

The enhancement of citrus value chains production in Pakistan and Australia through improved orchard management practices

Citrus project team



Department of
Primary Industries



ACIAR
aciar.gov.au



Project Objectives

- 1. To improve nursery production practices and introduce germplasm to extend the marketing season**
- 2. To demonstrate 'Best Practice' orchard management focussing on crop management and irrigation management**
- 3. To enhance research, extension and production capacity of Pakistan citrus institutions and industry**

Project sites in Pakistan

- 1. National Agriculture Research Centre, Islamabad**
- 2. University of Agriculture, Faisalabad
(Punjab province)**
- 3. Citrus Research Institute (CRI), Sargodha
(Punjab province)**
- 4. Agricultural Research Institute (ARI), Tarnab
Peshawar (KP province)**
- 5. Fruit and Vegetable Development Project
(Extension – Punjab province)**

Project Teams

Australia

Dr Tahir Khurshid (Project Leader)

- **Steven Falivene (Crop management)**
- **Nerida Donovan (Nursery management)**
- **JeremyGiddings (Irrigation management)**

Project Teams

Pakistan

Dr Dr Iftikhar Ahmad (Project Leader)

Dr Hafeezur Rehman (NARC)

Dr Abdul Samad (ARI)

Dr Ghulam Nabi (ARI)

Mr Nisar Naeem (ARI)

Dr M Jaskani (UAF)

Mr Altaf ur Rahman (CRI)

Mr Abdul Rahman (CRI)

Akbar Hayat (CRI)

Ahmed Raza (CRI)

Asif Khan (FVDP)

Tauseef Tahir (Project officer, Punjab)

Wajid Ali (Project officer, KP)

Objective 1

To improve nursery production practices and introduce germplasm to extend the marketing season

Vision/outcome – Expansion of harvest window with new varieties and to enhance industry efficiency and export opportunities

New Citrus germplasm

**Problem : industry reliant on one variety
with narrow production period**

- **Extend production season**
 - **Expand market opportunities domestic & export**

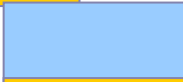
The expansion of production window

Nov Dec Jan Feb Mar Apr May Jun

Ryan Navel



Daisy mandarin



Salustiana



Cara Cara (red)



Arnold Blood



Harvard Blood



Kinnow mandarin



Mc Mahon seedless

