the largest form as it records data for various cases that are pitted against a dealer whose pesticide or fertilizer samples have been tested and based on the results, the case goes on, such as the case moving to the police for further investigation, the prosecution executing the case and finally, the court deciding on whether to incarcerate or liberate the accused. The details recorded include the substance batch numbers, substance sampling quantity, sampling dates, dispatch dates, results received, FIR details (if one is filed, owing to nature of the result), challan numbers, prosecution decision, the court's decision, any imprisonment and fine imposed upon the accused by the court etc.
8.	Pest Scouting	The pest scouting form records details for various pests being noticed at a farmer's farm. The details recorded include the details of the farmer, the name of the pest, the number of pests per leaf and its hot spots declared and treated.
9.	Rainfall Recording	The rainfall form simply records the amount of rain (in mm) along with the type of rain for a specific region.
10.	Seed Grader Records	The seed grader form records the details for the farmer, the seed grading targets defined and grading targets achieved.
11.	Sowing Position Recording	The sowing position form records the farmer's details along with the crop and the sowing position for that crop, i.e. the amount of that crop sowed for a given period.
12.	Urea Dispatch	The urea dispatch form records the quantity of urea dispatched by an importer to a dealer. The details for the records include the name of the dealer, the importer, the quantity of urea dispatched, the quantity of urea verified and the date of that verification.
13.	Weather Reporting	The weather form records various meteorological details for a given region. The details include the humidity in the morning and the afternoon and the maximum and minimum temperature.

Annex-5

Type of configuration data collected and provided by e-Zaraat web application

Icon	Description
 Canals	This button leads to the canal list where the canal names, as well as their total capacity are displayed. Clicking on the “Minors” button for each canal displays a list of all canal minors for that given canal, along with their total capacity.
 Crops	This button leads to the list of crops where the user can view the crops season as well as other details for that crop.
 Dealers	This button leads to the list of dealers which are identified by the type of dealer that they are. The types of dealers can be as follows: • Fertilizer • Pesticide Other information relevant to the dealers includes their name, CNIC ,parentage, address, contact number, dealer license details etc.
 Distributors	This button leads to the list of distributors which, like dealers, are identified by the type of distributor that they are. The types of distributors can be as follows: • Fertilizer • Pesticide Other information relevant to the dealers includes their name, parentage, address, contact number etc.
 Farmers	This button leads to the list of farmers where the user can choose and view details for the farmers. The information being stored in the eZaraat database for farmers include the farmers name, parentage, CNIC, address, contact number, area owned, area leased etc.
 Factories	This button leads to the list of factories which are identified by the name of the factory along with the name of the factory’s owner. The factory information being stored includes the ones mentioned, address and contact details for the factory as well as the name of the crop which is being processed at the factory.

Fertilizers

This button leads to the list of fertilizers which are identified by the market name of the fertilizer as well as the category that fertilizer falls into. The types of fertilizers being stored in the eZaraat database include the following:

- Micronutrient
- Macronutrient

Other information being stored for the fertilizers includes their chemical composition and their scientific name.

Importers

This button leads to the list of importers which, like distributors, are identified by the type of importer that they are. The types of importers can be as follows:

- Fertilizer
- Pesticide

Other information relevant to the dealers includes their name, parentage, address, contact number etc.

Pests

This button leads to the list of pests which are identified by the name of the pest along with the type of pest. This data is entered at the district level

Pesticides

This button leads to the list of pesticides which is identified by the market name of the pesticide as well as the category the pesticide falls into. The types of pesticides being stored in the e-Zaraat database include the following:

- Insecticides
- Fungicides
- Weedicides
- Rodenticides
- Acaricides
- Fumigants

Other information being stored for the pesticides includes their chemical composition and their group names.

Police Stations

This button leads to the list of police stations, each of which is identified by the name of the police station, its area, its head officer and the contact number for that police station.

User Profile

This button leads the user to their profile page, where they have the option to change their password, and other personal details, namely:

- Name
- CNIC
- Address
- Contact Numbers

etc.

Annex-6

List of Reports provided by e-Zaraat web application

1. Sowing Position Report
2. Urea Dispatch Report
3. Weather Report
4. Biological Control Record Report
5. Canal Status Report
6. Cotton Ginning Report
7. Dealer License Expiry Report
8. Kitchen Gardening Kits Distribution Report
9. Pest Scouting Report
10. Rainfall Report
11. Seed Grading Report
12. Pesticide/fertilizer inspection/raids cases report
13. ABC Report: This report enlists the pesticide fertilizer cases for a specific time period, e.g. a year, and the status for each of these cases is spread across 3 different report formats, each conveniently labeled A, B and C. Format A lists all cases that have taken place for the reporting time period and sampling details, such as the amount sampled and their batch no. along with the dispatch to laboratory details for investigation. Format B lists the cases and their results received from the laboratories, i.e. whether the samples were fit or unfit (adulterated or substandard). Format C lists the cases that have been put under investigation due to being unfit. It also details the different authorities, namely police, prosecution and court, which investigate the case and give a decision on whether the accused should be punished or liberated.
14. A-G Report: This report enlists all pesticide fertilizer cases registered with the extension department since 1998. The report is split into 7 separate sections, each labeled A, B, C, D, E, F and G. The details for each section is as follows:
    A. This section provides a summary of all years since 1998 to date, and the number of cases in each step of the case that are described in the next 6 sections.
    B. This section provides a list of all cases that are currently pending with the police.
    C. This section provides a list of all cases that have been discharged by the police.
    D. This section provides a list of all cases that are currently pending with the prosecution.
    E. This section provides a list of all cases that have been decided by the court.
    F. This section provides a list of all cases that have been consigned to the court.
    G. This section provides a list of all cases that are currently pending with the court

Annex-7

Workshop for end-user training of Agriculture Extension Personnel of 3 Districts (held at the agriculture extension office of Vehari – Workshop I)

Workshop Schedule 17 January 2013

TIME	ACTIVITY	RESPONSIBILITY
INAUGURAL SESSION		
0900	Registration	Agriculture Extension Office, Vehari
0920	Recitation from Holy Quran	Muhammad Waqas (CABI)
0930	Introductory speech to workshop	EDO, Vehari
0945	Introductory presentation to eZaraat	Mahrukh Siraj (CABI)
TECHNICAL SESSION		
1015	Demonstration of the mobile application	Muhammad Waqas (CABI)
1100	TEA	Agriculture Extension Office, Vehari/CABI
1130	Distribution of tablets to mobile users	Abdul Wahab Chauhdry (CABI), Muhammad Waqas (CABI)
1200	Data entry demonstration to mobile users	Muhammad Waqas (CABI)
1245	LUNCH	Agriculture Extension Office, Vehari/CABI
1345	Demonstration of the web application	Abdul Wahab Chauhdry (CABI)
1515	Closing Remarks & Group Photo	EDO, Vehari

Workshop Schedule 18 January 2013

TIME	ACTIVITY	RESPONSIBILITY
0900	Registration	Agriculture Extension Office, Vehari
1000	Training of the web application	Abdul Wahab Chauhdry (CABI), Muhammad Waqas (CABI)
1300	LUNCH	Agriculture Extension Office, Vehari/CABI
1400	Continued training of the web application	Abdul Wahab Chauhdry (CABI), Muhammad Waqas (CABI)
1530	Workshop Evaluation Form	Abdul Wahab Chauhdry (CABI), Muhammad Waqas (CABI)
1600	Closing Remarks	Mahrukh Siraj (CABI)

Workshop for Training Extension Department Personnel for eZaraat Mobile and Web Applications in Vehari
Venue: Marry Inn- Meeting Hall, Vehari
17-Jan-13
Attendence Sheet

Sr. No.	Name	Designation	Cell No.	Signature
1	Ms. Mahrukh Siraj	Coordinator, ICT & Knowledge Management CABI	0336-5133670	
2	Mr. Abdul Wahab	Software Engineer CABI	0313-5114958	
3	Mr. Muhammad Waqas	Software Engineer CABI	0321-5864034	
4	Mr. Shahzid Sabir	EDO O/O DCO complex Vehari	0300-6632304	
5	Mr. Ch. Muhammad Safdar	District Officer Agriculture (Ext) Vehari	0302-7735577	—
6	Mr. Rao Ishfaq Ahmad	Deputy District OfficerAgriculture (Ext) Vehari	0345-7212253	DDO(EXT), Vehari
7	Mr. Altaf Hussain	Deputy District OfficerAgriculture (Ext) Burewala	0300-6998944	
8	Mr. Muhammad Khalid Khan	Deputy District OfficerAgriculture (Ext) Mailsi	0300-7507852	17/1/13
9	Mr. Tariq Mehmood	AO (Tech) O/O DOA (Ext) Vehari	0321-7739899	
10	Mr. Rashid Minhas	AO Lab O/O DOA (Ext) Vehari	0300-7728929	
11	Mr. Nawaz Ahmad	Agriculture Officer Burewala	0300-7590711	
12	Mr. Muhammad Asif	Agriculture Officer Dallan	0346-7156134	—
13	Mr. Tahir Shahzad Rafique	Agriculture Officer Sh.Fazal	0300-6995503	
14	Mr. Muhammad Ismail Wattoo	Agriculture Officer Gaggoo	0300-7594414	—
15	Mr. Tariq Hussain	Agriculture Officer Jamlera	0300-6998239	
16	Mr. Saqib Farooq	Agriculture Officer Sahuka	0333-6152582	
17	Mr. Muhammad Asif Abid	Agriculture Officer Mailsi	~~0300-7722505~~ 0300-7732004	
18	Mr. Muhammad Iqbal	Agriculture Officer Dokota	0300-7729608	
19	Mr. Talib Hussain	Agriculture Officer Jalla Jheem	0300-7725131	
20	Mr. Imtiaz Hussain Shah	Agriculture Officer Tibba Sultan Pur	0300-7722505	
21	Mr. Muhammad Saleem Bhatti	Agriculture Officer Garah More	0300-6844090	
22	Mr. Muhammad Ishaq	Agriculture Officer Vehari	0300-7727953	
23	Mr. Muhammad Shaid	Agriculture Officer Pipli	0301-7943843	
24	Mr. Abdul Gahfoor	Agriculture Officer Thingi	0300-7731246	
25	Mr. Muhammad Qamar Mahmood	Agriculture Officer Machianwala	0300-6883068	
26	Mr. Mahr M.Riaz	Agriculture Officer Ratta Tiba	0301-6575631	
27	Mr. Irshad Ali Shahbaz	Agriculture Officer Luddan	0336-6707055	

28	Mr. Liaqat Ali	Agri. Officer F.M. Vehari	0308-8633667	
29	Mr. Muhammad Rashid Hussain	Cotton Inspector Agri Office Gaggoo	0300-6990926	
30	Mr. Jahangir Khan	Cotton Inspector O/O DDOA (Ext) Mailsi	0308-7940865	
31	Mr. Rashid Mukhtar	Cotton Inspector O/O DDOA Vehari	~~0333-4676118~~ 0333-7646118	
32	Mr. Abid Saleemi	Assistant O/O EDOA Vehari	0333-2859105	
33	Mr. Muhammad Malik	Junior clerk O/O DOA Vehari	0333-4028327	
34	Mr. Abdul Waqas	Junior clerk O/O DOA Vehari	0333-6279497	
35	Mr. Sajid Mehmood	Junior clerk O/O DOA Vehari	0334-5757911	
36	Mr. Mushrif Javad	Field Assistant O/O DDOA Vehari	0333-6271320	
37	Mr. Syed Muhammad Nasir Hussain	Assistant O/O DDOA Burewala	0300-7597004	
38	Mr. Muhammad Yaseen	Junior clerk O/O DDOA Mailsi	0344-4163146	

39 MUHAMMAD SHAHBAZ AHMAD Staff Officer to DG A (Ext.) Punjab 0321 4299496

Workshop for Training Extension Department Personnel for eZaraat Mobile and Web Applications in Vehari
Venue: Marry Inn- Meeting Hall, Vehari
18-Jan-13
Attendence Sheet

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5	Mr. Rao Ishfaq Ahmad	Deputy District OfficerAgriculture (Ext) Vehari	0345-7212253	
6	Mr. Tariq Mehmood	AO (Tech) O/O DOA (Ext) Vehari	0321-7739899	
7	Mr. Tahir Shahzad Rafique	Agriculture Officer Sh.Fazal	0300-6995509	
8	Mr. Jahangir Khan	Cotton Inspector O/O DDOA (Ext) Mailsi	0308-7940865	
9	Mr. Mushrif Javad	Field Assistant O/O DDOA Vehari	0333-6271320	
10	Mr. Saqib Farooq	Agriculture Officer Sahuka	0333-6152582	
11	Mr. Imtiaz Hussain Shah	Agriculture Officer Tibba Sultan Pur	0300-7722505	
12	Mr. Mahr M.Riaz	Agriculture Officer Ratta Tiba	0301-6575631	
13	Mr. Muhammad Malik	Junior clerk O/O DOA Vehari	0333-4028327	

14 MUHAMMAD SHAHBAZ AHMAD Staff Officer to DG(A)(Ext)PL Lahore 0321-4299496

Annex-8

Workshop for end-user training of Agriculture Extension Personnel at Agriculture Extension headquarters in Lahore

Workshop Schedule 5 April 2013

TIME	ACTIVITY	RESPONSIBILITY
INAUGURAL SESSION		
1000	Registration	Directorate of Agri Ext & AR/CABI
1020	Recitation from Holy Quran	Directorate of Agri Ext & AR/CABI
1030	Welcome Speech	Director General, Agriculture Extension Department
1100	Introduction to eZaraat	Mahrukh Siraj (CABI)
1130	TEA	Directorate of Agri Ext & AR/CABI
TECHNICAL SESSION		
1200	Demonstration of eZaraat mobile application	Muhammad Waqas (CABI)
1230	Demonstration of eZaraat web application	Abdul Wahab (CABI)
1315	LUNCH	Directorate of Agri Ext & AR/CABI
1400	Training of eZaraat web application	Abdul Wahab (CABI)
1330	Closing Remarks	Directorate of Agri Ext & AR/CABI

User Training Workshop on "ICT based services for Agriculture Extension-Phase II" in Lahore

April 5th, 2013

Attendance Sheet

Sr. No.	Name	Designation & Organization	Signature
1	Abdul Wahab Ch.	Software Engineer, CABI	
2	Muhammad Waqas	Software Engineer CABI	
3	Mulammad Nadeem Mughal	S/Cs. % DGA(Ext)	
4	Rao Khurram Shahzad	RO Hqrs % DGA(Ext)	
5	Muhammad Saeed	AO (Hq)	
6	Far M. Yousuf	A.O (Ext Cell)	
7	Fayyaed Hussain	A-O Adaptive Research	
8	Dr. Shaheen Iqbal	RO Adaptive Research	
9	FAYYAZ AHMAD	Assit Publicity Offr o/o DGA(Ext)	
10	Dr. Muhammad Aslam	Agri. Economist	
11			
12			
13			
14			

Annex-9

Workshop for end-user training of Agriculture Extension Personnel of 3 Districts (held at the agriculture extension office of Sialkot)

Workshop Schedule 11 April 2013

TIME	ACTIVITY	RESPONSIBILITY
INAUGURAL SESSION		
0930	Registration	Agriculture Extension Office, Sialkot
0950	Recitation from Holy Quran	Muhammad Waqas (CABI)
1000	Introductory speech to workshop	DOA (Extension), Sialkot
1010	Introduction of Trainers	Abdul Wahab Chauhdry (CABI), Muhammad Waqas (CABI)
1020	Introduction of Participants	Agriculture Extension Office, Sialkot
TECHNICAL SESSION		
1030	Demonstration of the mobile application	Muhammad Waqas (CABI)
1100	TEA	Agriculture Extension Office, Sialkot/CABI
1130	Demonstration of the web application	Abdul Wahab Chauhdry (CABI)
1245	Call Centre Demo	Abdul Wahab Chauhdry (CABI)
1315	User Guide distribution and explanation	Muhammad Waqas (CABI)
1345	LUNCH	Agriculture Extension Office, Sialkot /CABI
1430	Practice Session for web application	Abdul Wahab Chauhdry (CABI)
1600	Workshop Evaluation Form	Muhammad Waqas (CABI)
1630	Closing Remarks & Group Photo	DOA (Extension), Sialkot/CABI

User Training Workshop on "ICT based services for Agriculture Extension-Phase II" in Sialkot

April 11th, 2013

Attendance Sheet

Sr. No.	Name	Designation & Organization	Signature
1	NAFEES AHMAD	DDOA (Ext.) Sambrial.	N. Ahmed 11/4
2	Dr. M. Asif Zia	DDOA (Ext.) Daska	[signature]
3	Iftikhar Ahmad	A.O. Ext. Pasrur	[signature]
4	Sajjad Haider	A.O. Ext. Kalaswala	[signature]
5	M. Anwar Awan	DDOA (Ext.) Pasrur	M. A. Awan
6	Zohaib Ahmad Mir	A.O (PP) Daska	Ahmed Ali
7	Zahid Iqbal	A.O (Tech) Sialkot	[signature]
8	Muhammad Saleem Shad.	A.O (Ext). Sambrial.	[signature]
9	Muhammad Sami JC Tehsil Sambrial	J.C o/o DDOA/Sambrial	A. Sami Ullah
10	Rana Tahir Yousaf	J.C o/o DDOA (Ext) Pasrur	[signature]
11	A Sami Gw	DOA (ext) SLK	[signature]
12	Sharafat Ali	F.A Head marala	[signature]
13	Nabeel Shahzad	J/C o/o DDOA (ext) S	Nabeel
14	Mahboob Khan	FFA o/o DDOA	Mehboob Alam
15	Jawahar Ali	A.O. (EXT) Uggoke	Jawahar

User Training Workshop on "ICT based services for Agriculture Extension-Phase II" in Sialkot

April 11th, 2013

Attendance Sheet

Sr. No.	Name	Designation & Organization	Signature
15	Zaheer Iqbal	J/C O/O DDA (Ext) S	Zaheer Iqbal
16	HUMAIRA YOUNIS	Agricultural Officer (Ext) Sialkot Saddar	Humaira
17	Jawahar Ali	Agricultural Officer (Ext) Uggoke	Jawahar Ali
18	Waseem Akhtar	F. A Gondal	Waseem
19	Mirza Naheed Baig	J.C. O/O DDOA/Daska	Mirza Naheed Baig
20	Muhammad Waqas	Software Engineer CABI	
21	Abdul Wahab Ch.	Software Engineer CABI	
22			
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Annex-10

Workshop for end-user training of Agriculture Extension Personnel of 3 Districts (held at the agriculture extension office of Sargodha)

Workshop Schedule 17 May 2013

TIME	ACTIVITY	RESPONSIBILITY
INAUGURAL SESSION		
0930	Registration	Agriculture Extension Office, Sargodha
0950	Recitation from Holy Quran	Muhammad Waqas (CABI)
1000	Introductory speech to workshop	DOA (Extension), Sargodha
1010	Introduction of Trainers	Muhammad Waqas (CABI), Zahid Qureshi (CABI)
1020	Introduction of Participants	Agriculture Extension Office, Sargodha
1045	TEA	Agriculture Extension Office, Sargodha/CABI
TECHNICAL SESSION		
1115	Demonstration of the web application	Muhammad Waqas (CABI)
1145	Practice Session for web application	Muhammad Waqas (CABI)
1315	LUNCH	Agriculture Extension Office, Sargodha/CABI
1400	User Guide distribution and explanation	Muhammad Waqas (CABI), Zahid Qureshi (CABI)
1430	Workshop Evaluation Form	Zahid Qureshi (CABI)
1500	Closing Remarks & Group Photo	DOA (Extension), Sargodha/CABI

User Training Workshop on "ICT based services for Agriculture Extension-Phase II" in Sargodha

May17th, 2013

Attendance Sheet

Sr. No.	Name	Designation & Organization	Signature
1	M. TAHIR JAMIL	D.D.O. Agri. (Ext.) SARGODHA	
2	Majid Hameed Bajwa.	D.D.O. Agri (Ext.) Sahiwal	
3	Tahir Mustafa Piracha	D.Do. Agri (Ext.) Kotmomin	
4	Saeed Ahmad	A.O. (Ext.) ~~Kotmomin~~ Sahiwal	0314-5453096
5	Muhammad Nasir Zia	A.O. Ext Chak 75 S.B. Sargodha	0331-7643022
6	Ghulam Murtaza Shah.	DDO Agri (Ext.) Bhalwal	
7	Muhammad Aslam	Agri. Officer Kotmomen	
8	Muhammad Asif	Agri. officer Sillanwali	
9	Muhammad Sohail Ibrahim	Agri. Officer (Ext.) Ferozwala	
10	Arshad Nasim Qazi	Agri. Offr. Sargodha II	
11	M. Mukhtar Munawar	DDO Agri (E) Shah Pur	
12	Rab Nawaz	Agri. Officer Bhera	17/5/13
13	Masood Saqib 0334-6537807	Agri. Officer, Sgd-I	Masood Saqib
14			

Annex-11

Workshop for end-user training of Agriculture Extension Personnel at Agriculture Extension headquarters in Lahore May 20th & 21st, 2013

Workshop Schedule 20 May 2013

TIME	ACTIVITY	RESPONSIBILITY
INAUGURAL SESSION		
0900	Registration	Directorate of Agri Ext & AR/CABI
0930	Recitation from Holy Quran	Directorate of Agri Ext & AR/CABI
0940	Opening of the Workshop and Welcome Speech	Dr. Rana M. Shafique, Regional Director CABI
1000	eZaraat Initiative future Vision	Mahrukh Siraj (CABI)
1030	TEA	Directorate of Agri Ext & AR/CABI
TECHNICAL SESSION		
1100	Introduction to E-Zaraat Project	Mahrukh Siraj (CABI)
1120	eZaraat Demo & Training	Abdul Wahab (CABI)
1330	Closing Remarks & Group Photo	Directorate of Agri Ext & AR/CABI
1340	LUNCH	Directorate of Agri Ext & AR/CABI

Workshop for end-user training of Agriculture Extension Personnel at Agriculture Extension headquarters in Lahore May 20th & 21st, 2013

Workshop Schedule 21 May 2013

TIME	ACTIVITY	RESPONSIBILITY
INAUGURAL SESSION		
0900	Registration	Directorate of Agri Ext & AR/CABI
0930	Recitation from Holy Quran	Directorate of Agri Ext & AR/CABI
0940	Opening of the Workshop and Welcome Speech	Mahrukh Siraj (CABI)
1000	eZaraat Initiative future Vision	Mahrukh Siraj (CABI)
1030	TEA	Directorate of Agri Ext & AR/CABI
TECHNICAL SESSION		
1100	Introduction to E-Zaraat Project	Mahrukh Siraj (CABI)
1120	eZaraat Demo & Training	Abdul Wahab (CABI)
1330	Closing Remarks & Group Photo	Directorate of Agri Ext & AR/CABI
1340	LUNCH	Directorate of Agri Ext & AR/CABI

ATTENDANCE OF PARTICIPANTS OF TRAINING WORKSHOP ON E-ZARAAT ON 20.05.2013

Sr. No.		Name	Designation	Contact No.	E-mail address	Signature
1	**LAHORE**					
	i	Abrar Ahmad	A.O.T/Lahore	0345 445 2987	doaelhr2013@yahoo.com	
	ii	Abaidullah	J/L	0345 4887363	caibi.biz@gmail.com	
	iii	Muhammad Waqas	AO(Ext.)	0300-4744962	muhwaqas_786@yahoo.com	
2	**KASUR**					
	i	SHAHID IQBAL	A.O(Ed.)Kasur	0300-4350638	sndra786@gmail.com	
	ii	HAFIZ TAHIR NADEEM	A.O.(Tech) Kasur	0333-4077261	DOAextKSR@yahoo.com	
	iii	M. Zulfiqar Ali	F.A.	0302-4194884	doaextkas1@yahoo.com	
3	**SHEIKHUPURA**					
	i	ARIF SIDDIQUE	A.O. Tech.	0333-4277642	noorwalayaf@g.mail	
	ii	Muhammad Rizwan Tahir	J/L	0334-4962831	doaextvikskp@gmail.com	
	iii					

ATTENDANCE OF PARTICIPANTS OF TRAINING WORKSHOP ON E-ZARAAT ON 20.05.2013

Sr. No.		Name	Designation	Contact No.	E-mail address	Signature
4	**NANKANA SAHIB**					
	i	Imran Ahmad	A.O. (Tech.)	0345-7001274	imranahmadao@gmail.com.	
	ii	Qamar Iqbal	AO (Tech).	0301-7010075	qamariqbalaf@gmail.	
	iii	Ahmed Nawaz Khan Wattu	J/c	0333-3362900	Wattu_Naz@yahoo.com	
5	**FAISALABAD**					
	i	Faeza Naz	AO(Tech)Fsd	0332 6614865	faiza.ses@gmail.com	
	ii	NIDA AMIN	A.O (EXT) Jtw	0313-7201706	nidamalik.1000@gmail.com	
	iii	Muhammad Kamran	J/c	0301-6935598	zaheeagri32@gmail.	
6	**JHANG**					
	i	Waqar Islam.	Agri Officer (Tech)	0333-6209125	ddoapsial@yahoo.com.	
	ii	SHAFAQ ARSHAD	A.O (Tech.)	0334-6603600	doagriJhang@yahoo.	
	iii	Shazia Bano	T/C Agri Office Jhang	0334-7259095	Nesha-ind@yahoo.com	

ATTENDANCE OF PARTICIPANTS OF TRAINING WORKSHOP ON E-ZARAAT ON 20.05.2013

Sr. No.		Name	Designation	Contact No.	E-mail address	Signature
7	**T.T.SINGH**					
	i	Yasir Hussain	A.O (Ext.) Mangi Bangla Gojra	0347-8502716	YasirHussain7718@Yahoo.com	
	ii	Rehana Khalid	AO (Tech) T.T. Singh	0312-7119657	doagri@yahoo.com	
	iii	MUJAHID SHEERAZ	COMPUTER OPT.	0300-7971671	doagri.ttsingh@yahoo.com	
8	**CHINIOT**					
	i	Mohammad Ismail	Ao (Tech) Bhowana	03467601871	ismailagricht@gmail.com	
	ii	Muhammad Amin	A.O (Ext) Jamiabad	0315-7201144	maneen866@yahoo.com	
	iii					
9	**GUJRANWALA**					
	i	Muhammad Yousaf	A.O (Tech) Gujranwala	03007474471	bhatti_doa@yahoo.com	
	ii	Shujaud Din Rana	Stenographer O/o DO Adm	0346-6690511	— do —	
	iii	M. IMRAN	Agri officer (Ext) Alipur Chatha	0333-8163688	imranmirdo@gmail.com	

ATTENDANCE OF PARTICIPANTS OF TRAINING WORKSHOP ON E-ZARAAT ON 20.05.2013

Sr. No.		Name	Designation	Contact No.	E-mail address	Signature
10	**GUJRAT**					
	i	Muhammad Athar Latif	AO(Ext.) GRT	0346-0215000	atharlatif@gmail.com	[signature]
	ii	Ali Asad Yousaf	AO (Ext.) "	0312-5777303	aliasad.yousaf@gmail.com	[signature]
	iii	Malik Shahbaz Ahmed	J/C O/O DDA GRT	0300-6269520	ddagujrat@gmail.com	[signature]
11	**HAFIZABAD**					
	i	Faiz Hussain	A.O. (Tech.)	0331-5094176	faiz1322@yahoo.com	[signature]
	ii	Muhammad Zaman	A.O. (EXT)	0345-7706259	zamanuaf@gmail.com	[signature]
	iii	Shahid Imran	S/C Kamparoper	0332/8386617	Shahidbabo62@gmail	[signature]
	SIALKOT					
	i	Muhammad Abdul Qadeer	A.O (Ext)/Tech	0300-7177447	qadeer1962@hotmail	[signature]
	ii	Sajjad Haider	A.O.(Ext.) Kalaswala	0300-6118844	sajjad6655@yahoo.com	[signature]
	iii	Nabeel. Shehzad.	J/C	0346-6744533	DDAExtSKT@yahoo.	[signature]

ATTENDANCE OF PARTICIPANTS OF TRAINING WORKSHOP ON E-ZARAAT ON 20.05.2013

Sr. No.		Name	Designation	Contact No.	E-mail address	Signature
13	**NAROWAL**					
	i	Saif ur Rahmeen	Junior Clerk	0302-6366923	helosafi77@Yahoo.com	
	ii	Tanveer Ahmed	A.O (Tech.)	03338725782	tanveer-333@yahoo	
	iii	Ihsan ul-Haq	A-O (Ext.)	0342-6708770	Ihsan.panu@g.mail.com	
14	**M.B. DIN**					
	i	Ayaz Ahmad	A.O. (Ext) Phalia (M.B. DIN)	03007757519	ayaz1432@gmail.com	
	ii	Muhammad Afzal	A.O. (Tech)-M.B.DIN	03016873773	afzal_ph@Yahoo.com	
	iii	Muhammad Latif	J/O % DDOA	0321 7743056	doa-extmbdin@Yahoo.com	
15	**RAWALPINDI**					
	i	Muhammad Arif Malik	Agri. Officer (Ext) Murree	0334-5033433	MLUR19@yahoo.com	
	ii	Muhammad Qamar Zaib	AO (Ext) Lower Topa Murree	0345-2524116	rglogg@gmail.com	
	iii	Ikhsar Ahmed Abbasi	J/C	0321-4084723	ddoaextmurree@gmail.com	

ATTENDANCE OF PARTICIPANTS OF TRAINING WORKSHOP ON E-ZARAAT ON 20.05.2013

Sr. No.		Name	Designation	Contact No.	E-mail address	Signature
16	**ATTOCK**					
	i	Sabir Hussain	Agri. officer (Ext)	03465910923	Sabirao attock@Gmail	
	ii					
	iii	Mohammad Nasees	J/C	03015552356	ddoattk@Gmail.com	
17	**CHAKWAL**					
	i	Dr. M. Khalid	AO (Tech)	0321-5709936	aon786@yahoo.com	
	ii	Zia-ur-Rehman	A-O (Ext)	03025220476	rzia1589@gmail	
	iii	Mubashir Ali Hassan	J/C	0333-5637035	DOA ext. ckl@gmail.com	Mubashir
18	**JHELUM**					
	i	Abid Javed	A.O (Tech.)	0322-5850694	abid_791@hotmail.com	
	ii	Muhammad Nadeem	A.O (Ext.)	0324-7676935	ddoaext.Jhelum@yahoo.com	M. Nadeem
	iii	Muhammad Kamran	Field Assistant	0345-5724207	doaejlm@yahoo.com	Kamran

ATTENDANCE OF PARTICIPANTS OF TRAINING WORKSHOP ON E-ZARAAT ON 20.05.2013

Sr. No.		Name	Designation	Contact No.	E-mail address	Signature
19	**SARGODHA**					
	i					
	ii					
	iii					
20	**KHUSHAB**					
	i	Dr. Mahammad Sibtain	A.O (Ext) Noorpur Thal Khushab	0345-8671167	Sibtainuaf@gmail.com	
	ii	SHAHBAZ HUSSAIN	AO (Tech) O/o DOA (Ext) Khushab	03334637960	doaexthsb@yahoo.com	
	iii	Muhammad Aqeel	Junior Clerk of DOA (Ext) KHB	0301-6235357	doaextKHB@yahoo.com	
21	**MIANWALI**					
	i	SOHAIL NABI SAQIB	DDOA (Ext) Isa Khel	0321-4723143	Sohailsohail116@Yahoo.ca	
	ii	Rizwan Hassan	A-O (Tech.)	0306-6359294	dvagri_extmwi@yahoo	20.5.13
	iii	M. Nawaz Malik.	Ao (Tech) Mianwali	0301-5292639		
		Rafiq ur Anwar Shah	Steno	0333-6821865	do	

ATTENDANCE OF PARTICIPANTS OF TRAINING WORKSHOP ON E-ZARAAT ON 20.05.2013

Sr. No.		Name	Designation	Contact No.	E-mail address	Signature
22	BHAKKAR					
	i	Muhammad Rehman Saheem	Computer operator	0334-7605180	mrsaheem5180@yahoo.com	
	ii	DR. AMIR HUSSAIN	AO (Tech) Bhakkar	03336842620	doaextbkr@yahoo.com	
	iii	Abdus Sattar Tariq	AO (Ext) K.Kot	03125001827	chheena99@gmail	

ATTENDANCE OF PARTICIPANTS OF TRAINING WORKSHOP ON E-ZARAAT ON 21.05.2013

Sr. No.	Name	Designation	Contact No.	E-mail address	Signature
1.	Abdul Wahab Chaudhry	Software Engineer	0313-5114958	a.wahab@cabi.org	[signature]
2.	ZAHID QURESHI	NETWORK ADMIN	0300-9113632	z.qureshi@cabi.org	[signature]
3.	Khuram Mahzad	S/W/IT Engineer	0331-5561147	k.mahzad@cabi.org	[signature]
4.	MAHRUKH SIRAJ	COORD KM	0336-5133670	m.siraj@cabi.org	[signature]
5.	M. SHAHBAZ AHMAD	Staff Officer to DGA (EXT.)	03214299496	SERVERROOMHQ@GMAIL.Com	[signature]
6.	Sadia Kalsoom		0306-4668643		[signature]
7.	Muhammad Nasir	DDA (HQ) O/O DGA (Ext) LHR	0321-4268802	nasirddaext@gmail.com	[signature]
8.	Dr Muhammad Anjum Ag.	DGA (Ext) Ext	042-99200734	dgaextar@gmail.com	[signature]
9.	Shahid	DGA (Wm)	0334-4192510		[signature]
10.	RIAZ AHMAD	DGA (Ext)	03004403751		[signature]
11.	Faiz-ul-Hassan	Computer Operator	0322-8421966	faizabid90@gmail.com	[signature]

12.	ظفر اقبال	DOA Eat			ظفر اقبال
13.	رحیم بخش	〃			
14.	نسیم اختر	〃			
15.	فرخ شہزاد	〃			
16.					
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ATTENDANCE OF PARTICIPANTS OF TRAINING WORKSHOP ON E-ZARAAT ON 21.05.2013

Sr. No.		Name	Designation	Contact No.	E-mail address	Signature
1	SAHIWAL					
	i	Waseem Anwar	A.O. (Tech.).	0300-6934030	doaextsahiwal@yahoo.com	
	ii	Muhammad Latif	Computer Operator	0301-6911002	doaextsahiwal@yahoo.com	
	iii					
2	OKARA					
	i	Ghulam Mustafa	AO (Tech) Okara	0449200264	doaarriextok@live.com	
	ii	Mohammad Ijaz	A.O (Ext) Shahbore	0346-7407211	—	
	iii	Rashid Latif	Computer Operator	0331-4017047	rashidbhai731@yahoo.com	Rashid
3	PAKPATTAN					
	i	Aamer Ghaffar	Cotton Insp.	0300-6941769	aamerjit@gmail.com	
	ii	Muhammad Qasim	Junior Clerk	0334-5009962	m_qasim60@yahoo.com	
	iii	Muhammad Latif	A.O (Tech.)	0301-7257867	doapakpattan@gmail.com	

ATTENDANCE OF PARTICIPANTS OF TRAINING WORKSHOP ON E-ZARAAT ON 21.05.2013

Sr. No.		Name	Designation	Contact No.	E-mail address	Signature
4	MULTAN					
	i	Wajid Ali	Agri officer (Ext)	03458800617	wajji_akasi3@yahoo.com	[signature]
	ii	Shahjahan Ahmed	Agri. officer Tech:	0312-6600357	sa_mal_a@hotmail.com	[signature]
	iii	Muhammad Aslam	Junior clerk.	0300-7194600	doaextmn@hotmail.com	[signature]
5	VEHARI					
	i	Tariq Mehmood	Agri. officer Tech.	03217739899	ddoaextvehari @hotmail.com	[signature]
	ii	Jahangir Ali Khan	cotton Inspector O/O DDOAgri mailsi	03087940865	ddoaextmalsi@ hotmail.com	[signature]
	iii	Muhammad Javed	F.A Computer Operator	0333-6241320	ddoaextvehari@hotmail.com	[signature]
6	J KHANEWAL					
	i	Iram Naz	A.O (Ext.)	0347-8492792	~~DDoaext~~ iram.nazee@gmail.com	[signature]
	ii	Ammara Zahoor	A.O (Tech) O/O DOA (Ext.) KWL	0313-7595955	~~[illegible]@yahoo~~ zahoor.agri @gmail.com	[signature]
	iii	Zaid Sultan	Senior Clerk	0300-6341614	DOA (Ext.) KWL.	[signature]

ATTENDANCE OF PARTICIPANTS OF TRAINING WORKSHOP ON E-ZARAAT ON 21.05.2013

Sr. No.		Name	Designation	Contact No.	E-mail address	Signature
7	**LODHRAN**					
	i	Ghulam Taqi	A.O.	03017569905	ghlmtaqi87@gmail.com	
	ii	MUHAMMAD SHOAIB	A.O (Ext) Lodhran	03336157616	—	
	iii	M. Bilal Hussain	J/c	0346-9900099	Jam1575@yahoo.com	
8	**BAHAWALPUR**					
	i	DR. Muhammed Masood Saleem	Agri Officer	0334-6038918	mmsaleem68@yahoo.com	
	ii	Bashir Ahmad	A/O Tech BWP	03006825262	bashirahmed42@gmail.com	
	iii	M. Naeem Akhtar	Stenographer	03336405701	naeembobrai@gmail.com	
9	**BAHAWALNAGAR**					
	i	Rehan Alam	AO (Tech.)	0333-6308610	rehan_lm@yahoo.com	
	ii	MUHAMMAD ILYAS	A.O (Ext.)	0300-8337376	ilyastabassum@yahoo.com	
	iii	Rashid Nazir	Stenographer	0307 7856688	chrashid1124@gmail.com	

ATTENDANCE OF PARTICIPANTS OF TRAINING WORKSHOP ON E-ZARAAT ON 21.05.2013

Sr. No.		Name	Designation	Contact No.	E-mail address	Signature
10	**R.Y. KHAN**					
	i	Shahzad Ahmad Junaid	Agriculture Officer.	0333-6363835	shehzadjunaid@gmail.com	
	ii	KASHIF KHURSHID	"	0345-8055005	DOAgriRYK@yahoo.com	
	iii	M. Fahad Anjum	Computer Operator	0333-7244752	ddoaext@live.com	
11	**D.G. KHAN**					
	i	Allah Bakhsh	Agri. Officer	03453661984	Ab_affan@yahoo	
	ii	Shahik Munir	Agri Officer (Ext)	0331-7321543	shahikmunir@gmail	
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	MUZAFFARGARG					
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ATTENDANCE OF PARTICIPANTS OF TRAINING WORKSHOP ON E-ZARAAT ON 21.05.2013

Sr. No.		Name	Designation	Contact No.	E-mail address	Signature
13	RAJANPUR					
	i	Zafar ullah Atif	A.O (Tech) Rajanpur	0335-6395016	zafarao@gmail.com	[signature]
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14	LAYYAH					
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CABI – Pakistan

User Training Workshop on E-ZARAAT

Participants' Evaluation

Name: _____ Designation: _____

Duty Station_____ Age_____ Work Experience in years _____

	1	2	3	4	5
How confident are you in performing the following tasks? (Please tick appropriate box)	**Not Confident**	**A little Confident**	**Somewhat confident**	**Confident**	**Extremely confident**
Accessing the Application					
1. Accessing the application	1	2	3	4	5
2. Logging in	1	2	3	4	5
3. Overview of the Dashboard	1	2	3	4	5
4. Accessing forms	1	2	3	4	5
5. Navigation Options: browser < back> button. Using the Menu bar]	1	2	3	4	5
6. Data Entry	1	2	3	4	5
7. Report Generation on Screen	1	2	3	4	5
8. Report Generation on Printer	1	2	3	4	5
9. Updating User profile: Add personal Information, Change passwords	1	2	3	4	5
10. Accessing and searching Agricultural Advisories	1	2	3	4	5

	1	2	3	4	5
Please show your agreement or disagreement about the following statements by ticking appropriate box.	**Strongly Disagree**	**Disagree**	**Neither Agree nor disagree**	**Agree**	**Strongly Agree**
Call Centre Demo					
11. I know how to access call	1	2	3	4	5
12. I have call centre number on my cell phone	1	2	3	4	5
13. I can make a call to help line number from my cell phone	1	2	3	4	5

	1	2	3	4	5
Please show your agreement or disagreement about the following statements by ticking appropriate box.	**Strongly Disagree**	**Disagree**	**Neither Agree nor disagree**	**Agree**	**Strongly Agree**
User Guide					
14. I have my user guide and I can access it whenever needed	1	2	3	4	5
15. I can browse through the user guide to find relevant information	1	2	3	4	5
16. I can identify each section and task described	1	2	3	4	5
17. I can identify page number where each section starts	1	2	3	4	5

	1	2	3	4	5
Please show your agreement or disagreement about the following statements by ticking appropriate box.	**Strongly Disagree**	**Disagree**	**Neither Agree nor disagree**	**Agree**	**Strongly Agree**
Trainer					
18. The trainer was knowledgeable	1	2	3	4	5
19. The quality of training was good	1	2	3	4	5
20. The trainer was able to answer all my questions	1	2	3	4	5
21. The training material and presentation was good	1	2	3	4	5
General Training Arrangements					
22. The training room was suitable	1	2	3	4	5
23. The training duration was appropriate	1	2	3	4	5
24. The group size was appropriate	1	2	3	4	5

Annex-E Logical Framework

Annex- E Logical Framework

The project impact, outcome and output indicators have been developed and are presented here. The report is structured to report against the output indicators

PROJECT NAME	**A Model for developing ICT based services for Agriculture Extension-Phase II**						
IMPACT	**Impact Indicator 1**		**Baseline**	**Milestone 1**	**Milestone 2**	**Target (date)**	
Improved livelihoods for the farmers in target states	Improved earning capacity of the farmers	**Planned**	Baseline survey data on earnings from named crops			Not to be quantified in the lifecycle of the project. Aim is to collect data for possible follow-on studies.	
		Achieved					
			Source				
			Baseline Survey, and Follow up Survey collect potential impact data which would be useful should follow-up phases of the project be pursued.				
OUTCOME	**Outcome Indicator 1**		**Baseline**	**Milestone 1**	**Milestone 2**	**Target (date)**	**Assumptions**
Improved reach and monitoring of extension services to the farming community at a lower cost	Farmer helpline reaches 30% of farmers in target districts	**Planned**	Government extension services reach 10**%** (tbc) of farmers currently through existing extension services (figure from agricultural extension services - or add comparable figure derived through baseline survey)	Follow-on survey April 2013		Follow-on survey April 2013 (note - possible final post-project survey Nov 2013 (post-harvest)	1. Extension workers adopt ICT systems & Methodology (the new model); 2. Surveys collect gender disaggregated data; 3. Current costs of extension services in target regions can be obtained from the relevant authorities.
		Achieved				Not achieved in full	
			Source				
			Extension department data; Baseline survey August 2012; follow-on survey in April 2013; possible post-project survey Nov 2013				
	Outcome Indicator 2		**Baseline**	**Milestone 1**	**Milestone 2**	**Target (date)**	
	Directorate general office of AE&AR uses the system to monitor extension service performance	**Planned**	Current data collection forms are manually compiled and are prone to manipulation to falsify data	Automated data collection includes GPS stamp to verify data collector is at site (December 2012)	Directorate office has access to real-time survey dashboard (February 2013)	Directorate able to produce monthly summative reports from the system (February 2013), and have on-going access to real-time data	
		Achieved		Yes	Yes, first run was done in Feb, 2013	Yes, but delayed to May, 2013, due to last	

						minute changes requested in the MIS	
			Source				
			System stats/reporting function; Stage reports				
	Outcome Indicator 3		**Baseline**	**Milestone 1**	**Milestone 2**	**Target (date)**	
	Evidence obtained that unit cost of reaching farmer with extension advice is reduced	**Planned**	DG data. Note current budget for Punjab as a whole is £14.34m	Focus on Vehari as intervention as support is most intense in this area.		% increase in extension costs in target areas is lower than % increase in farmers reached. It is difficult to measure this and move towards a predefined target as disaggregated figures from Govt. are difficult to obtain. Final metrics tbc. Case study approach may be recommended if baseline data is difficult to come by.	
		Achieved		Yes		The system has been operational only very recently. Even so the EDO Vehari believes the costs will reduce by 40%	
			Source				
			DG data, project financial data, projections of reach at project conclusion; scale-up plans				
INPUTS (£)	**DFID (£)**		**Govt. (£)**	**Other (£)**	**Total (£)**	**DFID SHARE (%)**	
			0			**100**	
INPUTS (HR)	**DFID (FTEs)**						

	Output 1 – Systems						
OUTPUT 1	**Output Indicator 1.1**		**Baseline**	**Milestone 1**	**Milestone 2**	**Target (date)**	**Assumption**
A functional MIS for Agriculture Extension, helpdesk and mobile applications for use of the farmers and extension providers	Analysis of user need and current practice informs system development	**Planned**	Formal documentation of one extension system. Formal information processes do not exist in extension departments, nor does systematic data on farmer practice in region currently exist.	Business analysis (BA) version 1 (inclusive of MIS and Web specs); Farmer survey used to inform data structures (Aug-12)	BA final version (BA is a living document the application development will start as phases within BA are completed) Oct-12	Oct-12	1. the Directorate of Agri Extension and Adoptive Research will support the collection of information and will provide information on their current business processes 2. the Directorate will share the data available with it. 3. ICT services, especially mobile phone usage charges remain inexpensive and accessible to all. 4. the mobile app-based services will be accepted and used by Extension workers and the farmers 5. Changes in the economy and service provider do not affect ability to provide the service for free to end users (farmers) 6. Political and security conditions in country remain conducive to travel.
		Achieved		Yes	Yes, presented to DFID in December 2012	Yes, however, a Subsequent version was also produced as a result of field testing and presented as Annex A	
		Source					
		BA					
	Output Indicator 1.2		**Baseline**	**Milestone 1**	**Milestone 2**	**Target (date)**	
	Working MIS and mobile apps	**Planned**	Only MS-Word and MS-Excel, MS-PowerPoint are currently used to electronically document extension information. Format of material collected is variable	Development of a prototype system and application for Vehari. Local Champions from Vehari trained in the use of application (Dec-12)	Roll out of the applications in the other 2 districts. Staff in Vehari and the Directorate of AE & AR staff are trained. Application is tested in the other 2 districts (Jan-13)	Jan-13	
		Achieved		Yes	The application has been tested and deployed. Not delivered on time as requirements were changed.	Current (Final) version: May 13	
		Source					
		The applications; evidence of testing and training presented in stage reports					

IMPACT WEIGHTING (%)	Output Indicator 1.3		Baseline	Milestone 1	Milestone 2	Target (date)	
45	Working helpdesk (call centre)	**Planned**	Call centre based help lines do not exist in Agri Extension	Call centre specification developed	Call centre operational	Call centre has received 500 enquiries per district	
		Achieved		01-Oct	Dec-12	Till May 2013 the Call Canter/Helpline had received 840 calls from Vehari, 250 from Sargodha and 150 from Sialkot. The help line is a paid for service as opposed to being a free service as originally envisaged in the project.	
		Source					**RISK RATING**
			Call centre specification; system stats				
INPUTS (£)	**DFID (£)**		**Govt (£)**	**Other (£)**	**Total (£)**	**DFID SHARE (%)**	
	88716		**0**				
INPUTS (HR)	**DFID (FTEs)**						
	Output 2 – Content						
OUTPUT 2	**Output Indicator 2.1**		**Baseline**	**Milestone 1**	**Milestone 2**	**Target (date)**	**Assumptions**
Content developed for the system	400 FAQs developed for 4 target crops: rice, cotton, wheat & citrus	**Planned**	No content currently in this format	Farmer surveys used to develop FAQs (July 2012)	Review of extension advisories and extension worker workshops in target districts (July 2012)	Jul-12	
		Achieved		Yes	Yes	Exceeded the target of creating FAQs for 4 designated crops and generated an additional 220 FAQs on other crops. Total FAQs = 754. System in place to continue generating more FAQs	
		Source					
		System					
	Output Indicator 2.2		**Baseline**	**Milestone 1**	**Milestone 2**	**Target (date)**	
	400 SMS messages delivered to 1200 users	**Planned**	Currently no SMS service delivered	5 messages per day are being delivered		Jun-13	
		Achieved		A total of 450 messages have been		The target was to send 480,000 messages. So	

				developed		far 192,084 have been sent since the start of the service in April. The service start was delayed due to a) delay in approval of the messages and b) Mobilink was unable to fulfil its commitment of providing free air time.	
		Source					
		System reporting function					
IMPACT WEIGHTING (%)	**Output Indicator 2.3**		**Baseline**	**Milestone 1**	**Milestone 2**	**Target (date)**	
30	360 Urdu Voice messages developed and delivered	**Planned**	Currently no service	360 messages recorded (Feb-13)		Jun-13	
		Achieved		Yes but completed in May 13. QA assurance checking took longer than expected. 450 messages have been developed and hence the target for number of messages has been exceeded		The messages are still being delivered and 50 have been delivered at the time of reporting. Partially achieved as the QA took longer. Also the strategy for sending the messages was changed to 1 message per day as farmers found 5 voice messages plus text messages too much.	
		Source					**RISK RATING**
		System reporting function					
INPUTS (£)	**DFID (£)**		**Govt. (£)**	**Other (£)**	**Total (£)**	**DFID SHARE (%)**	
	59,144						
INPUTS (HR)	**DFID (FTEs)**						
	Output 3 – Training						
OUTPUT 3	**Output Indicator 3.1**		**Baseline**	**Milestone 1**	**Milestone 2**	**Target (date)**	**Assumptions**
Training & Capacity building of extension services	Successful one-to-one training completed with support from CABI	**Planned**			Workshop completed for 3 districts and Lahore workshop (Jan-13; Feb-13)	Feb-13	1. Political and security conditions in country remain conducive to travel. 2. Local champions follow mentoring plan 3. Satisfaction with the course materials can
		Achieved				Yes, but delayed due to change in requirements. Delivered 8 workshops	

						in total (5 more than originally planned), including one for entire Punjab province	be separated from fear of institutional changes in work practice
		Source					
		Final report, workshop attendance sheet and materials					
IMPACT WEIGHTING (%)	**Output Indicator 3.2**		**Baseline**	**Milestone 1**	**Milestone 2**	**Target (date)**	
15	Training materials found to be useful to **70%** of staff trained?	**Planned**		Document workflows in training manual (Dec-12)	Survey at training course indicates acceptability (Jan-13. Results compiled Feb-13)	Feb-13	
		Achieved		Yes	Yes, but delayed due to change in requirements.	More than 80% participants rated themselves as 'confident' or 'very confident' in using the guide.	
		Source					
		Training course evaluation					
INPUTS (£)	**DFID (£)**		**Govt. (£)**	**Other (£)**	**Total (£)**	**DFID SHARE (%)**	
	29,572					**100**	
INPUTS (HR)	**DFID (FTEs)**						

	Output 4 - Scale-up and Sustainability						
OUTPUT 4	**Output Indicator 4.1**		**Baseline**	**Milestone 1**	**Milestone 2**	**Target (date)**	**Assumptions**
Scale-up and sustainability planning leads to development of a robust model for adoption of the service in other districts/provinces	Scale up plan developed for deployment in other districts/provinces	**Planned**		Attend Meetings/Conferences to identify potential partners and collaborators to scale-up the project	Action plan to deliver scale-up (May-13)	May-13	
		Achieved		Yes	Yes	Yes	
		Source					
		Scale up report					
IMPACT WEIGHTING (%)	**Output Indicator 4.2**		**Baseline**	**Milestone 1**	**Milestone 2**	**Target (date)**	
10	Sustainability model is developed on the basis of making the service sustainable ina defined number of years. Aim is to move away from need to donor fund. Moving to local support or other revenue model, specifically reviewing models to examine likelihood of user pays sustainability after 5 years	**Planned**		Development & review of model (May-13)		June 13	
		Achieved		Yes		yes	
		Source					**RISK RATING**
		Sustainability model					
INPUTS (£)	**DFID (£)**		**Govt. (£)**	**Other (£)**	**Total (£)**	**DFID SHARE (%)**	
	19,715					**100**	
INPUTS (HR)	**DFID (FTEs)**						

Annex-F Baseline Survey Report

Baseline Survey Report – Vehari, Sargodha & Sialkot

An interim output for 'ICT based services for Agriculture Extension'

Atiq ur Rehman, Ambreen Siddique, Mahrukh Siraj

December 2012

www.cabi.org

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Contents

Table of Figures

Table of Tables

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Executive Summary

This Baseline Survey Report is one of the activities of the project that aim to develop a sustainable knowledge management system to facilitate decision making in farming communities by making access to information easier and affordable through the use of Information Communication Technologies (ICTs).

Project area comprises three districts i.e. Vehari, Sargodha and Sialkot. The districts were strategically chosen to encompass the most well-known areas for growing particular crops (cotton & wheat in Vehari, citrus & wheat in Sargodha and rice & wheat in Sialkot).

The project is expected to reach 30% of farmers in the focal district Vehari of the target districts through helpline. The project will establish an MIS for Agriculture Extension, helpdesk and mobile applications for use of the farmers and extension providers. Secondly, FAQs will be developed and the ICT based system will disseminate about 400 SMS messages to 1200 farmers during a typical crop life cycle. Besides, about 360 Urdu Voice messages will also be developed and delivered to the farmers.

A baseline research was designed to document the profile of farmers, knowledge base, current agricultural practices of farming community and evaluate women's role in the rural matrix prior to implementation of the project. Total sample size for the study was 1200 small and medium farmers, with 400 farmers sample taken from each district.

Mobile accessibility was found to be fairly common in all the three districts with only 2% farmers in Sargodha, 5% in Vehari and 10% in Sialkot not having cell phones.The case of women was different in terms of accessibility to mobile phones is concerned, none of the women in Sargodha, 16% in Sialkot and 33% of women in Vehari were reported to have their personal cell phones.

The average age of the head of the household was 41-60 years for 41% families in Vehari and 49% households in Sargodha and Sialkot. More than 40% of heads of the household were illiterate, however, more than half of them were able to read and write.

The most commonly used source of information was established to be fellow farmers and model farmers in each region. Around 70% of farmers in Vehari and more than 80% of farmers in Sialkot and Sargodha spend between Rs. 300-1000 per month on cell phones. Most of the farmers were not able to segregate the number of calls specifically for agricultural purposes; the ones who responded reported their spending to be below Rs. 300.

The most commonly used source for seeking weather related information was television mentioned by 66% farmers in Vehari, 88% in Sialkot and 90% in Sargodha. Water and soil testing practices were almost non-existent, except in Sargodha where 6% farmers got the water tested. Moreover, 9% got the leaf curl test done for orchards and none of the rice farmers got the rice crop leaf test.

The data for cotton yield last year [2011-12] depicts an average of 44 maunds for tehsil Vehari, 38 maunds each for tehsil Burewala and Mailsi. The average income from cotton crop was registered as Rs. 45,105 for Vehari, Rs. 55,644 for Burewala and Rs. 40,666 for Mailsi. Almost all the cotton farmers, i.e. 97%, use raised bed manual method for sowing. Only 70 farmers also use drill for sowing purposes. Two-third of them purchases seed from seed dealers or nearby markets and 49% also use home kept seed alongside the purchased seed. A total of 305 farmers, i.e. 76% use BT cotton seed, whereas 276 farmers are using non-BT varieties as well. The exclusive BT users formed 26% of the sample and exclusive non-BT users were 24% of the farmers surveyed. Almost half of the farmers, i.e. 201, rely on both varieties of cotton for various reasons.

The farmers using chemicals for seed treatment formed 37% of the total sample.The farmers who switched to BT cotton cultivation and registered their response attributed this to higher yield expectations. Moreover, the scale of farmers' satisfaction from cultivating BT cotton was found to be

fairly pleasing. A high number of respondents, i.e. 98% mentioned that they store the cotton at some dry place before transferring it to their storage or directly selling it. A significant relationship, though not very strong (r = 0.168), was found between investment in cotton production and income per acre.

Pakistan is among the top ten citrus producing countries in the world. There were only 10% farmers who do not engage in inter-cropping by growing wheat and fodder in their orchards.
More than half, i.e. 55%, declared an income of Rs.100, 001 - 150, 000 per acre. A large number of farmers i.e. 87% mentioned that they have an average of 91-100 plants per acre in their orchards Almost all the farmers, 98%, are using unregistered nurseries to buy plants for their orchards. The occurrence of disease in citrus orchards was informed as “considerable” by 64% farmers and 16% rate it as severe.

Rice is second major stable food crop in Pakistan after wheat, accounting for 4.9% of the value added in agriculture, 1 percent of GDP and about 10% of the export earnings of the country.

Average yield of rice is Sialkot comes to about 41 maunds (1.64 tonnes)/acre, with minimum of 10 maunds and maximum of 60 maunds. The farmers were able to generate an income of Rs. 40,001 – 60,000 per acre, as maintained by 77% farmers. The trend of raising own nursery is strongly entrenched in rice farmers, 95% of them do it for themselves. A total of 78% farmer use their own seed for their rice crop, 12% get it from their nearby market places or dealers.

The most popular variety of rice was observed as “Super Basmati” being used by 98.3%. Moreover, 21% farmers use “386”, 5% grow “Supera” and 9 farmers rely on “Basmati 385”. The maximum number of farmers sowing “Super Basmati” and “Basmati 385” use 8 kg of seed per acre. A total of 90% farmers transfer the nursery when it is at least 40 days old, a distance of 8-9 inches is maintained between the rice plants by 83% farmers.

Wheat is the staple diet of Pakistan; it contributes about 12.5% to the value added in agriculture and forms 2.6% of GDP. Vehari was the best performing district for wheat crop with an average yield of 40 maunds/acre in Vehari, 39 maunds/acre in Sialkot and 35.5 maunds/acre in Sargodha. The data shows that 94% farmers from Sialkot, 86% from Vehari and only 58% from Sargodha were able to make more than Rs. 30,000 per acre from their wheat crop. Almost all the farmers follow the method of wheat “Chatta” (broadcast) in dry land.The practice of using home kept seed is maintained by 88-89% people. It was quite astonishing to notice that none of the farmers in Sialkot and Sargodha and only 9 farmers from Vehari reported treatment of their wheat seed with chemicals. Manual harvesting was found to be still the more practiced method. The manual method was most prevalent in Vehari where 81% farmers follow this practice. Similar method was being used by 77% farmers in Sargodha and 63% in Sialkot. The problems faced by farmers were quite similar in every region; the most prominent common problems were unavailability of water, fertilizer issues and counterfeit products flooded in the market, high energy and input costs and unsatisfactory prices of their yields. Wheat farmers also face “Baardaana” (jute bags meant for storing wheat) issue.

Background

This Baseline Survey Report is one of the activities of the project that aim to develop a sustainable knowledge management system. This system is proposed to facilitate decision making in farming communities by making access to information easier and affordable through the use of Information Communication Technologies (ICTs). This project will nurture relationships among the partners of the project i.e., CABI, Punjab Agriculture Extension Department and Mobilink, a Mobile Network Operator, to attain the goals of improved outreach and monitoring of extension services.

Project area comprises three districts i.e. Vehari, Sargodha and Sialkot. The districts were strategically chosen to encompass the most well-known areas for growing particular crops (cotton & wheat in Vehari, citrus & wheat in Sargodha and rice & wheat in Sialkot) and to study the best practice in these high producing areas of these indispensable crops for Pakistan's economy. These four crops are of critical importance on account of their contribution to the economy of the country and livelihood of rural poor.

In order to benchmark the situation prior to the implementation of the project, a baseline study has been undertaken in the project area.

Rationale

Farmers work hard to grow their crops and manage their livestock to sustain their families, increase their income and improve their livelihoods. They are supported in their activities by extension services and agro input providers. This project aims to improve livelihoods for the farmers in target districts of Punjab Province (i.e. Vehari, Sargodha and Sialkot) by empowering them with critical information at critical stages of the major crops through an ICT based knowledge management system. The project targets to improve reach and monitoring of extension services to the farming community at a lower cost. It is expected that farmer helpline will reach 30% of farmers in target districts. Besides, it is also expected that Directorate General office of Agricultural Extension & Adaptive Research (AE&AR) will use the system to monitor extension service performance.

The project will establish an MIS for Agriculture Extension, helpdesk and mobile applications for use of the farmers and extension providers. Secondly, contents will be developed for the system. In this respect, FAQs will be developed for four major crops of the target districts i.e. rice, cotton, wheat and citrus. It is envisaged that ICT based system will disseminate about 400 SMS messages to 1200 farmers during a typical crop life cycle. Besides, about 360 Urdu Voice messages will also be developed and delivered to the farmers.

Another area of the intervention of the project is the training and capacity building of extension services. CABI will support the provision of one-to-one training to all staff of the extension department, who are responsible for dissemination of information among the farmers in the target districts.

Based on the success of the project, a robust model will be evolved for adoption of the service in other districts too.

The painstaking job of converting information into digestible/consumable and actionable formats, achieving maximum reach of this information in an affordable budget and finally assessing the absorption and adoption of information are the key elements of this project.

The project was planned in two phases. Concept testing of using technologies for dissemination of information was the main objective in phase I of this project. This next step aims at launching the model, developed in line with the inputs received in Phase I, through a pilot project in three districts of Punjab.

At the start of this phase of the programme it was necessary to assess the socio-economic patterns of the participating farmers, their current farming practices, evaluate their level of knowledge and assess the demand of use of complementary services delivered using mobile devices (*which provide access to actionable information and communication services with the aim of facilitating and informing farmers of critical information on existing technologies and of new technologies which could enhance their yields, and reap maximum value of their produce for improving livelihoods for the farmers in target districts*). This provides the baseline information about farmers and help in determining the performance indicators which would be evaluated after the launch of the project to assess the achievement index. Hence, a baseline study was undertaken in the target districts with the following objectives:

Farmers' groups and their support network were taken in the ambit of the research to assess the specific knowledge needs for integrating production, marketing and value addition activities.

Women form an integral part of the agriculture and ancillary activities. The role of women is generally undermined; however, they essentially play a major part from mainstream agricultural activities to livestock handling and involvement at various stages of crop management. Women generally participate in lighter agricultural activities. As such, they remain segregated from technical information related to fertiliser application, seed selection and the like. This was the information which needed validation to exactly probe the women role, their part in agricultural activities, gauging their empowerment index, access to various facilities including communication needs i.e. cell phones and so on. A baseline study of any rural set up would be incomplete without getting an input about women. Therefore, a qualitative part was built-in the research to get deeper insights in to various aspects of rural women in these districts.

Research Objectives

The research was designed to document the existing practices of the farmers. The broad based objectives are;

- To determine the profile of farmers in the project areas.
- To evaluate the infrastructure available to the rural areas in terms of road network, educational facilities, health network, access to various TV channels, landline and mobile phone coverage
- To gauge the existing knowledge base of farmers and sources thereof.
- To probe for a deep understanding of their current agricultural practices for each and every farming stage of major crops in the project region i.e. from land preparation; to seed selection; seed treatment; use of fertilizers, weedicides and pesticides; water management; harvesting; post harvesting, and so on.
- To evaluate the role of women in the household, level of financial empowerment, access to mobile phones and their familiarity with usage of various functions, participation in agricultural matters, financial gains from work, etc.

Research Design and Methodology

Instruments for Data Collection

In order to elicit data for the baseline study, four instruments were constructed. A guideline was developed for collecting information from women, while three separate structured Questionnaires were used to collect data from farmers. Assessment of the role of women in the existing rural matrix and their situation in rural system required a qualitative approach. Hence, a thematic guideline was used for thorough probing using a broader range of queries.

Questionnaires 2, 3 and 4 were meant for farmers. Each farmer questionnaire was for a particular district, having three sections. Section 1 contained questions related to major crop (cotton in case of

Vehari district, citrus in case of Sargodha district and rice in case of Sialkot district). Section 2 had questions on wheat crop (it is grown in all districts). The last section was meant to collect demographic and other information of the respondents including lifestyle, sources of information for agriculture, current practices of information gathering, attitude and behaviour towards modern agricultural practices, extent of technology uptake, existing familiarity and usage of mobile phones, etc.

Sampling Strategy

All three districts have different cropping pattern: cotton – wheat in Vehari, rice and wheat in Sialkot, while citrus and wheat in Sargodha. A district in Pakistan is divided into sub-administrative units which are called as tehsils (sometimes called as sub-divisions). There are three tehsils in Vehari district (Vehari, Mailsi and Burewala), six tehsils in Sargodha district (Sargodha, Bhalwal, Sahiwal, Kot Momin, Shahpur and Silanwali) and three in Sialkot (Sialkot, Daska, Pasrur and Sambrial). As discussed earlier, the idea underlying the selection of these districts was to represent the critical crops of Punjab to examine the current patterns of agricultural practices. Map showing all districts of the Punjab province is given at Figure 1. A brief profile of the districts taken up for the research is as follows:

- Sialkot is the smallest in size with total area of 3,016 square km1. The district is divided into four tehsils (Sialkot, Pasrur, Daska, and Raya) with 106 union councils and 2,348 villages 2.
- Sargodha is the largest district in size with an area of 5,864 square km3. It is administratively divided into 6 tehsils (Sargodha, Bhalwal, KotMomin, Sahiwal, Shahpur and Silanwali) and 161 union councils.
- Vehari District is most recently created (1976) and is relatively larger than Sialkot District in size, with a total area of 4,364 km2 (District Vehari, 2010). The district is administratively divided into three tehsils (Burewala, Mailsi and Vehari) and 89 union councils. The population of the district is 2,877,916 and population density is 659 persons per sq. km (Distrcit Vehari, 2010). Females account for 51%of the population (DCR, 1998). It is one of the poorest districts of the Punjab Province (Siddiqui, 2008). According to the District Census Report 98, about one third of the population lives in urban areas (DCR, 1998). Adult literacy rate in the District Vehari is 46% compared to 52%in the province (Government of Punjab, 2009a, p. v).

[1] DCS [District] (2012). Histroy of Sialkot. Retrieved 11 December, 2012, from http://sialkot.dc.lhc.gov.pk/?page_id=1335
[2] DCS [District] (2012). Histroy of Sialkot. Retrieved 11 December, 2012, from http://sialkot.dc.lhc.gov.pk/?page_id=1335
[3] SP [Sialkot Police] (2012). The district at a glance. Retrieved 11 December, 2012, from http://www.sargodhapolice.gov.pk/pages.php?id=56

Figure 1 Map of Punjab Province showing districts

Targeted population for the baseline study comprised of small and medium farmers. Farmers are usually categorized as follows (Hassan, Tabasam, & Iqbal, 2005):

Less than 12.5 acres	Small farmers
12.5 – 25 acres	Medium farmers
25 acres and above	Large farmers

Since small and medium farmers account for largest proportion of the farming community, hence, it is easy to find them. In selected villages, they were randomly selected for interviews.

Since target group of this project is the small and medium farmers, hence, sample consisted of farmers of these categories. Total sample size for the study was 1200, with 400 farmers sample taken from each district. A sampling framework was developed for each district based on the number of tehsils falling in each district. Sample size of each district was equally distributed among all tehsils. A three-stage Random Sampling Technique was applied to select sampling units from each tehsil. The sample size of 1200 was equally divided among the three districts i.e. 400 sample size for each district. At stage 1, the sample of 400 was equally divided among the tehsils in each district. At second stage of sampling, 3 villages were randomly selected from each tehsil. It was ensured that selected villages are located at fairly large distance from each other to achieve as wide geographic coverage as possible. At stage 3, in each village a representative sample of the determined for each village was distributed among small and medium farmers. Detailed sample distribution plan is given below:

Sample Distribution Plan

District	Tehsil	Sample Size	Village-wise sample / tehsil			Category-wise Sample /village	
			V1	V2	V3	SF	MF
Sialkot	Sialkot	100	34	33	33	18/17	16
	Pasrur	100	34	33	33	18/17	16
	Daska	100	34	33	33	18/17	16
	Raya	100	34	33	33	18/17	16
	Total	**400**	**136**	**132**	**132**		
Sargodha	Sargodha	67	23	22	22	12/11	11
	Bhalwal	67	23	22	22	12/11	11
	KotMomin	67	23	22	22	12/11	11
	Sahiwal	67	23	22	22	12/11	11
	Shahpur	67	23	22	22	12/11	11
	Silanwali	67	23	22	22	12/11	11
	Total	**402**	**138**	**132**	**132**		
Vehari	Vehari	133	45	44	44	23/22	22
	Burewala	133	45	44	44	23/22	22
	Mailsi	133	45	44	44	23/22	22
	Total	**400**	**135**	**132**	**132**		
Gross Total		**1202**	**409**	**396**	**396**		

SF = Small Farmers; and MF = Medium Farmers

In addition to the above 90 females were also interviewed.

Process of Data Collection

A team of social researchers and supervisors were given training on how to collect data by using these questionnaires. In order to ensure the quality of data collection, mock interviews were conducted. Work of each team was supervised by a more experienced team lead. Their main tasks were to make data collection work plan in the field (in line with the plan), assign work to team, provide them guidance as and when needed and monitor quality of data collection. The supervisors were briefed about the sampling design and geographical coverage. The supervisors ensured that all questionnaires were properly filled.

Qualitative data was collected from rural women in all the three districts using semi-structured questionnaire. This observational data collection was substantiated with an analysis based on their

lifestyle, body language and expression. The labour rates were also verified from various sources that include Pakistan Economic Survey 2011-12, agriculture extension personnel and local landlords hiring labour for various agricultural activities.

Data Processing and Analysis

Data were processed and analyzed in SPSS.

Farmers Profile

Number of household members

In all the three districts almost half of the farmers reported their family size as being between 6-8 members. However Sialkot had a higher percentage of large family size, with 27% of families reporting 9-11 members and 9% reporting 12-14 members.

Mobile ownership

Most respondents in all three districts reported that males in their household had access to mobile phones. Only about 2% of the farmers in Sargodha, 5% in Vehari and 10% farmers in Sialkot did not have a cell phone. It implies that cell phone concentration among farmers is higher in Sargodha than that in other two districts.

As far as access of women to the cell phones is concerned, almost all respondents of Sargodha district reported that women do not have access to mobile phones. However, in other two districts the situation is slightly better. About 16% of the respondents in Sialkot and around one-third of the respondents in Vehari reported that women in their households were having their separate or personal cell phones.

In was generally reported that the mobile phone of the head of the household was used as the family phone. Where women had access to mobile phones they were using them as means of communication with other family members.

The overall trend for mobile ownership represents the cultural norms and women empowerment indicators in each of the districts. Though Sargodha was ahead of other districts in mobile ownership among the farmers with 98% coverage, however, none of them reported their women to have cell phones. On the contrary, in Sialkot 90% farmers had cell phones and alongside 16% of their women also had access to their personal cell phones. The ratio of women having their mobiles was highest in Vehari with 33% women owning their sets, while 95% farmers reported to have mobiles. The women section of this report also explains that women in Sargodha rarely work as labour to make money, which keeps them economically dependent. This implies that economic empowerment of women is critical to their power of decision making and access to improved facilities.

Table 1 Cell-phone statistics of three districts

	Vehari		Sargodha		Sialkot	
Facilities	**400**		**403**		**400**	
	n	*%age*	*n*	*%age*	*N*	*%age*
Fixed line	16	4.0	14	3.5	18	4.5
Call phone owned by the Head of the household	378	94.5	382	94.8	338	84.5
Cell phone for joint family use	30	7.5	24	6.0	5	1.3
Women in the HH have cell phone/s	130	32.5	0	0.0	63	15.8

Demographics of head of the household

The average age of the head of the household was 41-60 years for 41% families in Vehari and 49% households in Sargodha and Sialkot. There was no household having female as its head. The other most prominent category was 26-40 years of age. The percentage of unmarried head of the household was relatively higher in Vehari with 13% people falling in that category (Table 2).

Table 2 Age profile of the heads of households

	Vehari		Sargodha		Sialkot	
Age	**400**		**403**		**400**	
	n	*%age*	*n*	*%age*	*N*	*%age*
Up to 25 years	38	9.5	11	2.7	10	2.5
26 - 40 years	148	37.0	158	39.2	149	37.3
41 - 60 years	164	41.0	196	48.6	195	48.8
Above 60 years	50	12.5	38	9.4	46	11.5
Total	***400***	***100.0***	***403***	***100.0***	***400***	***100.0***

More than 40% of heads of the household were illiterate and two-thirds reported themselves at being at the primary level (up to grade V) or below. Only 3-4% of farmers have completed their graduation / bachelor's degree (14 years of schooling). However, more than half of the head of the households were able to read and write.

Table 3 Education profile of the heads of households

	Vehari		Sargodha		Sialkot	
	400		**403**		**400**	
	n	*%age*	*n*	*%age*	*N*	*%age*
Illiterate	166	41.5	168	41.7	172	43.0
Primary Education	96	24	86	21.3	87	21.8
5 - 9 Class	61	15.25	75	18.6	73	18.3
Matriculation	42	10.5	27	6.7	43	10.8
Intermediate	23	5.75	31	7.7	15	3.8
Graduation	9	2.25	14	3.5	10	2.5
Post-Graduation	3	0.75	2	0.5	0	0.0
Total	***400***	***100.0***	***403***	***100.0***	***400***	***100.0***

The respondents reported the primary source of income as agriculture. There were very few cases, where agriculture was not listed as the prime profession of the head of the household. Other professions in the districts include small businesses (trade, transportation etc.) and jobs (government or private jobs). The number of people reporting primary professions other than agriculture was 6% in Vehari, 3% in Sargodha and 2% in Sialkot.

Assets of the Household

The farmers were asked about the assets in their household to assess their lifestyle and access to various essentials of life. Almost all the respondents had television sets at home in Sialkot, the ratio was quite high in Sargodha as well, with 89% having TVs. However, the trend in Vehari was different where only 60% had a television. Ownership of a car, jeep or pick up was rarely reported, but most had motorcycles or scooters as a mean of travelling.

A reasonable number of farmers, 40% in Vehari and 42% in Sargodha had their own tractors. However, this number was quite low for Sialkot with only 13% reporting to have their own tractors. Rotavators were available with 12-15% of the farmers in the three project districts. The farmers did not have easy access to other agricultural implements like cultivators, discs, harrow, ridger, drill, etc.

Spending on different heads in the last one year

The respondents were asked to document their expenses under various headings for the last year. The surveyors found it quite difficult to get realistic answers to this query and farmers were offended by deeper probing. They had a tendency to substantially under-report the details of their spending. However, we are presenting the data provided by the respondents.

Farmers in Vehari spend less than Rs.4000 in 90% cases for education and moreover, 70% of these do not allocate more than Rs.2000 for this purpose. A similar pattern was observed for spending on health, where 87% people do not spend beyond Rs. 2000 per year. This pattern was observed for clothes, religious occasions and social occasions, with little variation. Most of them reported spending less than Rs. 2000 per year under each of these headings. In Vehari, 19% of those farmers who answered the question (29%) on their level of spending on livestock and poultry reported spending more than Rs. 10,000 a year. Only 16% farmers reported their expenses on agricultural implements and 7% of these spent more than Rs. 10,000 per year.

The responses from Sargodha were similar to those of Vehari, on account of spending. More than 80% of the farmers from this district spend less than Rs. 4000 a year on each of health and education. The reported expenses on clothes were slightly higher than in Vehari, with 95% of farmers allocating up to Rs. 6000 for clothes per year. Only 24% farmers documented their spending on livestock and poultry, and of these 20% reported that they appropriate more than Rs. 10,000 for this expense.

Three-fourth of the farmers in Sialkot allocate less than Rs. 4000 for each of health and education. Of those farmers who responded to the query on spending for livestock and poultry (18% of total), 6% spent more than Rs. 10,000. Out of the 13% farmers who prioritised spend on agricultural implements, 5% earmarked more than Rs. 10,000 per year.

Loan/borrowing

Farmers were reluctant to share information about loan borrowing. Out of a total sample of 1202 farmers, only 6 disclosed that they had taken out a loan in the last year, which accounts for less than 0.5% of the farmers. It indicates that small and medium farmers have no access to or no preference of the loans.

Information sources for cotton crop

On reporting where they received information and advice on their crops, cotton farmers responded that they mainly relied on fellow farmers and role models around them. About 25% farmers consulted their

fellow farmers and 12% with the role models for advice on certain areas. Only about 14% farmers reported that they consulted the extension workers for seeking advice on cotton production. Electronic media was also not reported as a major source of information: only 9 farmers reported it as major source of information for them. There was negligible response for private extension workers, print media, zaraat naama (fortnightly magazine publishing by the Punjab Government) and the internet.

Information sources for citrus crop

Citrus farmers were dependent on their fellow farmers for getting information regarding their orchards. They extensively discussed with other farmers and prominent role models in their community. The farmers in Sargodha also exhibited a different trend by using electronic media (like TV) for getting information. One-fourth of the farmers ranked this medium as the top source of information (like TV). Internet, print media or zaraat naama were not ranked first by any citrus farmer. The role of private extension workers was more prominent than government extension staff.

Information sources for rice crop

The farmers involved in rice sowing also extensively consult each other for information sharing. Two-third of the farmers reported fellow farmers as the most frequently used source of information. The second most popular source was the model farmers who have been performing well. Model farms are progressive farms which are employing innovative / exemplary production technologies and agronomic practices. Such model farms are usually planned and managed with the technical collaboration of some organization like Extension Department or any Pesticide or fertilizer company. Government extension workers were not ranked as the top source of information and advice and private extension workers also had a little presence here. The rest of the sources were also essentially non-existent.

Information sources for wheat crop

Wheat farmers in Vehari were observed to show the least information seeking behaviour. Of the total number of farmers surveyed in Vehari 29% ranked their fellow farmers as the primary source of information and 12% consulted the model farmers around them. The other sources of information had an insignificant role in disseminating any information.

Farmers from Sargodha largely depend on each other to share information. Three quarters consulted fellow farmers and 18% adhered to the advice from their model farmers. The trend of not using other sources was present for wheat farmers in Sargodha also. There was almost a similar response in wheat farmers of Sialkot, with two-thirds of farmers using information gained from their peer group and 11% from the prominent farmers in the community to take advantage of their success stories.

Total monthly cell phone bills and expense on agriculture related calls

Around 70% of farmers in Vehari and more than 80% of farmers in Sialkot and Sargodha, spend between Rs. 300-1000 per month on cell phones. Almost half of the farmers from Sialkot and Sargodha and one third of the farmers in Vehari spend between Rs. 600 and 1000 per month for cell phone bills, in Some farmers allocated more than Rs.1000 for communication through mobiles; 14% from Vehari, 9% from Sargodha and 11% from Sialkot fall in that category.

When asked about the expenses on agricultural related calls, many farmers were not able to segregate the number of calls specifically for agricultural purposes. Of the farmers who responded to this query, almost all the farmers reported their spending to be below Rs. 300. There were only 6 farmers from Vehari and 4 from Sargodha who claimed to invest Rs. 300-600 for calls made for getting agricultural related information or discussing crop related matters.

Frequency of calls to get specific agriculture related information for their cotton, citrus and rice crops

The farmers from Vehari make calls to their fellow farmers, government extension workers and role model farmers for getting information. Half of them claimed that their calls are diverted towards their peer group, 31% call government extension staff and 23% contact the leading farmers in the area for cotton related information. They had an almost similar split for getting information about the wheat crop as well.

Sargodha presented a different scenario, more than half of the calls i.e. 57% were focused on getting information from other farmers regarding the citrus crop, 32% are diverted towards fertilizer dealers and 15% calls consult the best performing farmers in the community. The reliance on fellow farmers is greater in wheat crop where more than 70% farmers mentioned their role as a source of information. They also consume information from fertilizer dealers and role models; however, the role of extension workers was minimal for both the crops in Sargodha.

Sialkot farmers relied on their farmers' group for getting information about rice. Almost half of the calls i.e. 47% are made to other farmers and 34% are made to fertilizer dealers for various queries related to rice. The trend of respondents from Sialkot was quite similar for both rice and wheat. The frequency of calls to government extension workers was negligible.

Information sources for weather related information

Timely and accurate weather prediction is very critical for the production of cotton. Ali (2011a) suggests that farmers should look for weather forecasts before irrigating a cotton field, especially during monsoon season. Farmers referred to multiple sources for getting and verifying weather related information which is of prime concern for agriculture. However, the most commonly used source documented was television which was mentioned by 66% farmers in Vehari, 88% in Sialkot and 90% in Sargodha. The other two main sources were fellow farmers, being consulted by almost two-thirds of farmers in each district, and use of traditional methods to forecast weather (e.g. feeling air pressure). The weather information is not localized and gives a wider picture to the farmers; therefore, they have to further substantiate it with other sources to make a closer guess. The role of the government extension department was noticeable in Vehari where 14% farmers mentioned it. The office displays the weather updates for the next three days for the convenience of the farmers and they can even call to get weather information.

Information sources for pricing information about inputs and produce

The maximum number of farmers, 95% or more, consults their fellow farmers for information regarding seeds, fertilizers and pesticides, in Vehari. More than 80% further authenticated their information from nearby markets. Almost two-thirds of the farmers also use their farmer community networking in other places to get information about seeds; however, this source is not relevant in other cases. Seed information seems to be the most vital for farmers; therefore, 42% farmers in Vehari also call the dealers to verify pricing information. The same set of farmers only uses this source in 15% and 16% cases for fertilizers and pesticides, respectively. The trend for getting pricing information for the agriculture produce was totally different. The only major source was getting on the ground information from the local market. There was quite narrow response in other categories.

The farmers in Sargodha had quite a similar response for getting pricing information regarding seed, fertilizers, pesticides and agriculture produce. The two main source was fellow farmers being used by around 80% farmers in each category. However, in the case of the second most prominent source i.e. nearby markets there was some variation. An overwhelming majority i.e. 95% of the farmers were consulting these for seeds, 72% for fertilizers and 75% for the rest of the two categories i.e. pesticides and agriculture produce. Calls to dealers for getting information varied between 10-15% of farmers. Besides, television channels telecast feature programmes on various issues of the agricultural items market.

The response from Sialkot reported 95% of farmers visit their neighbouring marketplaces to check information about everything from seeds to fertilizers, pesticides and agricultural products. The other major source was the fellow farmers being used by around 72% farmers of this region. The dealers' role varied between 7-9% and television was even lower.

Agricultural practices and information needs of the farmers

Next four chapters discuss the existing agricultural practices, earnings, profitability and information needs of the farmers. This report documents the current state of agricultural practices, production, earning and profitability before introduction of the ICT-based availability of extension services. This information is used to inform the development of farmer advisory messages at this stage of the project. A possible post project study is planned to assess impact of the project on the earning capacity and livelihood of the farmers.

Cotton Crop – Vehari District

Overview

Agriculture accounts for 21 percent of GDP, generates employment for 45 percent of the labour force and provides livelihood to 60 percent of rural population of the country (Government of Pakistan, 2012, p. 17). Only three crops viz-a-viz cotton, wheat and rice contribute about 30 percent of the value added of agriculture (Government of Pakistan, 2012, p. 18).

Cotton is a strategic crop for the country. It accounts for 7.8 percent of the value added of agriculture and 1.6 percent of agriculture (Government of Pakistan, 2012, p. 19). During 2011-12, cotton was grown on an area of 2.84 million hectares, which produced 13 million bales cotton with yield of 815 kg/hectare (Government of Pakistan, 2012, p. 19).

Water and soil testing practices

Farming community in Punjab is facing acute shortage of canal water. Hence, in order to meet the deficiency of water, farmers are in practice of pumping out water (through tubewells and turbines) and use it for irrigation purpose. In Punjab, only 35% of cropped area is irrigated through canal water, while 41% of area is irrigated through canals and tube wells (Government of Punjab, 2011). However, ground water in most of the cases is not fit for irrigation purposes (Government of Punjab, 2011). Gap between demand and supply of irrigation water has increased over time, due to following factors (Government of Punjab, 2011):

a. Increase in cropping intensity
b. Increase in consumption of water in domestic and industrial sectors.

Excessive use of unfit groundwater for irrigation can damage quality of soil. Hence, farmers should get ground water tested before its use. Out of a total sample of 400 farmers in Vehari growing cotton, there were only 4 who claimed to have their water tested, forming a meager 1% of the respondents. Similar behavior was noticed for soil testing where 7 respondents gave an affirmative response.

Moreover, two of the four farmers who got their water tested did not use the results of the test. The other two became aware of the fact that ground water of their agricultural lands had excessive salts. The results for soil test, however, had a better uptake. The results identified a deficiency of potash and nitrogen in a couple of cases. At least, three respondents managed to lower / adjust the amount of urea and DAP in line with the requirements of their soil.

Secondly, it is also important to note that 40 to 50 per cent of canal water is wasted between the canal head works to the farm gate (Government of Punjab, 2011). It implies that there is significant potential for making additional canal water available for irrigation purpose.

Guidance for Farmer advisory messages:

a. Farmers should get groundwater and soil samples of their farm lands, tested from nearby lab to assess its fitness

b. Farmers should adopt water conservation practices to improve water use efficiency

Crop Related Information

Area under cultivation

Among the farmers interviewed during the research, 84% had their own land, 16% rented land for agricultural usage and another 15% opted for rented in addition to their self-owned to increase their area under cultivation. Therefore, a total of 124 farmers, i.e. 31% rely on rented land.

The breakup presents that 45% of the farmers in Vehari have less than 5 acres of own land under cultivation, another 22% own between 6-10 acres and 17% fall in the next bracket i.e. 11-15 acres of land. Of the surveyed farmers only 1.5% of the farmers had landholdings beyond 25 acres. However, the research was focused on small and medium farmers; therefore, the results are understandable in that context. A fairly noticeable number i.e. almost one-third of the total farmers chose to augment their agricultural activity by taking up rented land. The area breakup portrays that 75% farmers have rented in land a maximum of 10 acres (per farmer).

Yield of cotton

The data for cotton yield last year [2011-12] depicts more than half of the response falling in the average three brackets i.e. 55% having yield between 26-40 maunds per acre (1.04 – 1.60 tonnes/acre)[4]. However, it is healthy to notice that 29% farmers were able to fetch more than 40 maunds/acre. There were a negligible number of farmers, i.e. 4% who could not achieve beyond 20 mounds/acres and another 12% managed a mere 21-25 maunds/acre. Survey results show that average yield of cotton is about 37 maunds/acre in Vehari district. More than half (53 percent) of the farmers reported a yield less than average yield (i.e. 37 maunds/acre). Distribution of farmers according to yield brackets is given in Figure 2. . It means there is substantial room for improvement in the yield of cotton in the project area.

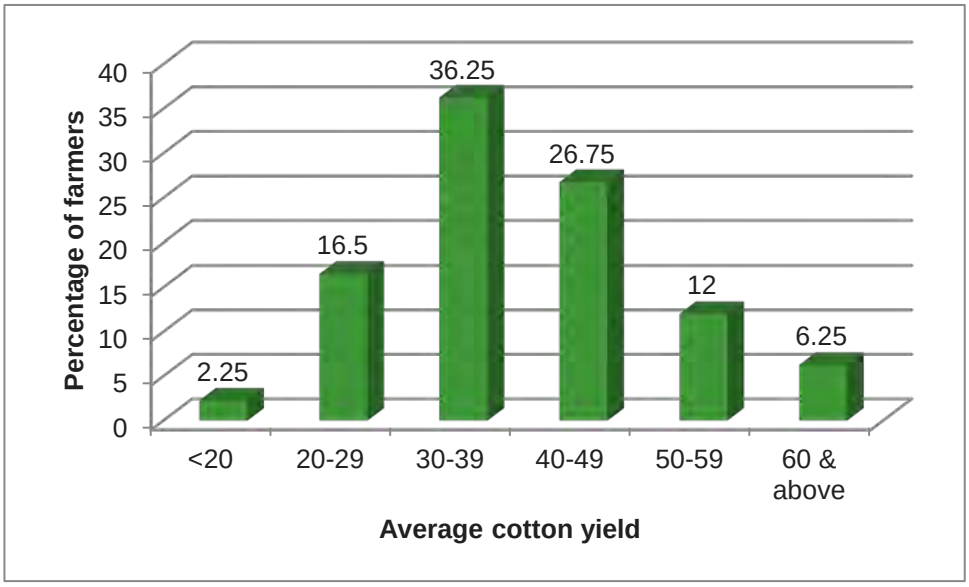

Figure 2 Yield-wise distribution of farmers

Guidance for Farmer advisory messages:

Figure 2 shows that there is significant potential for improvement in yield for most of the farmers. Just over 6 percent of the farmers achieved the yield of 60 maunds/acre, against average yield of 37 maunds/acre (1.48 tonnes / acre. This yield gap can be reduced through adaptation of improved technologies and practices.

[4] One maund = 40 Kgs = 0.04 tonnes

Average yield of cotton is highest in tehsil Vehari, as compared to other two tehsils. However, variation in yield among high performing and low performing farmers is very high. ANOVA results show that difference in yield among tehsils is not statistically significant (**Table 4**). However, statistically, difference in yield among the three tehsils is insignificant, as shown in the **Table 5**. It is basically due to the fact that variation in the yield among farmers in tehsil Vehari is very high, as reflected in the value of Standard Deviations (**Table 4**).

Table 4 Tehsil-wise yield of cotton

TEHSIL	Mean	N	Std. Deviation
Vehari	43.87	115	64.189
Burewala	37.66	92	12.270
Mailsi	38.09	134	25.737

Table 5 ANOVA – Tehsil-wise yield of cotton

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2786.537	3	928.846	.543	.653
Within Groups	571038.898	334	1709.697		
Total	573825.435	337			

Small farmers have significantly lower yield (35.52 mauds /acre) as compared to large farmers (39.44 mauds /acre), as is shown in Figure 3. It shows that there is substantial potential for improvement in the yield of the small farmers.

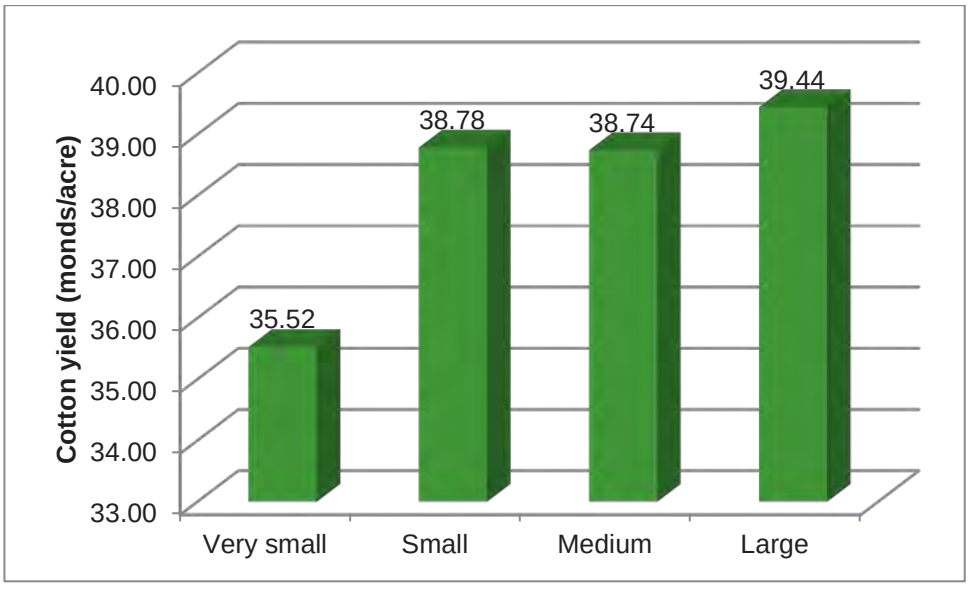

Figure 3 Yield viz-a-viz farm size

Table 6 shows that knowledge of the farmers positively and significantly correlated with yield/acre (r = 0.183, at p = 0.000 for knowledge). It implies that if knowledge of the farmers in plant protection is improved, it will lead to improvement in their per acre yield of cotton.

Table 6 Correlation between yield/acre and the plant protection

		CPPK	CPPC	Yield/acre
CPPK	Pearson Correlation	1	.786**	.183**
	Sig. (2-tailed)		.000	.000
	N	369	368	369
CPPC	Pearson Correlation	.786**	1	.127*
	Sig. (2-tailed)	.000		.015
	N	368	369	369
Yield/acre	Pearson Correlation	.183**	.127*	1
	Sig. (2-tailed)	.000	.015	
	N	369	369	400

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Guidance for Farmer advisory messages:

There is a significant correlation between farmers knowledge of plant protection and the cotton yield. It implies that farmers can enhance their cotton yield by improving their access to knowledge.

Cost of inputs per acre in cotton zone

The farmers were inquired about the cost of inputs towards their cotton growing area. The data presents picture of a positively skewed distribution, with 60% farmers spending between Rs.30,000 – 50,000 per acre[5] towards their cotton crop. Only 7.5% allocate a budget less than Rs.30,000. Another noticeable expense slot lies between Rs.50,000 – 80,000 representing almost 28% of the respondents. There were 5% farmers who even spend beyond Rs. 80,000. Average cost of production comes to PKR 48,413/acre.

Leading cost items include cotton picking, fertilizers, irrigation, land rent, and plant protection (Figure 4). The analysis of the input costs reveals that rent of land is one of the most expensive cost items for those who take this option. Of 124 farmers who have rental land, 105 people spend between Rs.10, 000 – 40,000 per acre as rent. The other most expensive inputs include cotton picking, followed by irrigation and fertilizers. About 65% farmers spend more than Rs. 9, 000 per acre, on cotton picking, 74% farmers spend Rs.7, 000 – Rs.20, 000 on it and an overwhelming 96% spend between Rs.6, 000-Rs. 20,000.

There is positive and significant correlation between expenditures /acre and the yield / acre, $r(400) = .225$, $p < .000$. It implies that investment in the cotton production is a major determinant of the yield.

[5] One GBP = Pak Rs. 156

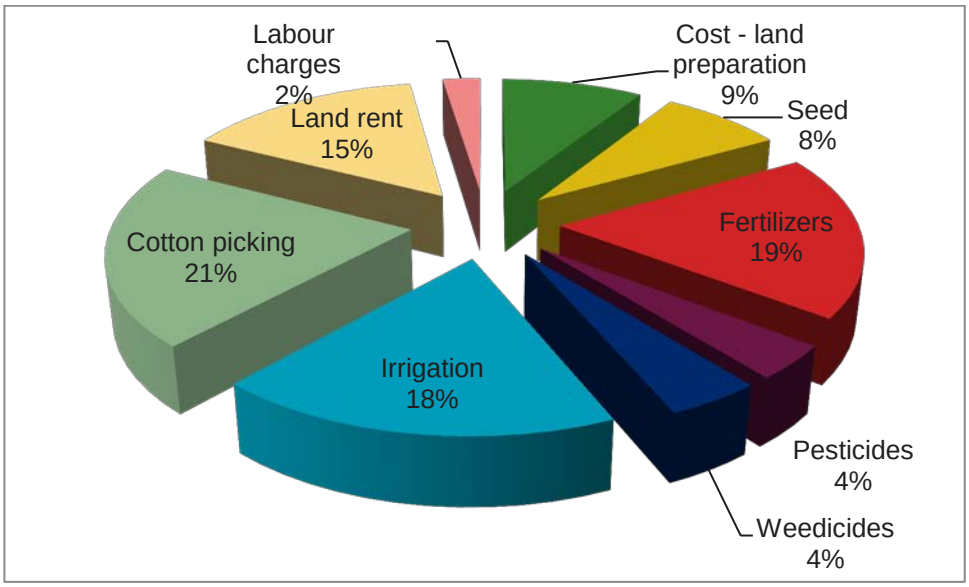

Figure 4 Cost of production of cotton (PKR 48,413/acre)

Cost of production in case of small farmers is less compared to the medium and large farmers (Figure 5), despite the fact that large farmers are expected to have benefits of economies of scale. It is due to the fact that medium and large farmers use more inputs.

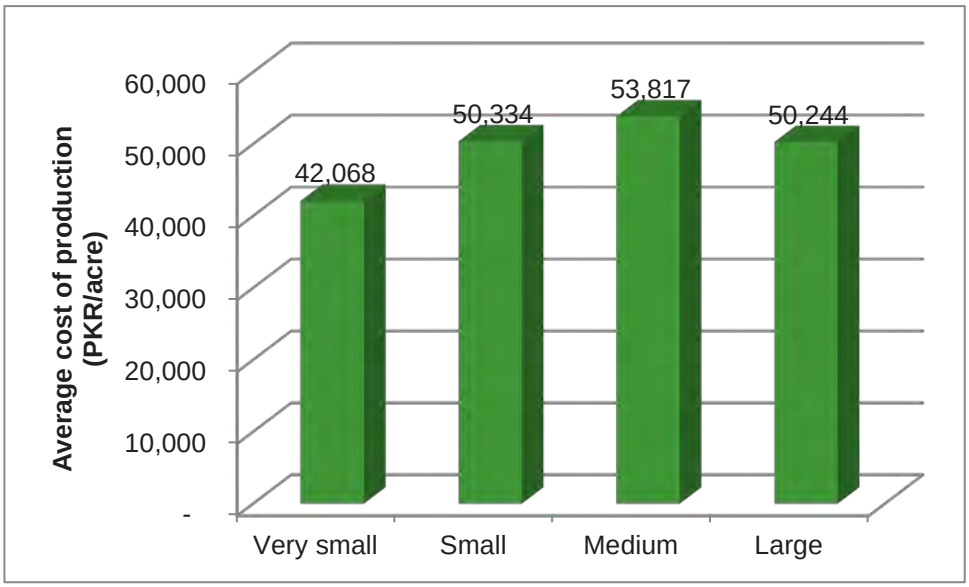

Figure 5 Cost of production of cotton vs farm size

Approximate Income from cotton

The income from cotton crop portrays that almost half of the farmers, i.e. 47%, earn between Rs.80, 000 – Rs. 120,000 per acre after accounting for all the expenses on the cotton crop. These earnings have been calculated on last year's estimates which were based on a bumper cotton crop. Moreover, around 21% people were able to generate an income above Rs.120,000/acre (GBP 764).

Average profit earned from one acre production of cotton is about PKR 46,885 (GBP 299). Surprisingly, Burewala tehsil stands out among all tehsils of Vehari, in terms of per acre profit from cotton production. It is perhaps due to the fact that most of the farms are of medium size, which are usually more easily manageable and are more efficient. However, variation of profit among three tehsils is not statistically significant.

Table 7 Per acre profit in cotton production

TEHSIL	Mean	N	Std. Deviation
Vehari	45104.78	115	50966.87
Burewala	55643.48	92	83863.38
Mailsi	40666.05	134	38733.94
Total	46885.25	400	55010.44

Number of irrigation applied to cotton crop

The farmers use canal water along with tube well water for irrigating their cotton crop. The number of canal water irrigations had a wide range; most of the respondents use this water for as much as 8 irrigation cycles. There are rare cases that even use it beyond eight irrigations. However, it is amazing to note that there are only 1.25% farmers who use tube well water for less than 6 irrigation cycles. On the other hand 95% farmers rely on this expensive proposition for more than 7 times in their water management schedule. Underground water at most of the locations is brackish which is not good for citrus plant health and fruit quality.

Guidance for Farmer advisory messages:

There is need for improvement in the adoption of improved irrigation practices – particularly timings of the application of irrigation. Government of Punjab (2011) suggests that Increase in awareness level of farming community regarding the water quality for its efficient use offers an opportunity for increasing agriculture productivity.

Distance of fields from head of water course

Two-third of the cotton growing farmers reported a distance of 1-3 km. of their fields from head of water course. Out of the rest 12%, fields fall beyond 3 km. from head of water course. Farms at tail ends of water courses receive less quantity of water.

Land Preparation

Soil Rating and awareness regarding characteristics of soil under cotton cultivation

The cotton farmers expressed their satisfaction with the soil under cotton cultivation; two-third of them rated quality of their land as fertile and 30% think it is average. There were only two persons who showed disappointment with their soil. However, when inquired about their familiarity with the characteristics of soil under their usage, only 50 farmers registered their response (i.e. only 25%).

The farmers who claimed to be familiar with the soil under cultivation, pointed out the deficiencies as nitrogen, potash, calcium and phosphorous. Moreover, 44% of these also revealed a high concentration of sodium in their agricultural land.

Guidance for Farmer advisory messages:

Farmers need to improve their knowledge about the soil characteristics/conditions, and knowledge in how to improve and sustain fertility of their soils. Improper use of soil is posing serious threats to quality of their soils. Hence, proper management of soil is very critical to improving crop yields and to ensure sustainability of cropping system. Government of Punjab (2011) suggests that better management of land resources offers an opportunity for increasing agriculture productivity.

Laser aided land levelling

Out of the 400 farmers contacted during this research, 99 i.e. one-fourth had used laser aided land leveling for their agricultural land.

Guidance for Farmer advisory messages:

Uneven field account for significant amount of loss in irrigation water, poor distribution of water in the fields, inefficient use of fertilizers, poor health of crops. It is very critical for the farmers to increase their awareness on the proper management of lands and benefits of laser-aided land leveling.

Methods of sowing

In response to the query regarding the sowing methods being used by the cotton growers, there was an exorbitantly high value for raised bed manual method being used by 97% people. There were 70 farmers who also use drill for sowing purposes. This question had a multiple response as some of the farmers use more than one method of sowing. Only three farmers mentioned using tractor for raised beds and none of them indulged in broadcast method. The response clearly depicts a tendency towards labor intensive sowing practices while lesser number of farmers relying on mechanical methods. They still rely on ages old technologies for sowing. Manual sowing is not only time consuming but is also having some critical weaknesses. For example, distribution of seed is not uniform when sown manually while it is uniformly distributed when sown mechanically.

Guidance for Farmer advisory messages:

Farmers should develop greater awareness about innovative methods of sowing, so as to enhance their crop yields.

Seed Purchase

Source of seed also fetched multiple responses as the farmers use more than one variety for their cotton fields. Almost two-third of them purchases seed from seed dealers or nearby markets. Moreover, 49% also make use of home kept seed alongside the purchased seed. There were 14% farmers who rely on their fellow farmers for their seed requirements and only 3 of them mentioned contacting research institutes for the purpose.

Getting maximum yield is the foremost priority for 82% farmers while deciding the variety of seed to be purchased for their cotton crop. An “affordable price” is another factor in scale of importance for the farmers which was rated as “most important” by 9% and ‘important’ by 20% farmers. Risk of disease could not fetch its place as the most important decisive factor, however, a noticeable percentage i.e. 42.5% consider it important when deciding the variety of seed for their crop. It was discouraging to note that innovation and technical knowledge requirements (like treatment with chemicals, timings and method of sowing, agronomic practice before and after sowing etc.), were the least bothering constituents in their choice of seed for cotton.

Variety of Cotton Seed being used

An analysis of the data places the usage of BT cotton seed by a total of 305 farmers, i.e. 76%, whereas 276 farmers are using non-BT varieties as well. The exclusive BT users formed 26% of the sample and exclusive non-BT users were 24% of the farmers surveyed. Almost half of the farmers, i.e. 201, rely on both varieties of cotton for various reasons.

The most commonly used BT variety was MNH-886[6], which was reportedly being used by 69% farmers. The other popular choices depicted through the data are Ali Akbar 703 and MNH 456 in BT cotton. There were small groups of farmers using a wide range of varieties in both categories.

[6] MNH-886 is one of the four BT varieties (other three are TARZAN-1, NS-141, IR-NIBGE-3) which were approved by the Punjab Seed Council in Feb 2012 for one year for field performance/monitoring of the varieties (Pakistan Today, 2012).

Guidance for Farmer advisory messages:

Selection of a variety for sowing is very critical to the yield and returns. Over 80% of the farmers considered yield as the primary decision factor related with selection of cotton variety. On the other hand, reliability of the source did not figure out among their decision criteria. Farmers need to increase their knowledge about the quality and reliability of seed and seed sources.

Time of sowing cotton

Out of 400 farmers, 296 farmers reported that they were growing non-BT cotton. A reasonably high number of people i.e. 76% sow this kind of cotton in May. There was negligible response in other categories except 19% farmers who did not register their response. On the contrary, BT cotton is sown in February and January by 78% and 13% farmers, respectively.

There were 30 farmers who expressed their reservations with their time of sowing. Most of them attributed this delay to non-clearance of their fields and financial constraints.

Guidance for Farmer advisory messages:

Bt varieties are gaining increasing popularity in the cotton belt especially the Vehari District. Such varieties are different from the conventional varieties on many accounts like sowing time, selection of seed, agronomic practices etc. Hence, Farmers need complete package of the proper knowledge of such varieties for achieving optimal yield.

Average germination rate of the seeds

The average germination rate attained by the farmers has been quite satisfactory. The data portrays that 90% farmers were able to get germination in the range of 70-90% which is fair enough. Moreover, 5% claimed to have achieved more than 90% germination and none of the farmers reported below 60%.

Guidance on Farmer advisory messages:

By following technical advice of experts / extension workers, farmers can improve germination rate of seed.

Seed treatment practices and perception towards their benefits

The farmers using chemicals for seed treatment formed 37% of the total sample. Out of the 148 farmers using chemicals, Amedeo and Confidor (it has ingredients like Imidacloprid) were being used by 47% and 43% farmers, respectively. The quantity used was mentioned by 400 grams per maund by almost all those who responded to this inquiry.

The farmers using the chemicals for seed treatment retreated that they use this to improve the germination rate, protect their plants from fungus and insects. These responses were endorsed by 56%, 48% and 42% of the 148 farmers who reported to follow this practice.

Guidance for Farmer advisory messages:

Analysis suggests that farmers are not following standard practices of the seed treatment for sowing. Farmers can improve yield by following recommendations of the experts.

Perception regarding difference in requirements and methods of sowing for BT and non-BT cotton

Out of the farmers contacted for gathering baseline information, 81% perceive that there is a difference in the requirements and methods of sowing for BT and non-BT varieties of cotton. The

farmers who responded in affirmative were quite comfortable with their knowledge base regarding the difference in sowing both of these varieties. There was an overwhelming response towards their perception of fair or full knowledge towards the time of sowing. More than 90% were quite content with their information which is also reflected in the time followed for sowing BT cotton as against non-BT varieties. Moreover, more than three-fourth of them showed their adequate familiarity with the difference in irrigation needs for both kinds of cotton crop. Similarly 69% think they have ample knowledge about disease control mechanism for both kinds. If we add up people perceiving to have "reasonable knowledge" with these skill sets, the percentages would be even better off. More than two-third of the farmers also had fair or full knowledge regarding pesticides and fertilizer requirements for various varieties of cotton crop.

Area under cultivation for BT and non-BT cotton crop

Out of the 305 BT growers, almost three-fourth use an area less than 10 acres for cultivating this type of cotton. Moreover, 18% of BT users grow it on 11-20 acres of land. Among the 296 non-BT farmers, 70% use less than 10 acre and 7% allocated 11-20 acres of land for non-BT cultivation. A noticeable number, 23% farmers growing non-BT variety did not respond to this question.

Start of BT cotton cultivation

The BT growers registered their response about the pattern of converting to BT cotton cultivation. Only one of them started growing BT cotton before 2004, the ratio of people experimenting with BT cotton did not pick up till 2008 when it still stood at only 13 farmers. However, it took a sharp jump in 2009 reaching 73 and suddenly to 229 farmers in 2010. The data shows that cultivation of BT cotton has gained momentum after 2008 and is now widely cultivated by majority of farmers.

Reasons for shifting to BT cotton cultivation and level of satisfaction

The farmers who switched to BT cotton cultivation and registered their response attributed this to higher yield expectations. Moreover, the scale of farmers' satisfaction from cultivating BT cotton was found to be fairly pleasing. Out of the 305 farmers engaged in BT cotton farming, 42% rate it as a great experience, another 17% consider it above satisfactory level and 38% place it as satisfactory enough to justify this shift. There were only 7 farmers who maintained a negative stance on this change.

Pest Management

Weed control methods

Important weeds of cotton include It-Sit, lumb, madhana ghass, jangli chulai, qulfa, tandla and deela (Haq, Islam, & Hussain, 2011). Besides, there are several other weeds of cotton crop too. List of all important weeds along with their common and technical names is given in **Table 8** Weeds cause damage to the crop directly as well as indirectly. Direct damage is usually through competition of weeds with crop in the use of available nutrition. As far as indirect damage is concerned, they prove to be hosts for leaf curl virus and whitefly. Hence, effective control of weeds is critical to higher yield.

Table 8 Technical names of cotton weeds

Local name	Common Name	*Technical Name*
Baru	Johnsongrass	*Sorghum halepense*
Bhakhra	Pucturevine	*Tribulus terrestris*
Chulai	Green amaranth	*Amaranthus viridis*
Deela	Purple nutsedge	*Cyperus rotundus*
Dhodak	Petty spurge	*Euphorbia prostrata*
Dhodak	Sun spurge	*Euphorbia helioscopia*
It-Sit	Horse purslane	*Trianthema monogyna*
Jangli Patsun	Wild jute	*Corchorus tridens*

Khabbal ghass	Bermuda grass	*Cynodon dactylon pers*
Kulfa	Common purslane	*Portulaca oleracea*
Lehli	Field bindweed	*Convolvulus arvensis*
Loomar ghass	Green foxtail	*Setaria viridis*
Swanki ghass	Jungle rice	*Echinochloa colonum*
Tandla	-	*Digeria muricata*

Source: Ali, Muhammad & Abid (2005).

Baseline survey results show that farmers are using many different methods for weed control simultaneously. A fairly large number of farmers, i.e. 71% use weedicides to fight against this menace. However, 62% also reported to use hoeing, 45% use manual method and 38% also use tractor driven hoeing to check the growth of weeds in their cotton crop. Each farmer is using multiple methods to control the weeds. Out of the 400 respondents, 32 told that they try crop rotation to keep the weeds under control and a couple of them also utilize bar harrow for this purpose.

After making use of these multiple methods for weed control, farmers appeared to be satisfied with their performance. The number of farmers recording complete control was 5.5% of the total, however, around 80% were able to control weeds up to 75% which seems to be acceptable by them. There were only 15% farmers who had a control less than 50% of weeds in their crops.

Perception regarding impact of killing beneficial insects

Use of pesticides also kills many beneficial insects while controlling the dangerous pests from the crop. The farmers were asked about their perception of their knowledge and views regarding this phenomenon. Two-thirds of the farmers expressed their unfamiliarity with this topic, however, the rest of the respondents were equally split between the ones who think it bears negative impact on the cotton crop and others who do not consider this an element impacting their crop.

Guidance on Farmer advisory messages:

Awareness of the farmers regarding beneficial insects is very critical to the effectiveness of plant protection measures. However, results suggest that two-third of farmers are totally unaware of such insects. By promoting their knowledge of such insects, effectiveness of plant protection can be improved and thus yield can be enhanced. Moreover, it will also lead to reduction in cost of plant protection.

Precautionary measures followed while spraying pesticides

Precautionary measures are taken by 93% of the farmers while spraying pesticides. Two-third of the farmers expressed their knowledge about wearing of a mask during pesticide sprays; half of them also properly cover the body while spraying pesticide and also keep the pesticides at a safe place. One-third of the respondents were also watchful about the direction of wind during the spray. However, the precautions about keeping these away from children and food were not highlighted much by the farmers.

The farmers mostly observe morning time for spraying; 64% do it before noon of which 32% spray at early morning hours. Moreover, 29% spray pesticides just before the evening. Ali (2011a) suggests that farmers should undertake pest scouting twice a week.

Knowledge and level of control for various pests

The knowledge about various pests and insects was perceived to be fairly reasonable by the farmers. They knew about all the pests mentioned and claimed to have fair and in many cases expert knowledge about each one of these. Similarly, they observed acceptable control over these pests; the ratio of complete control varied between 17 – 26% respondents and more than 60% claimed fair control. The number of people complaining about unacceptable control, including somewhat or little

control, was less than 15% in each category of pest. Common harmful insects of cotton include thrips, sabz taila (jassids), safaid makhi (whitefly), mites, sust taila (aphids) and mealy bugs.
(Ahmed, Haq, Hussain & Salim, 2011)

Fertilizer Application

Quantity of fertilizers per acre

The cotton growers stressed on the need for fertilizers especially as the requirements for BT cotton are different. Farm yard manure is used by a very insignificant number of farmers, only 13 out of a sample of 400 farmers reported to use it before the sowing stage, another 5 mentioned using it before flower development stage and only one of them use it at 30-45 days after watering stage. Use of Potash also maintained a similar pattern with a negligible number of growers utilizing this fertilizer. The total number of users of potash at various stages amounted to only 23 in Vehari.

The data reveals that DAP and urea are rated as unavoidable expenses and a must for any crop; the need is accentuated in case of BT cotton cultivation. There were more than 90% farmers who use 1-2 maunds (40-80 kgs) of both these fertilizers before seed sowing stage. The use of DAP is scanty at other stages, however, there were 6 farmers using DAP at first watering stage, the same 6 using 30-45 days after watering stage and a couple of them even use before flowering stage. The case of urea was different, more than 70% of the farmers repeat 1-2 maunds of urea at first watering stage and around 60% maintain this usage 30-45 days after the watering stage as well. A reasonable number of farmers, i.e. around a one-third , apply urea for the fourth time before flower development stage. Therefore, the usage of urea was repeated at four stages by at least one third of the respondents, and a significant number maintains three cycles of its application.

Guidance for Farmer advisory messages:

Survey findings suggest that farmers apply fertilizer without properly assessing the needs of the nutrients deficiency. Eventually, effectiveness of fertilizers remains low. There are many areas in which farmers need more awareness to make appropriate decisions related with timing, type and quantity of fertilizers

Cotton Picking

Usual time of picking cotton

The peak time for picking cotton starts at 8 - 9 am as communicated by 88% farmers during their interviews for the baseline. There was negligible response in other categories where only 9 people mentioned sunrise as the time for cotton picking and 37 farmers mentioned around 10 am. Choosing early morning to start cotton picking usually aims at taking benefit of the dew, which adds weight to the cotton produce. However, this practice negatively affects quality of cotton.

Usual place of stocking cotton before transferring to storage / selling

A high number of respondents, i.e. 98% mentioned that they store the cotton at some dry place before transferring it to their storage or directly selling it. There were only 7 farmers who committed to keep the cotton in some humid place like watercourses before the storage. This is their documented response as they told the survey team. Why do farmers keep stock of cotton in the humid place? Actually, main intension is to increase weight of their produce to generate more revenue from it.

Guidance for Farmer advisory messages:

Farmers should be given greater awareness on the importance of the quality of cotton produce.

Seed Selection

Decision for seed selection falls in the domain of farmer, maximum weight is given to personal consideration of the farmer himself, followed by advice from fellow farmers. There is less reliance on agriculture extension staff as 69% farmers never consult them for seed selection, only 14% people maintained that they take advice from extension staff frequently or definitely. Around 15% people take in to account guidance from the role models around them.

Disease control and plant protection

Farmers maintained a reserved attitude towards consultation for disease control and plant protection. They hardly take assistance from any agriculture department or even pesticide company's representatives. Some of them mentioned their farmer network that they utilize for discussing disease related issues.

Fertilizer Application

Agriculture extension department provide consultation to 16% farmers for quantity and timings for fertilizer application. Moreover, 14% farmers get guidance from fellow farmers and 10% also take advice from fertilizer dealers.

Irrigation and soil related advice

The overall trend of seeking advice has shown minimal results in most categories; however, in this case it seems to be virtually non-existent. There was hardly any response for getting advice from any source.

General Views

Level of satisfaction with cotton output

An incredible number of farmers i.e. 81% showed their satisfaction with their cotton output. The response for absolute disapproval was only recorded by 9 farmers and the rest 17% also showed their inclination towards satisfaction. Therefore, the numbers are quite encouraging in terms of their perception towards performance. (However, this becomes a negative element where the farmers cease to invest in innovations to improve their crop.)

Most significant complications being faced for cotton crop

The most alarming issues facing the cotton growing farmers were reported as "electricity and water" problems, lack of availability of genuine fertilizer and availability of parallel counterfeit fertilizers; and issues pertaining to harvesting of cotton. High prices of input were also raised in different phrases. There were only 4% farmers who complained of not having enough information which becomes an impediment in their growth.

Visit to extension office for advice

Two-third of the respondents either not responded or had never been to the extension office. There were 21% people who had a chance to go to the office once or a couple of times. There is a very limited number of farmers who frequently go to seek advice from agriculture extension office.

Guidance for Farmer advisory messages:

Results show that there is a weak coordination between farmers and the extension office. Either farmers lack trust in extension workers or there is issue of accessibility. An improved access to the extension services can help the farmers in meeting their information needs.

Whether attended any workshop arranged by extension department

Almost half of the farmers had a chance to attend an event or a workshop arranged by the extension staff.

Table 9 shows that average cotton yield of the farmers who attended Extension workshops (39.37 monds/acre i.e. 1.57 tonnes) was higher than that by the farmers who did not attend (35.93 maunds/acre i.e. 1.42 tonnes). In other words, participation in the extension workshops leads to increase in the yield by about 2.4 maunds/acre (about 10 percent).

Table 9 Does participation in extension workshops make any difference?

Participated in extension workshops		N	Mean	Std. Deviation	Std. Error Mean
Yield/acre	Yes	197	39.37	11.955	.852
	No	203	35.93	11.221	.788
Knowledge in PP*	Yes	186	4.2457	.56464	.04140
	No	183	3.9918	.62317	.04607
Control over PP	Yes	187	4.0984	.53021	.03877
	No	182	3.9632	.54744	.04058

* PP = Plant Protection

Correlation between investment in cotton production and income

We have found a positive and a significant relationship between investment in cotton production and income per acre (**Table 10**). But relationship is not very strong (r = 0.168). It implies that although, investment in cotton production matters a lot in the income of the cotton producers, however, there are some other factors too which affect income. Such factors may include technical knowledge and managerial of farmers and environmental factors etc. In other words, if capacity of farmers is developed, their income may be improved.

Table 10 Correlation between investment in cotton production and income/acre

		Total Cost/Acre	Income/acre
Total Cost/Acre	Pearson Correlation	1	.168**
	Sig. (2-tailed)		.001
	N	400	400
Income/acre	Pearson Correlation	.168**	1
	Sig. (2-tailed)	.001	
	N	400	400

**. Correlation is significant at the 0.01 level (2-tailed).

Correlation between Knowledge in plant protection and control over pests

We find that there is quite a significant, positive and strong relationship between knowledge of plant protection and control over pests (r = 0.786 at p = 0.000). Mean value of the knowledge in plant protection has been rated by them at about 4.1 and control over pests at about 4.0. Although, the

values are encouraging, however, knowledge of individual farmers and control over pests by individual farmers significantly varies from 1 to 5.

Table 11 Correlation between knowledge of plant protection and degree of control over pests

		CPP Know	CPP Control
CPPKnow	Pearson Correlation	1	.786**
	Sig. (2-tailed)		.000
	N	369	368
CPPControl	Pearson Correlation	.786**	1
	Sig. (2-tailed)	.000	
	N	368	369

**. Correlation is significant at the 0.01 level (2-tailed).

Citrus Crop - Sargodha District

Pakistan is among the top ten citrus producing countries in the world (Khan, 2010). Pakistan is very famous for Kinnow production. . Kinnow belongs to the family *Rutaceae.* Sargodha is the center of kinnow production in Pakistan.

TRTA Pakistan (2012) sates that *"At this point Sargodha is the main citrus producing district, with about 23 per cent of Pakistan's total citrus plantings, producing around 650,000 metric tons of fruit each year."* Kinnow is a very tasty fruit and is widely liked. Besides, it can retain its freshness, if kept in storage Khan (2010) says, *"Kinnow is very delicious in taste and if treated with proper fungicide and wax and careful handling and storing of Kinnow at about 4 Degree Centigrade can retain it's freshness until 2 months"*. It is very rich in juice contents. Average juice in kinnow is 50%. Average weight of a fruit is 210 grams. Average yield plant is 1000-1500 (Khan, ud).

Water and Soil Testing Practices

The response to water and soil test from the farmers in citrus orchid area present a relatively better practice for water testing, however, soil test is a totally ignored domain. Water test had been reported by 23 farmers, i.e. 5.7% of the total sample of 403 respondents whereas there was only one farmer who claimed to have had his soil tested. When probed for his awareness about the laboratory results, the farmer with soil testing did not register his response; however, the water test revealed that it is not suitable for orchards. Moreover, the laboratory results also pointed out excessive salts and lack of calcium in the water.

Table 12 shows that farmers who had the practice of getting water analyzed, had 9 percent more yield than those farmers having no such practice. In case of soil analysis, similar results are evident (Figure 6).

Table 12 The practice of water and soil analysis, and the citrus yield

	Water Analysis			Soil Analysis		
Done?	Mean	N	Std. Deviation	Mean	N	Std. Deviation
Yes	177.17	23	49.055	180.00	1	-
No	161.88	380	51.232	162.71	402	51.231
Total	162.76	403	51.175	Total	203	51.175

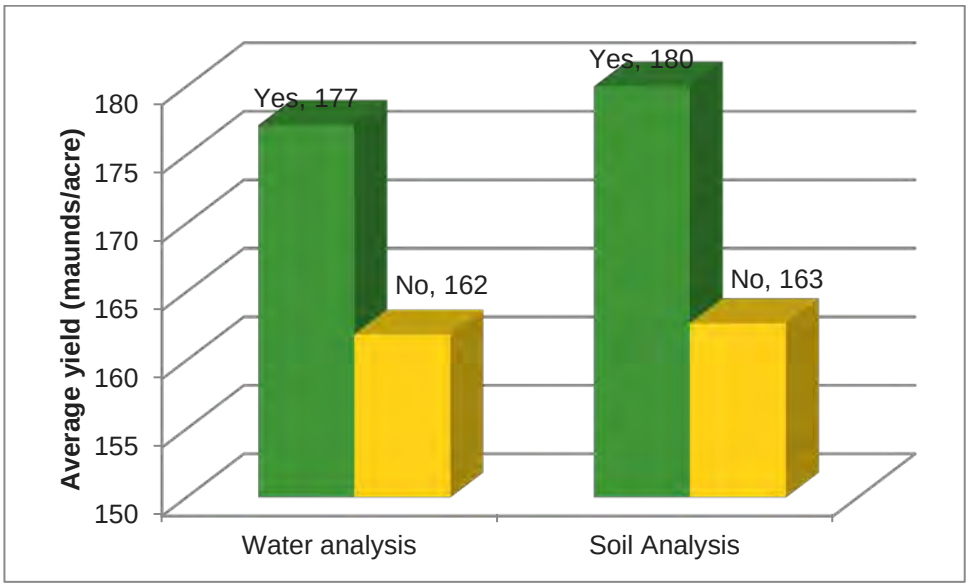

Figure 6 Yield comparison: Soil and water analysis done vs not done

Guidance for Farmer advisory messages:

Underground water in most parts of Sargodha District is unfit for irrigation purpose. Canal water is not available in adequate quantity and at most of the critical stages of the crop. Use of brackish water badly affects growth and quality of fruits. Farmers need proper knowledge in dealing with such situations.

Analysis of citrus leaves

The farmers were also inquired about analysis of citrus leaves for nutrient deficiency. A total of 37 farmers, i.e. 9%, had performed this test for their orchards. Figure 7 shows that farmers who had the practice of getting leaves analysis done, had about 10 percent more yield than the other farmers.

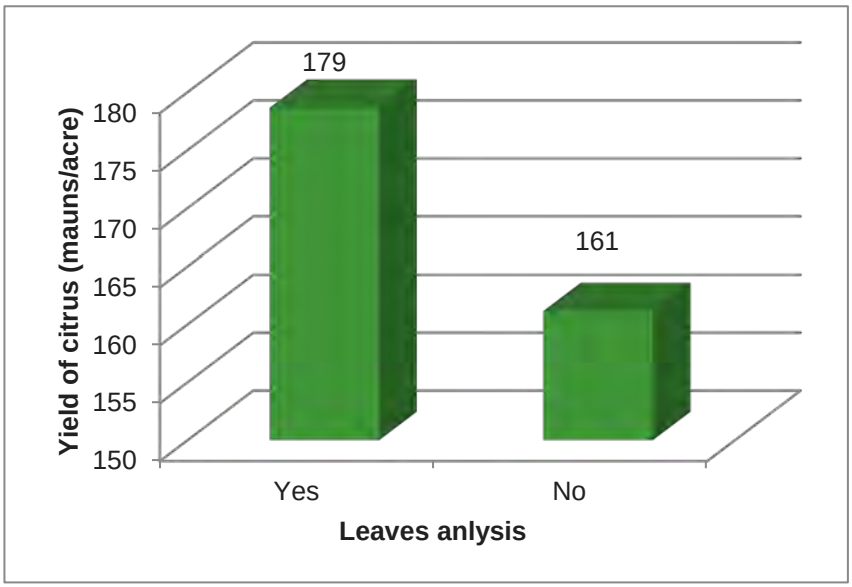

Figure 7 Yield comparison: Citrus leaves analysis done vs not done

Guidance for Farmer advisory messages:

Citrus leaves provide very useful and critical information on the attack of pests and deficiency of nutrients. Farmers need to learn how to read colour, shape and size of the citrus plants.

Citrus Crop Related Information

Total area under cultivation of citrus orchards

The data for area under citrus orchards reveals that more than one third of these fall below 5 acres of land; 26% between 6-10 acres and another 28% have been raised on 11-15 acres of land. There were 10% farmers who have allocated more than 15 acres of land for their orchards. However, this data pertains to small and medium farmers whose total area falls within 25 acres of land. Almost half of the farms had a size ranging between 5-11 acres (Figure 8). Therefore, the data is quite understandable.

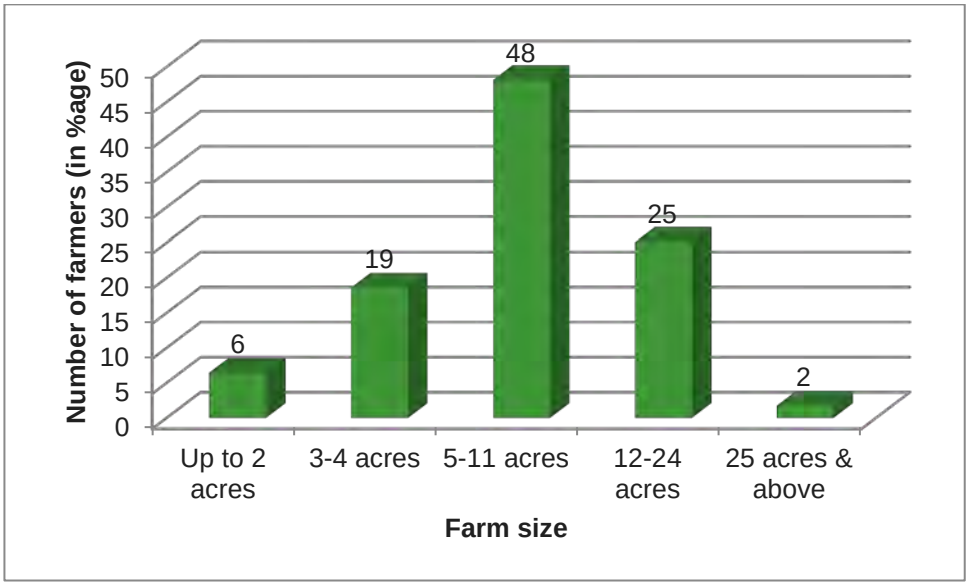

Figure 8 Size of farms

It appears that medium size farms are more efficient than large and small farms (Figure 9).

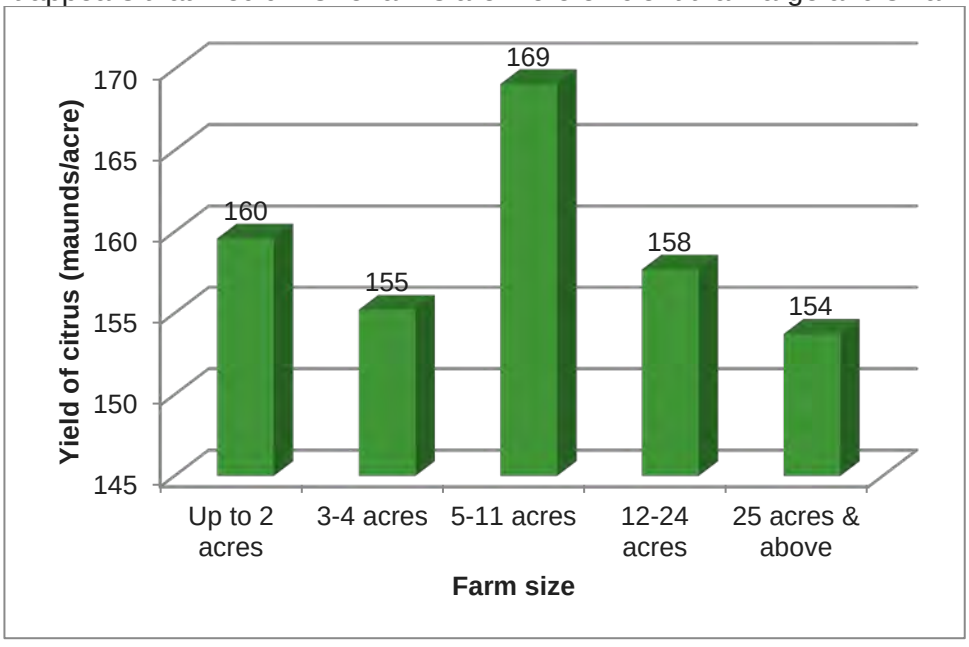

Figure 9 Yield of citrus vs size of farms

Number of crops in citrus orchards in a year

There were around 10% farmers who do not engage in inter-cropping and keep the orchards only for citrus production. However, a large number of farmers, i.e. 88%, inter-crop their orchards with one additional crop s and the rest 2% even use the area for two more crops other than the citrus.

The farmers involved in intercropping grow wheat and fodder in their orchards. These crops are being grown by 66% and 59% farmers for wheat and fodder respectively. These are grown for their livestock needs and to raise additional income from their land.

The extension department strongly recommends that no crop should be sown in the orchards for obtaining higher yield of citrus. As discussed above, a large number of farmers are in the practice of growing at least one additional crop on their orchards. Citrus yield comparison is given in Figure 10. It shows that farmers who are growing two crops have significantly lower yield of citrus. However, in case of single crop, there is no substantial difference.

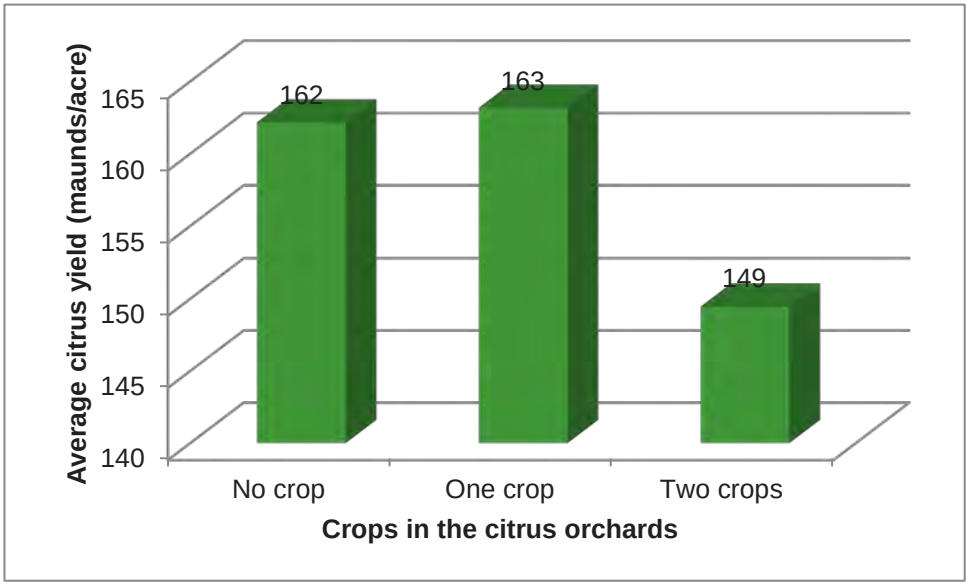

Figure 10 Yield comparison: number of crops in the orchard

Tractor ploughing practice in orchards

It is alarming to note that a high percentage of farmers i.e. 95.6% engage in 3-7 cycles of ploughing their orchards in a year. There were only 3% people who restrain from ploughing through tractor to avoid risking damage to their citrus plants. The data presents that ploughing by tractor is a fairly common practice in orchards.

Guidance for Farmer advisory messages:

It is a very common practice among the farmers to follow intercropping. About two third of the farmers are involved in such practices. A large number of farmers are growing two additional crops also. Intercropping creates several issues. Timings and quantity of irrigation needs of citrus plants significantly differ from other crops that are intercropped with citrus in the surveyed area. Hence, improper timing badly affects quality and quantity of fruits. Secondly, ploughing the fields for the crops may cause damages to the roots of citrus plants. Farmers need proper awareness / education on sensitivity of such issues.

Age of citrus orchards

There were 519 different orchards of different ages that were documented through the contacted farmers. The ages of 55.5% of these fall in the age bracket of 11-20 years. The other major slot fall in age category of 6-10 years comprising of 18.3% orchards and another 10.3% are even younger i.e. less than 5 years. The rest of the 15.8% are more than 21 years old, however, there was only one orchards aged more than 31 years which was the oldest in the whole lot of orchards under research.

The average yield per acre falls in the bracket of 50-200 maunds (2-8 tonnes) in most cases. For younger orchards, which were less than 5 years old, the maximum response came for 50-100 maunds yield per acre in 76% cases, 20% were managing between 101-200 maunds (4- 8 tonnes) and the rest 4% were only producing less than 50 maunds. For orchards between the age of 6-10, about 80% of the farmers recorded their yield falling within 100-200 maunds/acre. The rest, i.e. 19% were producing 50-100 maunds per acre in this age category. The reported yield for 11-15 year older orchards was quite in line with this previous category, bringing in 101-200 maunds in 83% cases, and 50-100 maunds in 10% orchards. However, there were some orchards that are producing amazing quantities, a couple of them even claimed more than 600 maunds/acre and 6 orchards have a produce of 201-300 maunds/acre. The data portrays an average of 101-200 maunds in orchards beyond 5 years of age, however, with more mature orchards the number of them producing more fruit increases. Therefore, though the average of 101-200 maunds maintained for around 81% orchards; there were 11 of them producing 201-300 maunds, and one each in consequent brackets of 301-400 maunds and 401-500 maunds and another getting more than 600 maunds yield. Similarly, for more aged orchards in the next categories i.e. 21-25 years and 26-30 years had more percentage in higher yield brackets. The only orchard aged 31-35 years was getting 101-200 maunds.

The overall results for yield present 82% orchards producing 101-200 maunds, 9% getting 50-100 maunds fruit and 7% falling in 201-300 maunds yield category.

Guidance for Farmer advisory messages:

Managing citrus plants of different ages require different type care and management. Proper care and management of the citrus plants can help in enhancing their life.

Total cost and income from orchards

The farmers were asked about the total cost they incur on their orchards. The maximum number of farmers, 56.3%, reported an expense of Rs. 30,001 – 40,000 per acre. Moreover, 30% people spend Rs.20, 001 - 30, 000 for the same purpose. There was negligible response in rest of the categories.
The respondents were also inquired about approximate income from their last year's crop. More than half, i.e. 55%, declared an income of Rs.100, 001 - 150, 000 per acre, and 28.5% told between Rs.50, 001 – 100,000. There was a total of 7 farmers who claimed to earn more than Rs.200, 000 per acre from their orchards.

Guidance for Farmer advisory messages:

The advisory messages should cater to the income levels of the farmers. Advice that is too expensive to implement is ignored/implemented partially by the farmers.

Distance of plants and average number of plant per acre

A large number of farmers i.e. 87% mentioned that they have an average of 91-100 plants per acre in their orchards. Moreover, out of the rest everyone has 71-90 plants except one farmer who has managed to grow more than 100 plants in the same area. A large majority of the orchards had 90-100 plants / acre (Figure 11). Nasir, Aziz, Mohar, Ahmad & Rehman (2006) found that plant to plant distance of 7x 7m produced juice concentration of 43 percent. Nawaz, Ahmed, & Jiskani (2008)

recommend that plant to plant distance should be 22 X 22 ft or 20 X 22 ft resulting in 90 and 99 citrus plants per acre.

In line with the response about the average number of plants in the orchards, there was almost unanimous response that the distance between the plants is maintained within 16-20 feet, substantiated by 98% farmers. Average number of plants/acre in Sargodha is about 92.

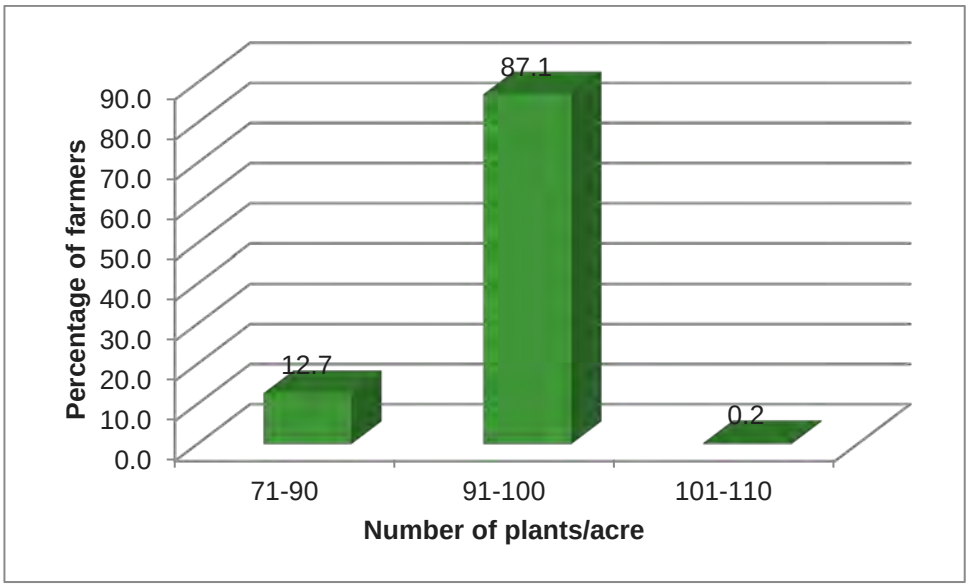

Figure 11 Distribution of farms vs number of plants /acre

Guidance for Farmer advisory messages:

Proper distance from plant to plant is very critical to the health of the orchards and production. Most of the farmers keep larger distances in between the plants only for creating adequate space for growing crops. Farmers can enhance their income by managing recommended plant to plant distance.

Ratio of canal and tube well water

The ratio of canal and tube well water is also quite promising, all the farmers receive at least half of the water required for their orchards from canals. About, half of the farmers use 70% of canal water and the rest 30% through tube wells. Another 34% manage to get between 60-70% canal water and more than 10% were fortunate enough to get more than 80% of canal water.

Share of canal water in the irrigation of citrus orchards is averaged at 67 percent (Figure 12). There is a significant correlation between the share of canal water in irrigation and the average yield of citrus (Table 13).

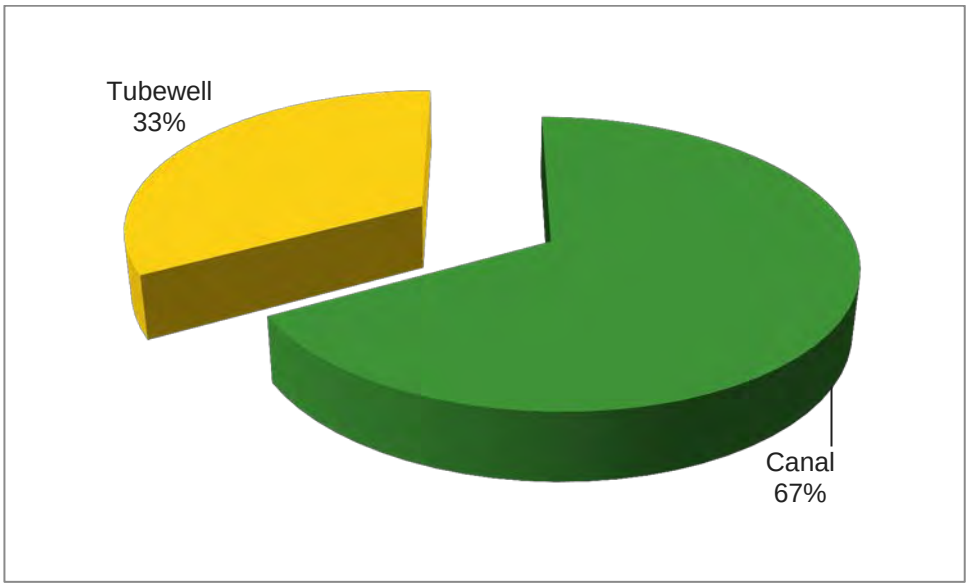

Figure 12 Sources of irrigation water for orchards

Table 13 Correlation between share of canal water in irrigation and citrus yield

		Total yield (maunds/acre)	Share of canal in irrigation (%)
Total yield (maunds/acre)	Pearson Correlation	1	.267**
	Sig. (2-tailed)		.000
	N	403	403
Share of canal in irrigation (%)	Pearson Correlation	.267**	1
	Sig. (2-tailed)	.000	
	N	403	403

**. Correlation is significant at the 0.01 level (2-tailed).

Distance of citrus orchards from head of water course

More than half of the orchards are placed within 1-2 km from head of water course. Moreover, 28% were found to be lying within a distance of 2-3 km from the source of water.

Land Preparation

Soil characteristics

The farmers were probed about their knowledge about the soil under citrus cultivation. However, 69% declined to have any such information. Of the 31% who claimed to know their soil, 77% perceive that their soil is deficient in Potash which is very essential especially for fruits. There is no evidence of laboratory analysis so this data is essentially based on perceptions and experience of the farmers. They judged their soil to be deficient in phosphorous and nitrogen. Moreover, high concentration of sodium salts was also reported by a reasonable number of farmers.

Farmers having knowledge about soil characteristics reported more yield than those having no such knowledge Table 14).

Table 14 Knowledge of soil characteristics and citrus yield

Knowledge about soil characteristics	Average yield (maunds/acre)	N	Std. Deviation
Yes	165.16	125	60.839
No	161.68	278	46.259
Total	162.76	403	51.175

Guidance for Farmer advisory messages:

Farmers who had knowledge of their soil characteristics reported more yield than those having no such knowledge. Hence, farmers' improved knowledge about the soil characteristics and the nutrition requirements, can boost their citrus yield.

Rating of the soil

Despite the perceived deficiencies in the soil being used for citrus cultivation, overall rating for the soil was above average. A large number of farmers, i.e. 68% consider it fertile and 30% rate it at "medium". There were only two framers who think their soil is very poor. However, their assessment is not based on any scientific knowledge. Fact is land degradation is becoming a serious threat to sustainable agriculture in Pakistan. According to Shah & Arshad (2006) about 61 percent of the agricultural land in Pakistan is worst affected. This shows that farmers seriously lack basic understanding of the quality of the soil and are mostly not aware of the significance of the issue.

Balanced use of fertilizers

The farmers consider themselves aware of the balanced use of fertilizers for their land. There were only 13 people who acknowledged lack of knowledge on this extremely important component of their agricultural practices.

Nursery Plants

Source of nursery purchase

The farmers are using unregistered nurseries to buy plants for their orchards. This response was received from 98% of them. There were only 7 farmers who grow their own nursery and only one farmer cared to buy from an approved registered nursery. None of them contact any citrus research institute for purchasing plants. Figure 13 shows that farmers who obtained nursery plants from certified nurseries had 62 percent more yield of citrus than those who purchased nursery plants from certified nurseries.

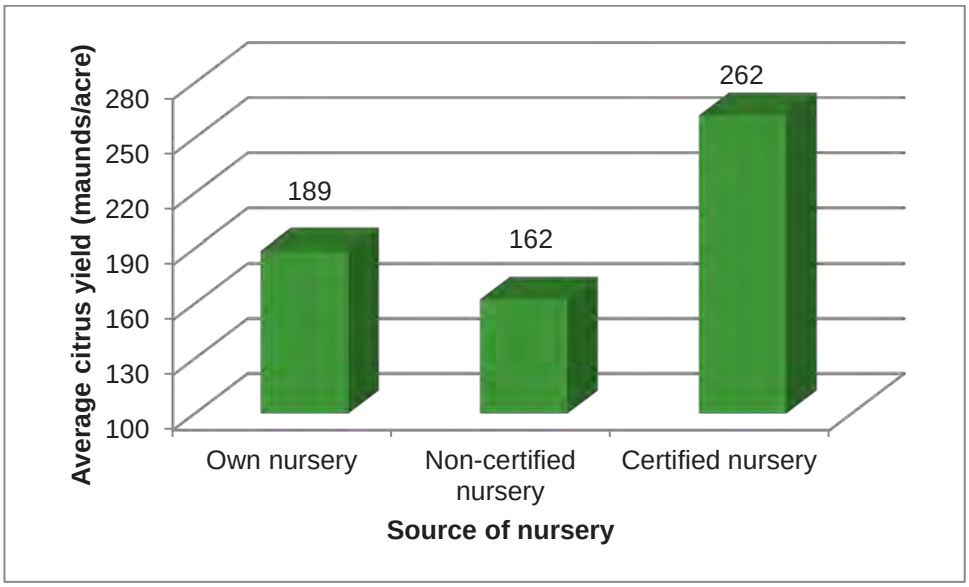

Figure 13 Average yield of citrus vs source of nursery plants

Important factors in nursery purchase decision

Yield was singled out as the most important factor that farmers take in to account when buying the nursery plants. Affordable prices and risk of disease are the other two elements considered before reaching the decision. Registered nursery was not acknowledged as an important factor and neither market returns influence the decision of the farmers. Perhaps, high quality fruit is considered for high end markets and is not considered as an attractive proposition for small and medium farmers as they can make the same amounts by offloading more quantities of lesser quality in the local and nearby markets.

Guidance for Farmer advisory messages:

Analysis suggests that large number of farmers obtain nursery plants from non-certified sources, whereas, results show that nursery plants obtained from certified sources give significantly higher yield. It implies that they need to be educated to purchase nursery plants only from certified sources.

Variety of citrus being used and yields

This area has a predominant concentration of “Kinnow” being grown by 98% farmers. Moreover, 38 farmers were also growing “Mousami” (a form of sweet orange; technically known as *C. sinensis*) and only 7 were engaged in cultivation of “Feutrells” (Mandarines). This query had a multiple response where a few growers are using more than one variety; however, the data shows Kinnow as the variety of choice.

The data reveals that there is no significant relation of variety on the yield. The results are very similar and therefore, one can safely assume that all the three varieties are producing matching yields.

Survival rate of plants in Citrus orchards

The survival rate of plants presents quite stable results; in 96% cases farmers reported 80% endurance in their orchards. The remaining 4% maintain that more than 70% of their plants are able to survive.

Guidance for Farmer advisory messages:

High mortality rate among the citrus plants is a serious source of concern for the farmers, which results in substantial loss for them. They need technical advice how to handle such problem.

Difference in requirements and sowing methods for different varieties

In case of citrus only 2% growers answered in affirmative, the rest 98% are not aware of any difference in requirements or sowing methods for various varieties of citrus.
The eight farmers, who maintained that the requirements differ with respect to various varieties, expressed their fair command on the subject. They perceive the degree of their knowledge regarding irrigation and nutrient requirements, disease control and pesticide application requirements for different varieties as fairly reasonable.

Satisfaction level with citrus production

The satisfaction index of the citrus growers bore average results; 72% rate the crop as “satisfactory”, 14% consider it “above satisfactory” and only 3% people marked it as a great experience. Out of a total of 403 farmers, 45 were displeased with their output, of which 5 farmers reported it as a disaster.

Table 15 shows that citrus growers who obtained nursery plants from certified nurseries are significantly more satisfied than other citrus growers.

Table 15 Source of nursery plants vs satisfaction with citrus production

Satisfaction level	Mean	N	Std. Deviation
Own nursery	2.8571	7	.69007
Non-certified nursery	3.0709	395	.62522
Certified nursery	4.0000	1	.
Total	3.0695	403	.62703

Type of rootstock to be used and methods of propagation

Only 30% of the farmers responded to this query; of these 28.5% take advice from common nursery growers. There were only 5 farmers who consider registered nursery growers to be authentic advisors in this regard.

None of the farmers responded towards methods of propagation used.

Guidance for Farmer advisory messages:

Selection of rootstock is also a critical decision for the farmers. Results reveal that the practice of obtaining guidance / information from rights sources like extension workers or experts is quite rare. In other words, empowering farmers with easy access to authentic and reliable source of guidance can help in improving quality and sale value of their fruits.

Pest Management and Weed Control

Weed control methods

A very high proportion of farmers, i.e. 88%, use tractor driven hoeing to get rid of weeds in their orchards. Moreover, 68% growers also use weedicides alongside other methods to fight this hazard to their production. There were only 7% people manually controlling the weeds and 15% mentioned hoeing to control the weeds.

Pruning of orchards

The frequency of pruning was observed to be once every 2-3 years. This pattern was being followed by more than three-fourth of the respondents. There were 23% farmers who believed in doing it more frequently and prune their orchards every year.

Guidance for Farmer advisory messages:

Pruning and trimming of citrus trees are important for maintaining their strength, vigour and health. Moreover such practices also affect the yield and quality of fruits. Timing, method and intensity of such practices are also very critical decisions.

Impact of killing beneficial insects on citrus

Three-fourth of the orchard farmers expressed that killing of beneficial insects bring an adverse impact on citrus. Only 7% of them do not consider this a negative element and the rest 17% showed their lack of knowledge about this phenomenon.

Guidance for Farmer advisory messages:

Farmers should learn how to promote the growth of beneficial insects .

Precautionary measures during pesticide spray

There was an almost absolute positive response to taking precautionary measures when spraying pesticides. Only one farmer denied using any precautions. A very high section of them, i.e. 92%, wear masks and around half of them cover their body. One-third of the farmers take note of the wind directions when spraying and keep it away from food products.

The time of pesticide spray was observed to be before noon by 61% people and another 27.5% also spray just before evening.

Incidence of disease attack and Canker in citrus orchards

The occurrence of disease in citrus orchards was informed as “considerable” by 64% farmers and 16% rate it as severe. There were only 20% respondents who rate the incidence of disease attack as low.

Moreover, they were inquired about attack of canker. It also brought similar response, where 62% think it is considerable and the category of severe lie at 24% which is one-fourth of the total sample. Ali (2007) believes canker to be the most threatening disease for citrus especially for Kinnow. Ali describes canker disease as follows,

> “Citrus canker is characterized by appearance of lesions on fruit, foliage, and young stems of susceptible cultivars of citrus. On leaves, first appearance is as oily looking, 2–10 mm, similarly sized, circular spots, usually on the abaxial surface. On leaves, stems, thorns and fruit, circular lesions become raised and blister-like, growing into white or yellow spongy pustules. These pustules then darken and thicken into a light tan to brown corky canker, which is rough to the touch...”

Canker is a bacterial disease and is caused by bacterium known as *Xanthomonas axonopodis*.

It is apparent from the Table 16 that there is negative and significant relationship between the incidence of diseases and the average yield of citrus, as well as between incidence of diseases and farmers satisfaction with citrus production business. It implies that gaining greater control on the diseases, yield can be significantly enhanced.

Table 16 Correlation between incidence of diseases and the yield and farmer satisfaction

		Average yield (maunds/acre)	Farmer Satisfaction	Incidence of disease on scale of 5
Average yield (maunds/acre)	Pearson Correlation	1	.389**	-.397**
	Sig. (2-tailed)		.000	.000
	N	403	403	403
Farmer Satisfaction	Pearson Correlation	.389**	1	-.342**
	Sig. (2-tailed)	.000		.000
	N	403	403	403
Incidence of disease on scale of 5	Pearson Correlation	-.397**	-.342**	1
	Sig. (2-tailed)	.000	.000	
	N	403	403	403

**. Correlation is significant at the 0.01 level (2-tailed).

Guidance for Farmer advisory messages:

Canker is a serious threat for the citrus fruits. It lowers down sale value of the fruits. Farmers need to know how to handle such situation.

Level of knowledge and control of pests

The respondents were content with their level of knowledge about various pests and insects of citrus, however, there were inhibitions regarding the level of control they managed to achieve. They had reservations on the level of control especially in case of citrus root nematode (Tylenchulus semipentrans)[7], Canker"[8] and citrus wither-tip disease[9]. The rest of the pests had a fair control as perceived by the farmers during their interface for this research.

Average level of knowledge of farmers in pest management in mere 2.64 on scale of 5, i.e. below satisfactory. Similarly, degree of control achieved over pests is also very low i.e. 1.73 on scale of 5.00.

Table 17 shows that there is positive and very significant relationship between knowledge in pest management and the pest control. Table 17 also indicates that there is strong relationship between pest control and average yield. It implies that pests can be effectively managed through enhancing knowledge of the farmers in how to manage pests, which in turn would help in enhancing yield.

[7] It results in gradual decline in yield and quality of citrus produce

[8] Citrus canker (technically known as Xanthomonas compestris. pv. citri) badly affects the citrus plants health and their fruit quality (Burhan et al., 2007)

[9] It causes twigs and affects branches, which appear like have been scorched with fire

Table 17 Correlation between knowledge in pest management and pest control

		Pest Control	Pest Knowledge	Total yield (maunds/acre)
Pest Control	Pearson Correlation	1	.560**	.170**
	Sig. (2-tailed)		.000	.001
	N	365	364	365
Pest Knowledge	Pearson Correlation	.560**	1	.106*
	Sig. (2-tailed)	.000		.043
	N	364	364	364
Total yield (maunds/acre)	Pearson Correlation	.170**	.106*	1
	Sig. (2-tailed)	.001	.043	
	N	365	364	403

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Knowledge regarding deficiency of nutrients

More than half of the farmers surveyed claimed to have complete or fair knowledge about Zinc and potash. Moreover, almost one-third of the farmers were found to be knowledgeable about nitrogen and phosphorous, whereas almost a quarter of the farmers contacted had knowledge of copper and manganese. About 60% of the farmers were familiar with Boron and Zinc as well.

The use of nutrients for improving yields observes the highest emphasis on zinc which was applied by 53% of the total sample of 403 farmers. The number of farmers using magnesium was found to be 29 which form around 7% of the total. There was even less response in rest of the categories.

Average of knowledge in application of major nutrients i.e. NPK is 3.35 on scale of 5.00, slightly above satisfactory level, while that for micro nutrients is 3.19. Moreover, results indicate that average citrus yield is positively and significantly correlated with knowledge in nutrients management (Table 18).

Table 18 Correlation between knowledge in nutrition management and yield

		Total yield (maunds/acre)	Knowledge in application of NPK	Knowledge in Micro Nutrients
Total yield (maunds/acre)	Pearson Correlation	1	.209**	.168**
	Sig. (2-tailed)		.000	.001
	N	403	403	403
Knowledge in application of NPK	Pearson Correlation	.209**	1	.892**
	Sig. (2-tailed)	.000		.000
	N	403	403	403
Knowledge in Micro Nutrients	Pearson Correlation	.168**	.892**	1
	Sig. (2-tailed)	.001	.000	
	N	403	403	403

**. Correlation is significant at the 0.01 level (2-tailed).

Guidance for Farmer advisory messages:

Farmers not only need information on the selection and application of fertilizers at appropriate times but also need information on availability and prices of fertilizers in the market.

Harvesting

Place of stocking citrus before shifting to storage

Only 16% farmers submitted their response to the query regarding place of stocking citrus before transferring it to storage. Most of the farmers place the fruit under shady places to avoid exposure to direct sunlight.

Grading of fruit

None of the farmers engage in mechanical grading of the fruit. These responses have been collected from small and medium farmers and many have not even registered their opinion for this question.

Cost of inputs per acre

Almost two-third of the farmers engaged in citrus cultivation, spend Rs.30,000-40,000 per acre. Moreover, 34% of these allocate Rs.20,000 -30,000 for the same purpose. The response was mainly split between these two categories and there was insubstantial numbers in other brackets of expenditures.

The major chunk of expenses for citrus farmers is diverted towards fertilizers followed by irrigation and land preparation cost. None of the farmers quoted expenses for grading, waxing and packing.

Problems faced during Citrus cultivation

The major inhibiting factors in citrus crop were explained as water issue. This was mentioned by 39% of the farmers. Moreover, the farmers further explained that tube well water is not suitable for orchards. The other issue pertains to fertilizers which were reported to be not available when required, it was also reported that markets are flooded with counterfeit and prices are too high. The citrus

growers also complained about the rates of their citrus produce. They cannot fetch appropriate prices for their produce which discourages them to invest heavily on their crop.

Guidance for Farmer advisory messages:

1. Farmers need to adopt water conservation strategies to minimize the use of ground water for irrigation purpose. They should consult the extension department for adoption of innovative technologies in conservation of water

2. They should get groundwater samples tested from the laboratories available at the district level

3. They should consult the experts of the Agricultural Marketing Department for making adjustments in the timing of the supply of their produce.

Rice Crop - Sialkot District

Rice is second major stable food crop in Pakistan after wheat. It accounts for 4.9% of the value added in agriculture, 1 percent of GDP (Government of Pakistan, 2012, p. 21) and about 10% of the export earnings of the country.

Water and Soil Tests

The farmers' survey did not show any evidence of the water and soil testing. The results are rather discouraging. Though the number of farmers who got their water and soil tested is also low in the other districts, the problem in Sialkot was found to be rather alarming where there was not even a single positive response to these questions-

Guidance for Farmer advisory messages:

Information on soil and water testing is important for the farmers to improve their yields.

Rice crop leaf test

The farmers were inquired about the rice crop leaf test; however, none of them had done this test as well.

Rice Crop Related Information

Total area under cultivation of rice crop

The research was focused on small and medium farmers, therefore, the sample comprise of farmers below 25 acres of land. The landholdings are generally small 395 out of 400 farmers - cultivated rice on their own land. Moreover, 41 farmers also acquired additional land on rent to augment their production..Out of the self-owned land, almost half fell below 5 acres of land, whereas 29% farmers had employed 6-10 acres of land for rice cultivation and 14% in the category of 11-15 acres. Out of the farmers engaged in renting land[10], 39% land fell in 6-10 acres and 11-15 acres categories each. Six of the farmers rented less than 5 acres for rice cultivation.

Rice yield per acre

Rice yield for last year crop ranged between 31-50 maunds per acre for 93% farmers. The farmers securing 31-40 maunds per acre were 57.3%, whereas 35.5% were able to fetch 41-50 maunds per acre. Twelve of the farmers contacted during the baseline research had a rice yield between 51-60 maunds per acre. On the contrary, 14 farmers could not push their yield beyond 20 maunds mark. Average yield of rice is Sialkot come to about 41 maunds (1.64 tonnes)/acre, with minimum of 10 maunds and maximum of 60 maunds.

Cost of inputs per acre

The farmers gave a detailed breakup of their expenses incurred on each acre of rice cultivation. Nursery costs them below Rs. 2000 per acre, and 59% even spend less than Rs. 1000 under this head. Land preparation costs vary between Rs. 3000 – 6000 for 95% of the farmers. The maximum number spend between Rs. 4000 – 5000. This amount was quoted by 46% of the farmers. Nursery transplant costs Rs. 2000 – 3000 for 95% respondents. Expense on fertilizers was noted as Rs. 5000 – 6000 by 85% rice cultivators, another 8.5% spend between Rs.6001-8000 and 4% mentioned Rs. 4000-5000.

[10] It includes both categories of farmers i.e. those who have their own land too and rent in additional land for rice cultivation, and those farmers who only rely on the rented lands.

The farmers reportedly spent below Rs.1000 on pesticides for each acre of their rice crop, a similar pattern was quoted for weedicides. The expenses have been quite uniform in most of the categories yielding very similar response for almost all the farmers. However, in case of irrigation expense farmers observed different patterns. Out of 400 farmers, 40% claimed to allocate Rs. 7001-8000, 17% mentioned Rs. 9001-10,000 and 16% spend even more than Rs.10,000 for irrigation purposes. This varies with the ratio of availability of canal water. The harvesting cost was reported between Rs.1000 – 3000 by 98% farmers.

Data on land rental was not properly reported by the farmers. Similarly, there were very few people who explained the expense on hired labor. The total costs per acre were calculated between Rs. 20,000 – 30,000 by more than two-third of the farmers, i.e. 68.5%. The other major category was observed as Rs. 30,001 – 40,000, which was being spent by 25% people cultivating rice. It should be noted that average wage rate in Lahore (provincial headquarter located near Sialkot) is Rs. 390/day (Government of Pakistan, 2012). This implies that per acre labour required in Sialkot ranged between 77 – 103 man-days.

Income from rice crop

The farmers were able to generate Rs. 40,001 – 60,000, as maintained by 77% farmers. Of these, 40.5% reported an income of Rs. 50,001 – 60,000 per acre of land under rice cultivation. Moreover, 8.6% farmers raise between Rs.60, 001 – 80,000 and 3% make even more than that. There were only 5.5% farmers who do not manage to get more than Rs.20,000 per acre from their land.

No of Canal and Tube well water

The farmers from Sialkot were complainant about access and availability of canal water. Most of this district lacks canal network especially the ancillary drains for agricultural purposes. They, therefore, have to largely rely on tube well for their rice crop. An overwhelming number of 88% farmers reported to use tube well water for 26-40 irrigation cycles. There were only 6% farmers who responded towards usage of canal water.

Distance of crop from head of water course

Unfortunately 88.5% farmers did not register their response towards this query as most of them do not have access to canal water. However, the maximum number of farmers reported a distance within 1-3 km. from the source of water.

Characteristics of soil under rice cultivation

Most of the farmers, i.e. 94%, denied any information regarding the characteristics of soil under rice cultivation. The 23 farmers, who perceive a familiarity with their soil, think that it is deficient in nitrogen, calcium and potash. These results are based on their personal judgment and are not backed by any scientific knowledge.

Guidance for Farmer advisory messages:

Only a small percentage of farmers know some characteristics of soil. Without such knowledge, many decisions like application of fertilizer etc cannot be made properly and hence the yield cannot be optimized. Moreover, farmers also need to learn symptoms of the deficiency of different types of nutrients. They also need to know when organic fertilizer should be applied and what other practices should be adopted like use of leguminous crops.

Rating of Soil

A majority of farmers in Sialkot district, known for its rice cultivation, consider the soil to be fertile. This satisfaction was expressed by 78% people, of which 7% rate it very fertile. Out of the remaining, 21%

consider the soil to be of average category and there were hardly 5 farmers who were displeased with the quality of the soil.

Laser aided land leveling

It is encouraging to notice that 30% farmers had performed lase aided land leveling in the recent past for their land.

Guidance for Farmer advisory messages:

Rice production involves the use of intensive water application. Studies (Tran, ud) suggest that one kg production of rice requires 4000-5000 liter of irrigation water. Requirement of water increase if land is not properly leveled. In order to conserve water and improve water use efficiency, farmers need information related with laser land leveling.

Nursery Preparation

Sources of nursery

The trend of raising own nursery is strongly entrenched in rice farmers, 95% of them do it for themselves and 5% get it from their fellow farmers. Only 3 farmers reported to use registered seed for their nursery.

Source of seed purchase

The pattern of using home kept seed is very strong in Sialkot district. A total of 78% farmer use their own seed for their rice crop, 12% get it from their nearby market places or dealers. Farmers also rely on each other for their seed requirement; therefore, 10.5% also get it from fellow farmers. None of the farmers contact any research institute for buying seeds.

Guidance for Farmer advisory messages:

Farmers need proper information and guidance on the selection of varieties and nursery plants. Only recommended variety should be sown. There are some varieties which are not recommended by the government e.g. 386, Super Fine, Kashmiri, Malta, Hero etc. Such information is needed to be provided to the farmers prior to the sowing time.

Methods of sowing

The response was extremely inclined towards one response and i.e. “Kaddu method[11]” being used by 94.5%. The remaining farmers use “dry method” or “Daab method” for sowing rice.

Factors important in deciding the variety of seed

The most prominent reasons for selecting a particular variety of seed for rice cultivation were reported as maximum yield and affordable prices. These factors impact the decision, however, the third element taken in to account is the risk of disease.

[11] According to Kaddu Method, prepare a solution by mixing 450 grams salt (sodium chloride) in 18 liter water. Then add and soak rice seed in it. Light-weight seed will rise to the surface of water. Simply remove all such seed. Take out remaining seed, wash it with water to wash away salts. Then soak it in simple water for 24 hours. Now take out soaked seed and keep it in a dry place in piles (each of 15-20 kg). Cover the piles with wet bags. Keep sprinkling water thrice a day to protect it from heat. It will be ready for sowing after 36 hours in plots each measuring not more than 10 marlas where water is standing there for last three days. Sow the seed by using broadcast method. It should be done in evening time. Next evening drain out the water from the plots and re-irrigate it in the following morning. This process should be repeated for one week.

Variety of rice being used

The most popular variety of rice was observed as “Super Basmati” being used by 98.3%. Moreover, 21% farmers use “386”, 5% grow “Supera” and 9 farmers rely on “Basmati 385”.

Time of sowing

The time of sowing ranged between May to July for various varieties. Super Basmati was found to be largely sown in July, endorsed by 97% growers of this variety. Basmati 385 was being grown in June by two-third of the respondents who reported to use this variety. June and May were the months for sowing “386” by 82% and 17% respondent, respectively. “Supera” was being sown in June 2012 by all the farmers.

Quantity of seed used per acre

The quantity of seed used per acre differed for various varieties. The maximum number of farmers sowing “Super Basmati” and “Basmati 385” use 8 kg of seed per acre. However, there was varied response for “386” and “Supera”, where the quantity ranges between 4 to more than 8 Kg. for “386” and mainly 5-7 kg for “Supera”. The recommended seed rate is about 5-6 kg for basmati varieties and 8-10 kg for coarse varieties.

Yield per acre for different varieties

The yield per acre was quite in line with the overall yields as discussed above. A noticeable relationship cannot be established between the kind of variety sown and yield; almost all the varieties had quite similar response.

Use of chemicals for seed treatment

None of the farmers in the rice region use any chemical treatment for their seeds.

Time for sowing seed for nursery

There was conformity on time of sowing for the rice farmers, 98% sow the seed for nursery between 1-19 May.

Guidance for Farmer advisory messages:

There is need for preparation of crop calendars for rice crop production in Sialkot, so that farmers are provided with critical information at the critical stages of the crop.

Transplantation of Nursery to Fields

Age of nursery at transplant stage

The farmers were inquired about the age of nursery at transplant stage, there was again quite uniform response reported for this. A total of 90% farmers transfer the nursery when it is at least 40 days old, however, 10% of them prefer to shift them during 35-39 days after sowing. Most of the farmers, i.e. 94% showed their satisfaction with timely shifting of nurseries. The remaining farmers attributed this delay mainly to labor problems and in a few cases financial constraints barred them from following the anticipated timelines.

Distance of plants in rice fields

An extensive response was received for 8-9 inches distance between the rice plants endorsed by 83% farmers. Another 11% maintain 10-11 inches between their plants and response in other categories was too meager to be meaningful.

Average germination rate

Farmers in Sialkot region are also able to get an outstanding germination rate; almost all the farmers mange to get more than 80% germination from their seeds. Moreover, two-third of these even get more than 90% success rate which is quite exceptional.

Average number of plants in rice fields

The farmers expressed their lack of knowledge about the number of rice plants per acre in their rice fields. There were only few who responded to this query; 9% think that there are approximately 50,000 – 70,000 plants per acre whereas 2.5% perceive them to be less than 50,000 on average.

Difference in requirements and sowing methods for different varieties

There were only 50 farmers who think that various varieties of rice require different handling in terms of requirements and sowing methods, especially in terms of irrigation and pesticide application requirements. They mainly stressed on difference in these two aspects of rice cultivation.

Guidance for Farmer advisory messages:

Farmers need proper awareness related with agronomic and other requirements of each variety for optimal results.

Pest Management and Weed Control

Weed control methods and success achieved

The rice farmers mainly rely on weedicides, crop rotation and simultaneous usage of both the techniques to fight against the weeds. The number of farmers using weedicides alone was 46%, whereas 32% used both the methods and 22% find crop rotation sufficient in dealing with the weeds. Out of the 400 farmers contacted during the research, 29% managed to have complete control over the weeds, however, the rest of the 70% reported only 51-75% success in fighting this hazard to the crop.

Guidance for Farmer advisory messages:

Weeds cause colossal loss to the rice crop in the form of reduction in yield from 25% to even 50% (Ahmed & Akhtar, 2011).

Perception regarding adverse impact of killing beneficial insects

Only 17% farmers agreed with the statement that killing the beneficial insects, during efforts to control other pests, bears a negative impact on the rice crop. More than half, i.e. 56%, people were not aware of this happening and 27% disagreed with the query or the statement?.

Precautionary measures while spraying pesticides

Precautionary measures are taken by nearly all the farmers when spraying pesticides. A fairly large number of them, 82% in rice region, wear masks and almost half of them were aware of properly covering their body before spraying the pesticides. The farmers also reported their awareness about keeping these away from children's access and food. However, there were only a few farmers in Sialkot who considered wind direction when spraying.

The farmers prefer to spray before noon, as reported by 83% of the respondents. There were 9% of them who spray afternoon and response in other categories was negligible. Usually experts recommend that spray should be done in early hours of morning for greater effectiveness.

Level of knowledge about pests and control thereof

The farmers were quite satisfied with their knowledge about various pests of their rice crop. They rated their level of knowledge as at least fairly reasonable and in many cases, farmers thought they had an expert knowledge of these pests. There was absolutely no response denying knowledge in this respect.

As far the level of control is concerned, more than two-third of the farmer maintained a fair control over all the pests. The rest of the response was split between complete control and somewhat control however, the number of farmers falling in the former category was lesser and 25-35% farmers reported as having only somewhat control over the pests

Guidance for Farmer advisory messages:

Plant protection is an area, where farmers frequently need information on how to identify symptoms of various diseases and on how to handle disease. Farmers need timely proper advice/guidance on how to control weeds.

Similarly, farmers also need proper guidance in how to control important diseases of the rice crop (foot rot / bakanae, paddy blast, bacterial leaf blight, brown leaf spot, and stem rot). Effective measures taken on timely basis can help in gaining control over the diseases.

Harvesting

Harvesting time

The usual time for harvesting the rice crop ranges between 8 – 10 am. Almost half of the farmers start harvesting at 9 am and the remaining were equally split between 8 am and 10 am.

Methods for harvesting

Manual method for harvesting is still being used by 46% farmers, 14% engage in harvesting through tractors and the remaining 40% make use of both the methods for harvesting their rice crop.

Almost all the farmers, i.e. 96%, were satisfied with timely harvesting of their crop.

Methods for clearing the roots of rice crop

A fairly high percentage of farmers, i.e. 70%, burn these roots and 58.5% also use deep ploughing method to clear off the roots from the rice field.

Advice for managing rice crop

The mechanism of consultation was found to be completely missing in farmers of rice region. The other regions were also deficient on building in a process of taking advice; however, there was absolutely no response in any category. The only source being used by some of the farmers is their fellow farmer network where they discuss issues related to seed selection, fertilizer application, disease control, plant protection, irrigation and soil related problems.

Level of satisfaction with rice crop

There was an average reaction towards this query. The number of satisfied farmers was 60%, further augmented with 4.5% highly satisfied ones. Therefore, two-third of the farmers fall in the contented class. There were 14% respondents who were quite displeased with their performance in the fields and 23% explained their response as “somewhat satisfied” which clearly depicts they would like to accomplish better yields.

Problems faced during rice cultivation

The problems being faced by farmers appear to be quite similar in every region and for every crop. The farmers from Sialkot also complained about “lack of canal water”, “unavailability and counterfeit fertilizers” and “unsatisfactory prices of their yields” as the major problems being faced by them.

Visits to extension office and workshops arranged

There were very few farmers who recorded their liaison with agricultural extension office for seeking their advice. Only 13.3 respondents have visited this office once or twice. However, 21.5% farmers acknowledged to have attended events or workshops arranged by the extension department.

Wheat - Vehari, Sialkot & Sargodha Districts

Wheat Related Information

Wheat is technically known as *Triticum aestivum L*. Wheat is the staple diet of most of the Pakistanis and hence it is very important crop in Pakistan from the perspective of food security. Besides, it contributes about 12.5% to the value added in agriculture and 2.6% of GDP (Government of Pakistan, 2012, p. 21). It is grown in almost all parts of the country, hence, livelihood of the rural poor. During 2011-12, it was grown on an area of about 8.67 million hectares and production exceeded 23 million tonnes with average yield of about 2.7 tonnes/hectare (Government of Pakistan, 2012, pp. 21-22). Total consumption of wheat in Pakistan hovers around 21 million tonnes.

Total area under wheat cultivation

The data reveals similar trends in Sialkot and Vehari where 78% of the farmers have used less than 10 acres of land for wheat cultivation in case of self- owned land, however, 83% of the rented land also fall in the same category in Vehari whereas farmers have largely rented 11-15 acres for wheat crop in Sialkot. In Sargodha, 99% of the self-owned and 100% of the rented land being used for wheat cultivation does not exceed 10 acres.

There is one more observation which needs to be reviewed. In Vehari and Sialkot, farmers' total land exceeds the land being utilized for wheat cultivation which reflects the usage of land for other crops as well. On the contrary in Sargodha, almost all of the total land is used for wheat crop. Wheat is grown even in the orchards. Such pattern of farming is called as intercropping.

Yield of wheat

A comparison of yield between the three districts clearly shows that Vehari was the best performing district for wheat crop. Average yield of wheat was about 40.20 maunds/acre in Vehari, 39.22 maunds/acre in Sialkot and 35.49 maunds/acre in Sargodha (Figure 14). The number of farmers producing 41-50 maunds/acre of wheat per acre form 33% of Vehari farmers, 21% of Sialkot and 15% of farmers from Sargodha district. Moreover, Sialkot was ahead of other districts in 31-40 maunds/acre category where 72.5% of its farmers had yields within this range. Out of the contacted farmers, 53% from Vehari and 41% from Sargodha had a yield between 31-40 maunds per acre.

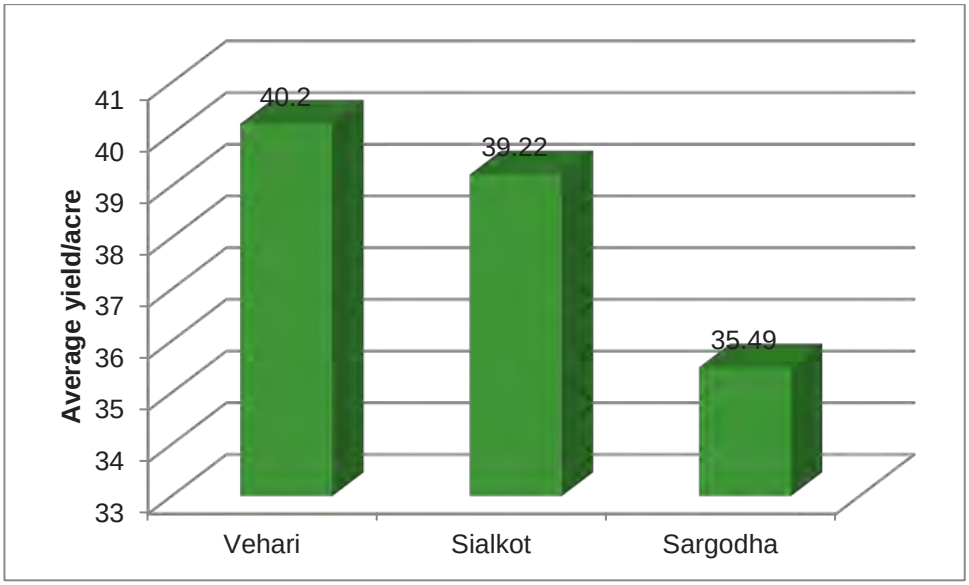

Figure 14 District-wise comparison of wheat yield

Yield-wise distribution of farmers of Vehari is shown in Figure 15

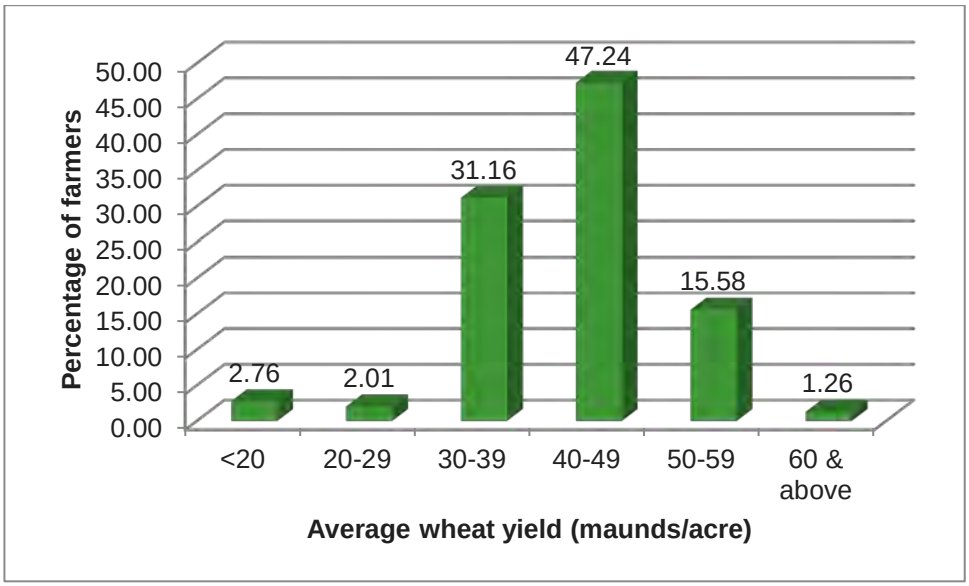

Figure 15 Distribution of farmers wrt wheat yield in Vehari

However, average wheat yield of small farmers in Vehari District is significantly lower than that of the large farmers. It means there is considerable potential for improvement in the yield of small farmers.

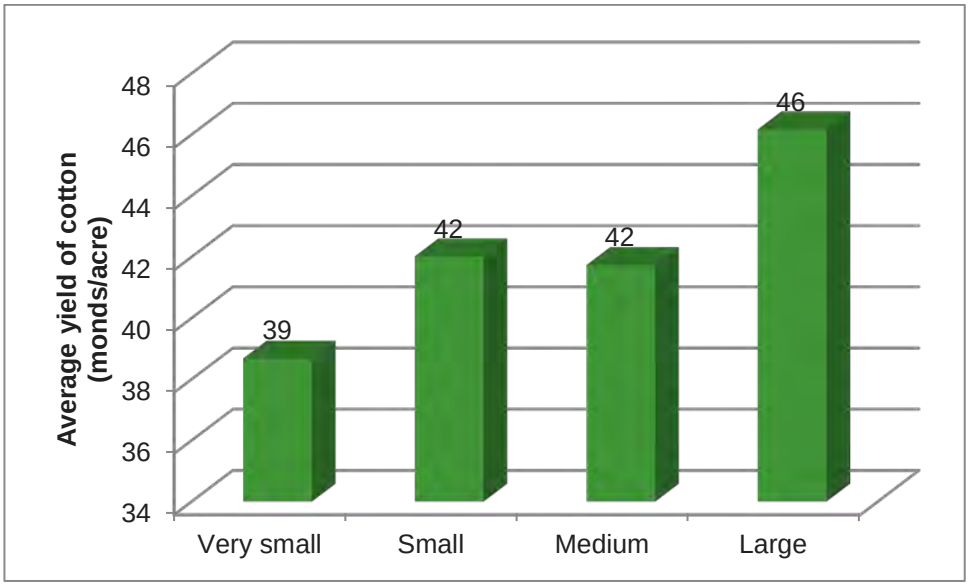

Figure 16 Average wheat yield for different farmers categories in Vehari

In a similar set of sample, 13 farmers from Sialkot and 18 farmers from Vehari could not exceed 25 maund yield mark, whereas in Sargodha 76 farmers had a yield below 25 maunds. Sargodha, therefore, remains the worst performing among the project districts for wheat crop.

Total cost of inputs for wheat

The data portrays that farmers in Sargodha and Vehari were spending relatively more on inputs than the farmers in Sialkot. The farmers spending Rs. 20,000 – 30,000 per acre towards inputs form 71% of total sample in Sargodha, 67% in Vehari and 41% in Sialkot. However, the percentage of farmers quoting an expense between Rs.10, 000 – 20,000 was observed to be 58%, 29% and 24% for Sialkot, Sargodha and Vehari, respectively. Therefore, a greater number of respondents from Sialkot fall in the lower expense bracket for inputs. There were few farmers who were allocating more funds towards inputs; most of them belong to Vehari region.

However, average cost of wheat production in Vehari is significantly higher than that in other districts (Figure 17). This pattern appears to be in conflict with above trend where farmers spending between Rs. 20000 – 30000 were slightly higher in Sargodha than in Vehari. This paradox is explained by the fact that in Sargodha, spending is slightly more skewed towards lower side.

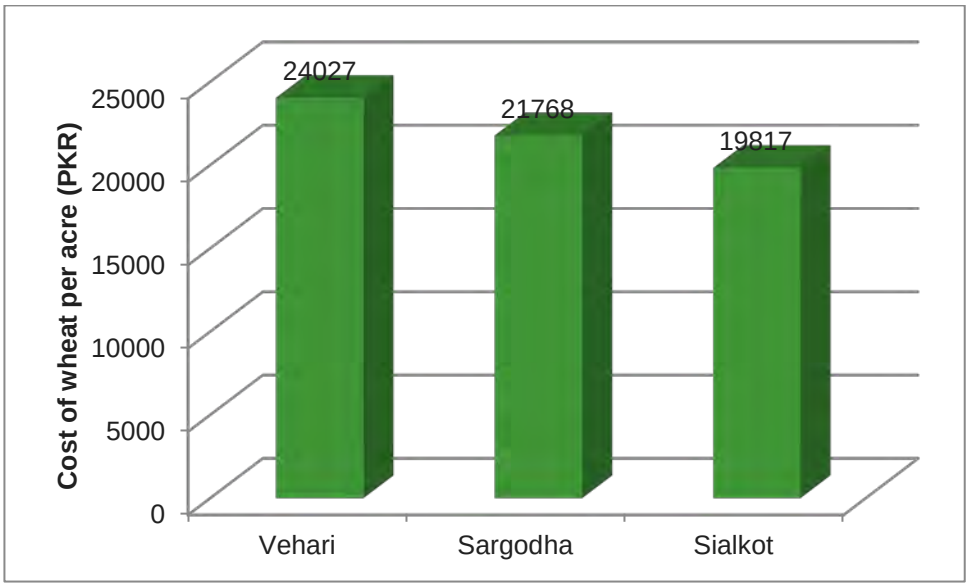

Figure 17 District-wise per acre cost of wheat production

Distribution of expenses on inputs

The graph below shows the distribution of expenses by farmers of Vehari on various inputs. Fertilizer is the major cost item in wheat production (31 percent), followed by land preparation and irrigation (each with 15 percent) and threshing (10 percent), as shown in Figure 18,

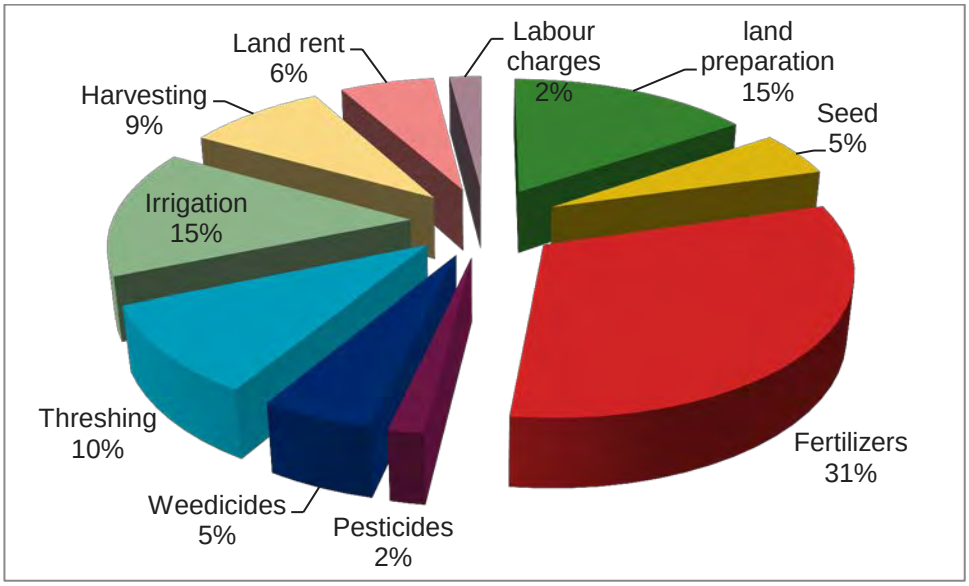

Figure 18 Cost of production of wheat (PKR 24,027/acre) in Vehari

In Sargodha too, fertilizer is the major cost item, rather with slightly higher share, in wheat production (34 percent), followed by land preparation (17 percent), irrigation (15 percent) and threshing (10 percent), as shown in Figure 19,

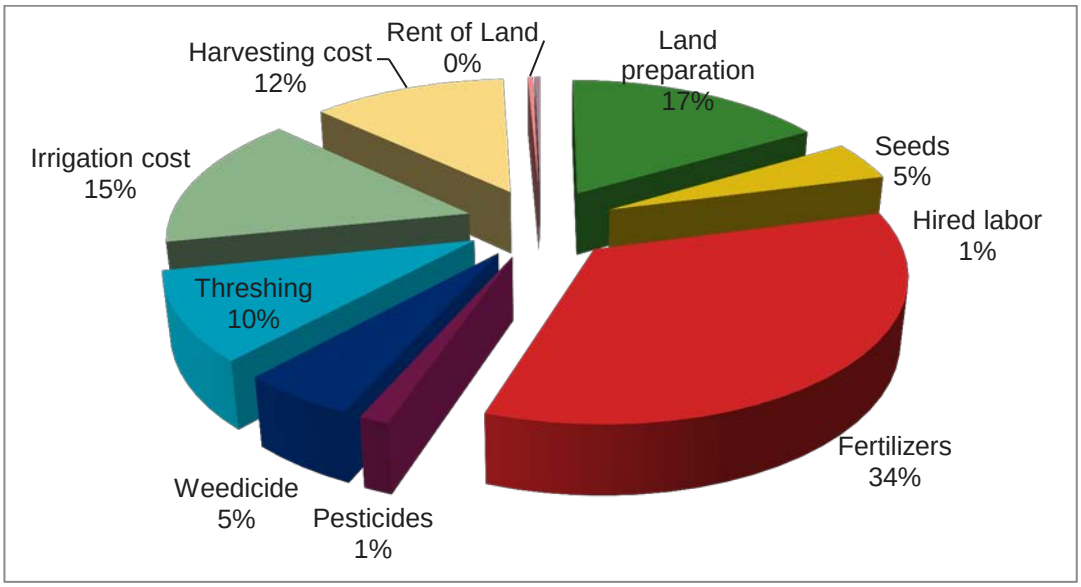

Figure 19 Cost of production of wheat (PKR 21,768/acre) in Sargodha

Fertilizer remained the major cost item for Sialkot, however, with slightly lesser share, in wheat production (30 percent), followed by land preparation and irrigation (each with 17 percent) and threshing (11 percent), as shown in Figure 20.

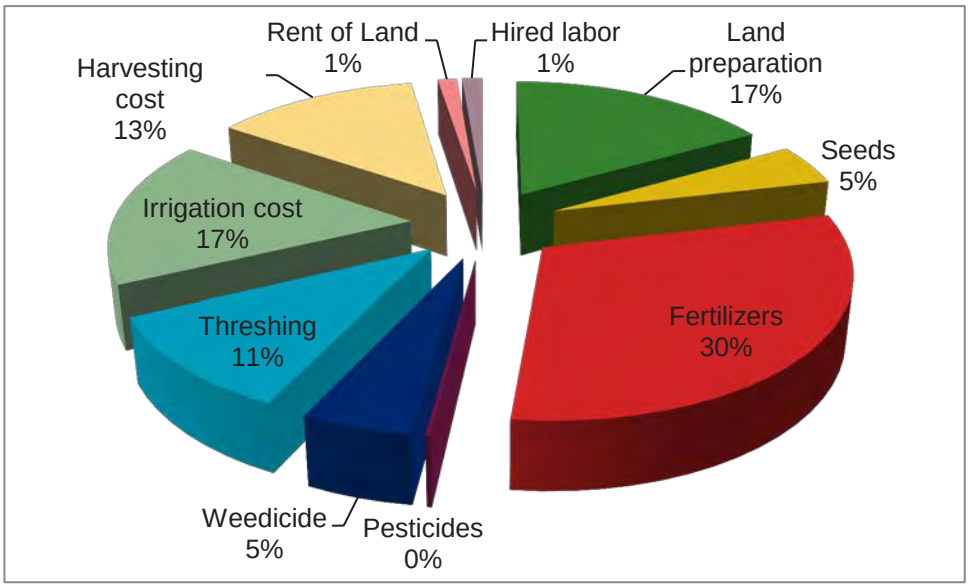

Figure 20 Cost of production of wheat (PKR 19,817/acre) in Sialkot

In Vehari District, cost of production of one acre is significantly lower in case of small farmers as compared to large farmers (Figure 21). Obviously, larger investment in wheat production results in increase in yield (Figure 16).

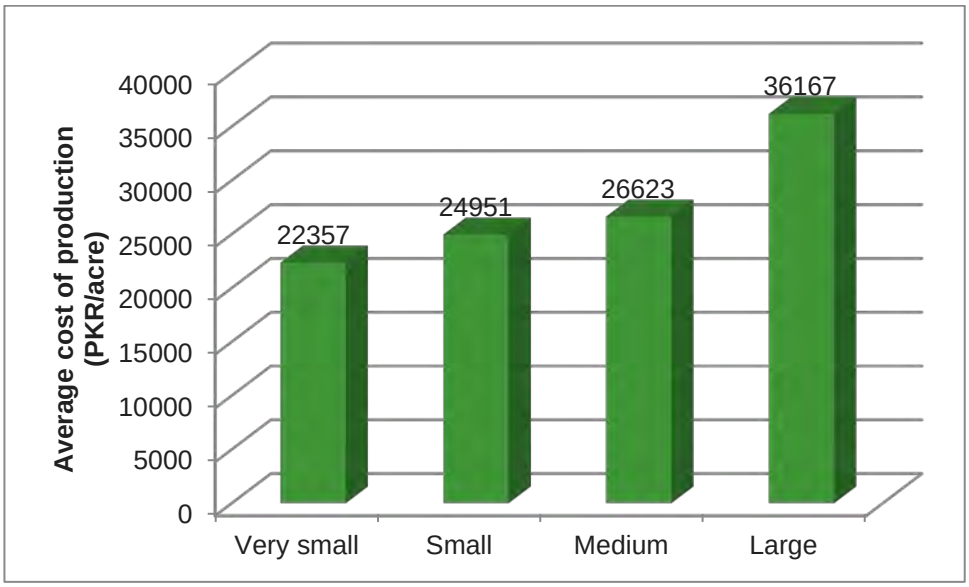

Figure 21 Average wheat cost of production for different farmers categories in Vehari

Income from wheat crop

The income from wheat crop presents that farmers from Vehari and Sialkot were able to fetch better income from their land. The data shows that 94% farmers from Sialkot, 86% from Vehari and only 58% from Sargodha were able to make more than Rs. 30,000 per acre from their wheat crop. A fairly large portion of the total sample, i.e.40% only makes Rs. 20,000 – 30,000 in Sargodha. Perhaps, it is due to the fact that cost of production in Sialkot is relatively on lower side.

Method of Sowing

There was no difference of practice regarding method of sowing adopted in all the three project districts. Almost all the farmers follow the method of wheat "Chatta" in dry land. There were 3 farmers in Vehari only who used drill to sow wheat.

Source of seed for wheat crop

The response to source of wheat seed brought similar practices in the project districts. The practice of using home kept seed is equally entrenched, 88-89% people using this source. Some of the farmers, however, also buy the shortfall from nearby dealers or fellow farmers.

Guidance for Farmer advisory messages:

Farmers remain concerned about the reliability of the source of seed. They need to be informed that certified seed is available with reliable sources like Punjab Seed Corporation.

Guidance for Farmer advisory messages:

Proper land preparation is essential for many purposes like water conservation, growth of seed, elimination of weeds, and maintenance of fertility and so on. Farmers always need guidance on this area.

Factors important in deciding the variety of seed

"Maximum yield" was the most important factor in deciding the variety of seed for their wheat crop in all the three districts. "Risk of disease" was the second most important factor followed by affordable prices in Vehari. "Affordable price" was more important for farmers in Sargodha and Sialkot than "risk of disease" as a deciding factors.

Varieties of wheat used

Varieties of wheat recommended by the government for the irrigated area include “Auqaab 2000”, Punjnad-1, Manthar 2003, Ufq 2002, Sahar 2006, Shafaq 2006, Farid 2006, Pasban 90, Inqalab 91, Mairaj 2008, Lasani 2008, Faisalabad 2008, Bhakar 2002, Aas 2011, Milat 2011, and Punjab 2011 (Ali, 2011b).

The farmers in Vehari preferred “Sehar”, “Watan” and “Inqalaab 91” used by 70%, 27% and 11% farmers, respectively. There was negligible response in rest of the categories of wheat. However, the popular varieties in Sargodha were found to be “Faislabad”, “Bhakar”, “Inqalaab 91” and “Sahar”, being sown by 34%, 24%, 16% and 12% respondents, respectively. The reported varieties differ in all the three districts. The respondents from Sialkot claimed to use “Inqalaab 91”, “Sahar”, “Punjab 96”, “Auqaab 2000”, “Chenab 2000” and ‘Paras 2009”. The first two varieties were being used by 39% and 17% respondents; however, the remaining varieties were being used by 8-9% farmers in each category. The Extension Department suggests that varieties of Sahar 2006, Aqaab 2000, Inqalaab 91, and Bhakkar 2002 should be grown on very limited scale, as these varieties are infested with diseases.

Guidance for Farmer advisory messages:

Each zone has different recommended varieties of wheat crop. Yield potential for each crop is different. Hence, some farmers quite often remain in search of high yielding varieties. They need easy and quick access to some reliable sources for guidance.

Varieties like Sahar 2006, Aqaab 2000, Inqalaab 91, and Bhakkar 2002 should be grown on very limited scale, as these varieties are infested with diseases.

Quantity of seed used

The farmers in Vehari predominantly use 50 Kg. per acre for all the popular varieties being used in this district. The ratio of seed used was quite similar in Sialkot, where most of the farmers put 50 Kg. seed for each acre of land especially the farmers using “Sahar”. However, almost 40% of the farmers opting for “Inqalaab 91” and “Bhakar” also mentioned relatively lesser seed quantities ranging between 40-50 kg per acre. The seed per acre usage varied in Sargodha, it ranges between 40-50 kg. for “Sahar”, “Watan”, “Inqilaab” and “Faislabad”. However, in case of “Bhakar” 21% farmers reported using only 35 kg for each acre of their land.

Guidance for Farmer advisory messages:

Quantity of seed requirement varies with respect to variety and timing of sowing. It is usually a complex decision. Farmers need proper guidance and timely information in this respect.

Time of sowing wheat

The farmers from Sialkot region were found to be most diligent in timely sowing of wheat crop; 26% of them were able to conclude their sowing by mid-November and 70% make it by the end of this month. Most of the farmers finish this exercise by mid-December, with 39% achieving the target of mid-November, another 31% by end of November and 27% completing it by mid-December. The most delayed sowing was noticed in Vehari where only 18% were able to hit the target of mid-November, and one-fourth of them even surpass mid-December as well.

More than 90% people in all the three districts were satisfied with the time of sowing they maintain, the farmers of Sargodha were the most satisfied with 97% people endorsing their level of contentment with the time of sowing.

The few farmers who expressed their displeasure with the time of sowing pointed out financial constraints and unclear fields for delay in sowing wherever applicable.

It is recommended that wheat sowing should be completed by the mid of November (Ali, 2011b). Delay in sowing of wheat after mid-November leads to decline in the potential yield of wheat by about 15 kg per day. However, Figure 22 shows that only 18 percent of the farmers could complete showing within the recommended time. Similarly, Figure 23 shows that about 60 percent of the farmers in Sargodha could not complete sowing of wheat in time. However, Figure 24 shows almost all farmers in Sialkot completed sowing well in time. It implies that there is substantial potential for improvement in Vehari and Sargodha districts.

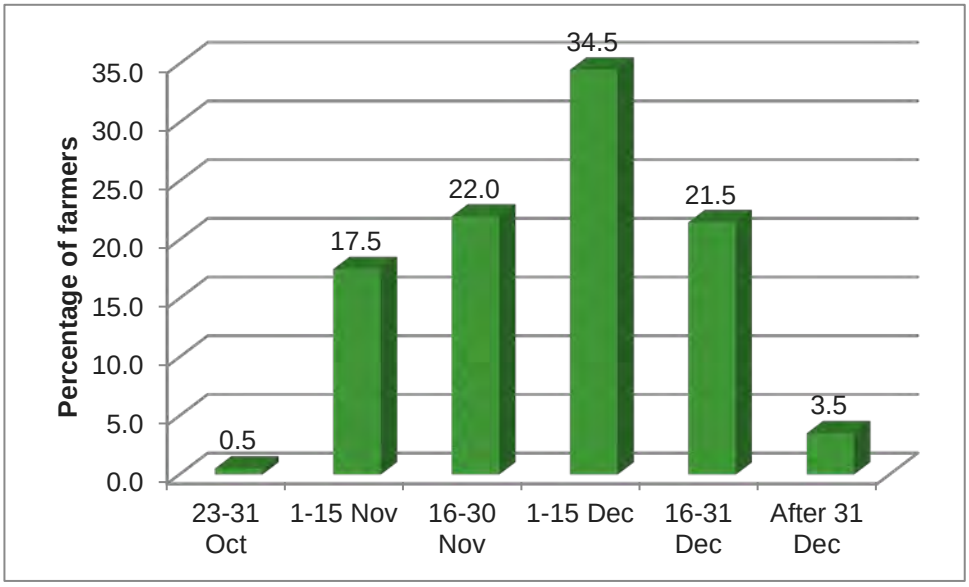

Figure 22 Time of wheat sowing followed by farmers in Vehari

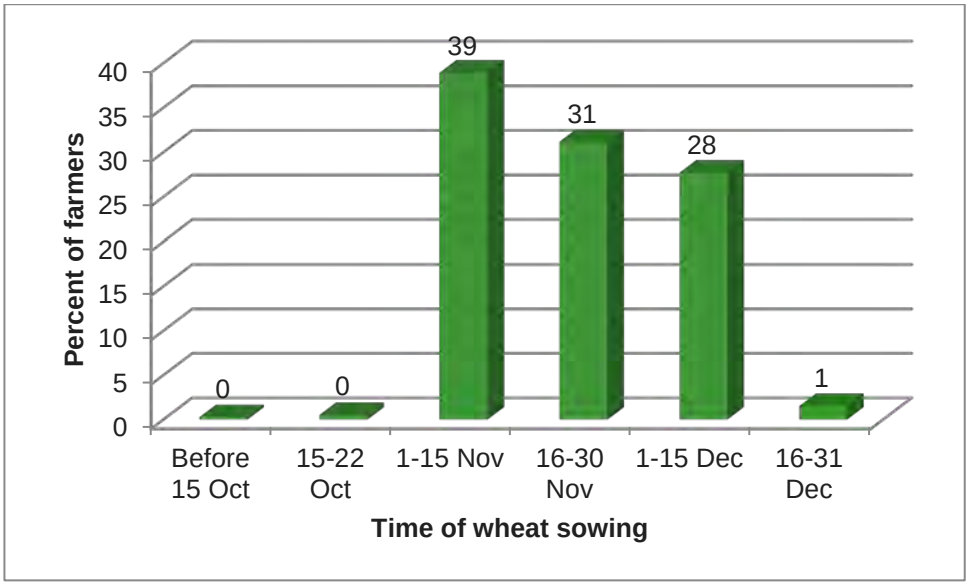

Figure 23 Time of wheat sowing followed by farmers in Sargodha

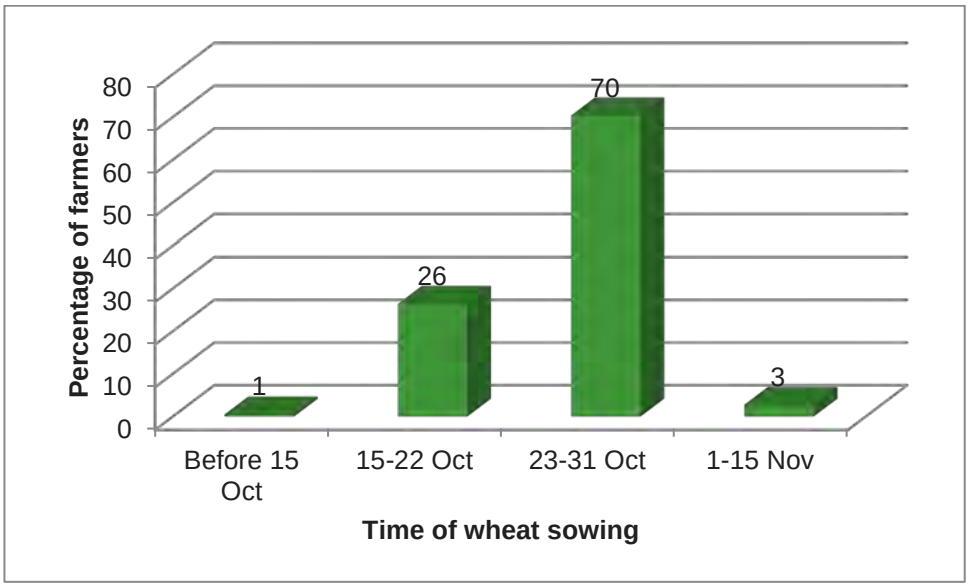

Figure 24 Time of wheat sowing followed by farmers in Sialkot

Guidance for Farmer advisory messages:

Mid November is the critical threshold on account of sowing of wheat. Each day delay in sowing of wheat crop, thereafter, causes decline in the yield by 15 kg. However, in practice large number of farmers is not aware of the criticality of such timings.

Average germination rate

The results for average germination yielded best results from Sialkot district where 94% farmers reported to achieve a germination rate of more than 80%. The similar milestone was achieved by 84% farmers in Sargodha and 66% from Vehari. In Vehari, 30% farmers record 70-80% germination rate for their wheat crop.

Seed grading practices

Seed grading practices differed between Vehari and the other two districts. This practice was being followed by approximately half of the farmers whereas in Sialkot and Sargodha only one-fourth farmers perform seed grading.

Seed treatment

It was quite astonishing to notice that none of the farmers in Sialkot and Sargodha reported treatment of their wheat seed with chemicals. There were only 9 farmers from Vehari who use chemicals for treating their wheat seed. The 9 farmers, who treat their seeds, use “Confidor” (imidacloprid), “Python” and “Amedeo” for this purpose. The farmers who recorded their response for the quantity of chemical used, mentioned 400 grams for 40 kg of seeds as an appropriate dosage for seed treatment. Two of the farmers, however, only use 100 grams for the same quantity.

The farmers who treat the seeds, were able to explain that this practice protects the plant from fungus attack and improve the germination rate of the seeds.

Guidance for Farmer advisory messages:

In order to improve germination rate, farmers can adopt multiple measures like selection of healthy and clean seed, seed grading, treatment of seed with fungicides etc.

Difference in requirements and sowing methods for different varieties

Most of the farmers disagree with any difference in requirements and sowing methods for different varieties. There were only 20 farmers from a total sample of 1203 who think that different varieties require different treatment with respect to sowing methods and other requirements.

The farmers who believe in differing requirements of varieties of wheat think that the difference lies in irrigation requirements and nutrients requirements.

Use of water at tillering stage

The crop of wheat attains maturity in about 160 days. During this period, the crop passes through some critical stages, irrigation at these stages plays vital role in determination of yield. Such stages include tillering, boot stage, grain formation and dough stages (Gill, 2012).

Tillering stage is a critical stage in wheat production. At this stage, application of irrigation is strongly recommended. The practice of irrigation at tillering stage was not found to be followed by many of the farmers. The maximum response came from Vehari where 30% respondents use water at this point in time. However, the data revealed merely 17% and 9% farmers involved in this practice in Sargodha and Sialkot, respectively.

Grain formation stage

The practice of water application at grain formation stage was found to be followed very rigorously in all the three districts. The ratio of farmers validating this practice was 99% in Vehari, 98% in Sargodha and 93% in Sialkot.

Guidance for Farmer advisory messages:

Irrigation of wheat crop at critical stages has a profound impact on the yield. Such stages include tillering stage, grain formation and dough stage.

Pest Management and Weed Control

Methods of weed control, their efficacy and damage caused by weeds

Weeds cause decline in wheat yield by 14-42 percent. They don't only cause damage to existing crop but also badly affect the quality of seed obtained through the current crop (Gill & Sattar, 2011). The farmers extensively rely on use of weedicides to combat weeds from their crops. The use was fairly common in all the three districts, substantiated by 86% usage in Vehari followed by 77% each in both Sialkot and Sargodha. The second most common practice to control weeds was reported as crop rotation, mentioned by 31% people in Sargodha, 30% from Sialkot and 25% from Vehari. Tractor driven hoeing was only being used in Sargodha to control weeds by 10% wheat farmers. Manual method was not found to be popular in this respect; the maximum response came from Vehari where 7% farmers use manual method in conjunction with other methods for weed control.

Despite the usage of all these different techniques for weed control, complete control is attained by only 10% farmers in Vehari, 9% in Sialkot and a mere 1% in Sargodha. Almost all the remaining farmers were able to achieve 51-75% control over weeds. The number of farmers reporting less than 50% control was highest in Vehari where 44 farmers fall in this category. However, there were only 7 such farmers in Sargodha and 4 in Sialkot.

All the farmers were aware of the fact that weeds reduce their yield of crop. Moreover, 41% farmers from Sialkot, 30% from Sargodha and 11% from Vehari also mentioned that weeds become breeding places for harmful insects and therefore, uncontrolled weeds aggravate the incidence of pest attack.

There were few farmers who mentioned that weeds also become a shareholder in all the nutrients, water, air and sunlight essentially required for the crop.

Guidance for Farmer advisory messages:

Weeds cause significant loss to the crop. Timely control is necessary. Similarly, farmers also need information related with gaining control on diseases like karnal bunt of wheat[12], smut etc., which can be proactively controlled through treatment of seed with recommended chemicals.

Perception regarding adverse impact of killing beneficial insects

Most of the farmers appear to be unfamiliar with the adverse effect of killing of beneficial insects along with pests when pesticides are used. Two-third of the farmers in Vehari, 59% from Sialkot and 45% from Sargodha mentioned their unawareness with the topic under discussion. This belief was not found to be very popular among the farmers in Vehari where only 6% think it impacts their crop and the rest 27% do not believe in this. Moreover, the response in Sargodha was equally split between the believers of adverse impact and otherwise, endorsed by 27% farmers in each category. In Sialkot, 18% farmers recorded their concern over the killing of these insects which eventually has a a negative effect on wheat crop.

Number of pest scouting for wheat crop

Pest scouting was generally done once during the wheat cultivation last year. This response was substantiated by 66% respondents from Vehari, 71% from Sialkot and 77% from Sargodha. The farmers who did not indulge in this practice formed 16% of the sample in Vehari, 13% in Sargodha and 24% in Sialkot. However, a number of more vigilant farmers was observed in Vehari, where 14% people scout their fields for pests every month and there were 15 more farmers who reported pest scouting even more frequently.

Level of knowledge and control for pests

The farmers in all three districts believed they had very good knowledge of the common pests confronting their wheat crop. They were very comfortable with the degree of knowledge and there were hardly 2-3% farmers in all the districts who claimed to not having or having very little familiarity with these pests.

Pest control figures are closely aligned with the farmer's judgment about their level of knowledge. Therefore, very few farmers expressed their disappointment with their degree of control over these pests. Most of them think they were able to fairly control all of these pests, some opined to have "somewhat control" and there was a noticeable presence of farmers registering complete control, especially in case of Vehari.

Usage of Boron and Zinc

The number of farmers using Boron and Zinc was insubstantial, only 7 farmers reported it. The farmers who used these nutrients applied them after sowing and the quantity used was 3-4 kg per acre. The response was too meager to use the results to determine trends in quantity of use.

Harvesting

Methods of harvesting

Manual harvesting was found to be still the more practiced method. The manual method was most prevalent in Vehari where 81% farmers follow this practice. Similar method was being used by 77% farmers in Sargodha and 63% in Sialkot. Use of tractor for harvesting was more extensive in Sialkot

[12] Karnal bunt of wheat is caused by the smut fungus Tilletia indica. It is spread by spores.

than the other districts, with 42% farmers relying on this. There were only 22-23% farmers in the other two districts who use tractors for harvesting wheat.

Satisfaction level with wheat output

The data shows that around two-third of the respondents expressed their satisfaction with their output of wheat, in all the three districts. However, the satisfaction level was slightly higher in Vehari 72% were satisfied and another 7% rated themselves to be highly satisfied. The range of farmers who were "somewhat satisfied" fell between 20% in Vehari to 23% in Sargodha and 27% in Sialkot.

Problems faced during wheat cultivation

As pointed out for other crops, farmers cultivating wheat in Vehari also complained of water issues, fertilizer unavailability and counterfeit products flooded in the market, and problems in getting "Baardaana" (jute bags meant for storing wheat). Almost similar set of problems was registered from farmers in Sialkot who criticized about lack of canal water, high prices of inputs and difficulty in obtaining "Baardaana". However, interestingly the farmers from Sargodha maintained a different stance and the most frequent problem related to "lack of information" which they think is the biggest impediment during wheat cultivation. Moreover, they also raised fertilizer issues, unavailability and counterfeit pesticides??, and "Baardaana" issues.

Visits to extension office and workshops

There were very few farmers who reported visits to extension office; 17% farmers in Vehari had been to agriculture office once or twice. The ratio was even lower for the other two project districts; 4% in Sargodha and 7% in Sialkot. This presents the facts for farmer's reliance on agricultural department for seeking advice. The reach for events and workshop arranged by the extension department was slightly better, with 17-19% farmers admitting to have attended any of the events from all the three districts.

Conclusion: Guidance for Farmer advisory messages:

Farming has increasingly become a very technical enterprise. Farmers have to take decisions which must be right and be taken at right time. In other words, farmers need to shift to informed decision making from conventional mode of decision making. However, farmers lack easy and quick access to critical information / guidance needed at critical stages of crops.

Critical stages for each crop are different. However, some critical areas are common among all four major crops of the target districts:

- How to prepare land?

- Selection of a variety

- Selection of seed

- Timings of irrigation

- Weeds control – proactive and reactive measures

- Plant protection – proactive and reactive measures

- Purchase of fertilizers / nutrients

- Care of fruit

- Harvesting

- Marketing of produce

In short, if farmers are empowered with easy and quick access to much needed information at critical stages of the crops, they can easily and substantially improve their earning and earning capacity.

Rural Women --- Some Insights

During the baseline survey it was found that women's participation and knowledge about agriculture varied among three districts. The women were found to be working at the lower end of the workforce. Hence most of the women could not respond to the questions in the baseline survey. Therefore a different strategy using a qualitative approach was designed to understand the role of women. The following feedback will help in understanding the role and status of rural women in the project area.

Education of the respondent and Head of the household

Most of the respondents from Vehari had never attended school. Most of the heads of the households (male) had less education, only a few had passed matriculation examination.

Education trends were not very progressive in Sargodha, women were not educated but neither were the men. There was hardly any respondent who reported that their men attended school for a few classes.

However, education of the respondents and head of the household revealed relatively better trends in Sialkot. There were quite a few respondents who were able to read and write to some extent and their head of the households were matriculate (having 10 years schooling). In a few cases, the household women were having bachelor degrees.

Children's education

The children (both boys and girls) in Vehari in general attended school. There were very few cases where the children did not attend school. This was a healthy sign that at least people in this area were aware of the importance of educating their children. However, it was noticed that children usually drop out when they reach teenage and do not achieve further education. Children start work after fifteen years of age and none of the respondents reported children studying in grade 8 or beyond.

The trends in schooling were not very healthy for children in Sargodha. Some of them were going to school but the dropout rate was very high. The financial pressure on children to start earning does not let them complete the middle school.

Children of the respondents in Sialkot did attend schools. There was a drop out trend in Sialkot but it was relatively better than the other project districts. There were very few respondents who were not sending their children for schooling.

Occupation of Head of the Household

In 90% cases, the male head of the household in Vehari worked as daily paid labour, mostly in agriculture sector. Some of them either own landholdings, usually small in size, or have rented land or work for other landlords. A few respondents reported that their head of the household work in some other districts for better remunerations and one of them was running a small retail outlet.

The occupation of head of the household in Sargodha was mainly as labourer in agriculture sector. They were involved in all kinds of agricultural labour.

Men in Sialkot district were actively engaged in factory jobs due to industrial activity in this region. There were quite a few women also who mentioned that they were working in factories which are longer term/permanent work compared to shorter term and non-permanent work in agriculture. They reported that agriculture labour is relatively under paid and tougher than factory jobs. The factory owners arrange for their transport to and from work. These facilities make these jobs more attractive and lucrative for them

Household responsibilities being shared by women

Women in Vehari cater to their household responsibilities on a sharing basis with other women in the household including daughters, mother, mother-in-law, sister(s)-in-law, sisters, and so on depending upon the family structure. Family type is generally a joint family system so there is sharing in every respect. They do the cleaning, cooking, washing, dropping off children to school, attending family festivities, and other related household chores. However, they cannot do tutor their kids which is understandable due to almost negligible literacy rate in this area.

Women in Sargodha also maintain their household responsibilities except their children's educational responsibilities where they lack the capabilities. They handle the rest of the household obligations.

Women in rural areas of Sialkot district take responsibility for all kind of household tasks other than tutoring the children. One of the reasons for this trend is their lack of education to guide their children for educational assistance.

Pattern of decision making

The decision making pattern in Vehari is heavily skewed in favour of women in the household. The response was almost unanimous for women holding the power to run the house and take major decisions of the household. The respondents maintained that they do discuss with their partners; however, they have dominance in deciding the household matters.

The women in Sargodha were relatively less resourceful and had limited decision making. They did not have opportunities to work, they wanted to work but the general pattern here was different than the rest of the areas. Therefore, they did not have any personal earnings and they did not have much say in their household decision making either.

The pattern of decision making lies with women in Sialkot for household activities and major decisions are taken after joint consultation.

The bigger landlords (i.e. big land owners) had their families settled in urban areas and their pattern of living and handling affairs was not in line with the typical rural women of the project districts. However, the focus of the research was mainly the women from relatively marginalized farmers, small and medium, actually residing in rural areas.

Financial handling

In line with the pattern of decision making in day to day household matters, women in Vehari asserted that irrespective of the financial kitty they have, they are the ones managing it. They complained about the resources and some of them took it as a negative point as they are forced to manage within a limited budget. They reported that whatever they earn, if they do, is spent towards household expenses.

Women in Sargodha were handling the daily finances for their households but their means were very limited. They find it very hard to manage the household expenses within the budget granted to them. However, they were in charge of the everyday financial management.

Women in Sialkot were handling the money matters for their daily affairs; however, the major financial decisions are taken by males in consultation with the women in the household. In joint families the mother-in-law generally leads the house. This pattern was so strongly rooted that where the mother (-in-law) handles the financial affairs, the sons who are the major earners of the household would also abide by the decisions taken at the highest level.

Knowledge about agriculture related matters

Women in all the three districts expressed their knowledge skills for land preparation, crop cycles, harvesting, manual weed controls, livestock management and the like. They were not very familiar with more technical aspects like seed varieties, fertilizer selection, pesticides, weedicides, financial management of the agricultural activity and marketing the produce.

Whether informed regarding agriculture related matters

The respondents from Vehari told that the males in the household share agricultural related matters with them in most cases. They admitted the fact that they only possess information regarding crop cycles, seed grading, seed treatments, land preparation, water management, harvesting, and the like, however, they lack knowledge related to fertilizers, pesticides, weedicides, where to buy seed, seed varieties, and other technical information. Therefore, the males only keep them in loop in most cases and take their advice in rare cases where they are not qualified enough to comment.

The respondents interviewed in Sargodha mostly belonged to households of small landholdings. The farmers with bigger landholdings maintained their family houses in nearby cities particularly for the education of their children and other facilities. Women from small landholdings worked alongside their male counterparts to avoid hiring outside help. Therefore, they are part of the agricultural activity themselves and are informed of all the developments.

The women in Sialkot also reported a similar response. Men involve women of the household where they expect valid input; however, in technical matters they take the decisions themselves. The women maintained that in most cases, their male counterparts keep them posted about the agricultural decisions taken.

Personal occupation other than agriculture

None of the women in Vehari was involved in any occupation other than agriculture related.

Some of the respondents from Sargodha reported that they work as domestic help but that is not a permanent job here and they are hired on an ad hoc basis. A few mentioned different activities like candle making and other crafts to raise some money. They also take care of livestock on commercial or sharing basis.

Sialkot is an industrial city and hence it provides options for varied jobs in factories. This is a relatively more affluent area and buying power is higher than other districts of the project. Some of the respondents were also working in factories which offer permanent jobs, as against seasonal trends in agriculture, transport and lighter work when compared with the rugged weather conditions in the fields.

Agriculture activities engaged in

The women in Vehari were engaged in light agricultural practices like harvesting, tobacco strings for drying, hoeing and rice transplant. Moreover, they were also responsible for livestock handling. Almost all the respondents had livestock, some of them had their own and others had these on a sharing basis. They further maintained that they do not get much opportunity to work and earn. They were not satisfied with the compensation they get in return which is very little to attract them to work.

The respondents from Sargodha who worked in the family owned fields were engaged in almost every step of the crop from land preparation, manual weed control, sowing, transplanting, harvesting, etc. They, however, do not get involved in water management, fertilizer and pesticide spraying. Women work in agriculture on their family land but there are not many options for women as hired labour in agriculture in Sargodha.

Women in the Sialkot region were mostly involved in vegetable picking, packing vegetables in sacks, land preparation, manual weed control, and other lighter activities related to crops. They were also managing livestock which is by far considered as women's domain of work.

Maintenance of livestock and its related work was the common factor in all the three districts. As discussed earlier, this is mainly considered as women's responsibility. They keep their own animals and do it on "sharing or caring basis" for others to raise additional resources and by products.

Compensation for work

The rates for cotton picking range from Rs.6 -10 per kg and it varies on the capacity of the worker and hours of work employed. There were women who made up to Rs.500 a day after eight hours of work. However, the women mostly reported earning between Rs.100 – 150 per day for cotton picking after working for 4-6 hours. Some of them claimed to make only Rs.40-50, but this is for shorter hours. However, in the last one year, situation slightly improved as cotton picking wage rate increased to Rs. 12/kg due to shortage of labour and production of a bumper crop.

The women involved in rice transplanting reported earnings of Rs. 250 per day and the ones engaged in tobacco drying make Rs.150 a day.

The women in Sargodha rarely work as hired labour for agriculture. The women who work as domestic help reported that they get compensated with Rs. 100 a day. A few women who were engaged in seed grading, fodder cutting, vegetables growing and manage livestock for others reported to make Rs.200-250 after doing a variety of jobs. Moreover, there were some of the respondents who make candles and other crafts. These women make around Rs.1500-2000 a month.

The women working in the factories get around Rs.5000-6000 per month and they consider it a permanent job where they get some additional facilities (like transportation etc.) as well. The ones working on the agriculture side reported to get Rs. 70 for one shift of 4 hours in the morning and Rs. 90 for evening shift of 4 hours again for vegetable picking. The rate increase per year is Rs.10. Moreover, one of the women in a supervisory position gets Rs. 90 for morning shift and Rs. 90 for the evening shift. The rate for hoeing range between Rs. 150-200 per day and for packing the vegetables (potatoes and corn) in sacks was Rs. 150 per day. The average earning was reported as Rs.2500-3000 depending on the number of working days employed.

Financial empowerment

There are no issues pertaining to financial empowerment, women take charge of the financial resources and manage these all by themselves. In most cases, women were handling day to day affairs of the household including the financial side. Men get involved in agricultural related issues and bigger matters where they jointly reach the decisions. However, agriculture is the only domain where men take the major lead and just keep the women in informed where necessary.

This pattern was prevalent in all the three districts, with lesser extent in Sargodha. However, the general behaviour presents women to be quite empowered financially.

Time spent on different activities

The working hours for women in Vehari appear to be fairly relaxed. The household chores are managed jointly with all the women in the household. The women working in the fields work for relatively shorter hours. Some of the women work on need basis i.e. whenever they are short on cash, they work for a few hours. Moreover, some of the women from lower socio-economic background work as domestic help on a temporary basis; this would be as and when required basis. The overall impression of the women in Vehari was lack of passion for laborious work. They clearly maintained that it was hard to work in the fields in hot weather and they choose to work only for three to four hours, and that too only a few days in a month. There were very few women who permanently work full time in Vehari district.

The respondents, however, do maintain the livestock. Some of them have their own livestock and the rest keep it on a sharing basis. The number of animal kept was also very limited in most cases.

The women in Sialkot were the most professional; some of them even work in the factories. The women involved in agriculture related work for their own fields or as labour for other landlords. These women work hard and mentioned two shifts of work, four hours each in the morning and evening. They were managing household responsibilities alongside their work.

Sargodha had a mixed trend; household tasks are a must for rural women though they generally do it on a sharing basis due to joint family structures. The women work on their family agricultural land to overcome the need for hired labour, however, they complained of not having work prospects to earn and add to their pool of funds. They work as domestic help but those are not permanent jobs in rural areas.

Phone facilities

Landline facility has declined in rural areas since mobile accessibility became more reachable. There was no availability of landline phones, in certain areas the national network closed its operations due to very low number of clients which become unfeasible for them to cater. Therefore, people in rural areas rely on mobile phones for their communication needs. Each household had at least one cell phone, mostly owned by the male members. There were hardly few cases where women had a shared cell phone at home for reaching out their male counterparts at work or else.

The pattern for telephone usage and ownership was quite similar in all the three districts.

Mobile ownership

Mobile ownership maintained a similar pattern in most rural areas where it is regarded as a man's prerogative to keep cell phones. There was a very clear trend that each household at least had one mobile, however, it was predominantly owned by the male members of the house. The women interviewed mostly were not literate and were not able to report any accessible cell number. The respondents who gave numbers had written down on a piece of paper or saved these in some relative's cell phone.

It is considered against the social norms for women to carry mobiles and they use the phone on need basis. The women residing in areas close to the city or landlords having their families in the urban areas had a different pattern. The women living around urban centres owned cell phones and had a totally different approach towards its usage. However, even the women belonging to affluent families in rural areas denied access to cell phones rather they reported it as a taboo for women. A wife of a big land owner in Sialkot said

> ***"Yahan mard kehtay hain aurtoon ko mobile ki kia zaroorat hay aur***
>
> ***aisi aurtoon ko theek nahi samajhtay"***

(Men in rural areas argue that why women need a cell phone and consider that the women (of the area) who possess one as having a loose character)

Another women who was a widow and used to work in a supervisory position for agricultural labour, said

> ***"Main beewa aurat hoon, main mobile kaissay rakh sakti hoon,***
>
> ***her koi meray kirdaar par unglian uthai ga"***

(I am a widow so how can I keep a cell phone? I will have to face character assassination if I keep one.)

An interesting observation came from women in Vehari, which was further verified from other sources. The respondents interviewed for this research included some younger girls in this district who had attained an age of 23-24 years or even crossed that but were still unmarried. They reported that lack of financial resources is the biggest impediment in their getting married. A few women admitted secretly keeping cell phones and some others who reported not to have access to mobiles were quite familiar with various functions of the cell phones. It seems like a common practice to secretly keep unreported cell phones, mostly used by the younger group of women in Vehari. Moreover, although the women in Vehari denied having cell phones many of them were holding mobile sets during the interview sessions which they claimed belonged to some other member of the family.

Frequency of mobile usage and number of calls

In absence of the landline facility in the rural areas, mobile use is fairly common in Vehari. Every household has at least one cell phone, mainly owned by the males. Women use these numbers whenever they need to get in touch with their family or relatives. They claimed a very low usage of cell phones, only a few calls in a week. The few women who claimed to have a family cell phone or personal phone, told that they use it for getting in touch with male members of the household.

Mobile ownership rests with males and women hardly use this facility in Sargodha. They use the phones of their head of the household to make any necessary calls. The frequency of calls was reported as only a few calls per week.

Sialkot follows the same trend however; it is different in areas closer to the urban centres where women were keeping separate cell phones and were well conversed with its usage despite their uneducated backgrounds. However, the rural women consider it a taboo to have cell phones. One of the respondents who were working at a supervisory level for agricultural labour; has to contact her fellow workers for arranging the required number of women in the fields. When asked about her ways to manage this, she explained that she maintains a list of contact numbers for these women and gives these to the farm manager / munshi who would let her use his mobile to reach these women. She was a widow and was very conscious about her reputation which according to her would be “shattered” if she carries a mobile phone. The cell phone usage was limited to a maximum of a couple of calls a day and that’s too on requirement basis.

Mobile usage awareness and knowledge (use of cell phone functions)

The elderly women in Vehari were only aware of how to take an incoming call; most of them were able to locate numbers from the phone books. This was despite the fact that none of the women was educated, but they tend to recognize numbers using some kind of symbols. The relatively younger group of women was also able to listen to music but none of them was able to use the message function as they were all uneducated. The younger women in Vehari were much more conversant with various functions than the rest of the two project districts.

The women in Sargodha were not much familiar with various functions of the cell phone. They were familiar with the green and red buttons to receive the call and end the call. The knowledge was limited on the same pattern as the mobile ownership itself.

Mobile usage awareness was limited to taking calls and number search in some cases in women from Sialkot. None of the women reported to use other functions like messaging, downloading or listening to music. This is more so as none of them owns a mobile and they use it only for socializing with the family on a limited scale.

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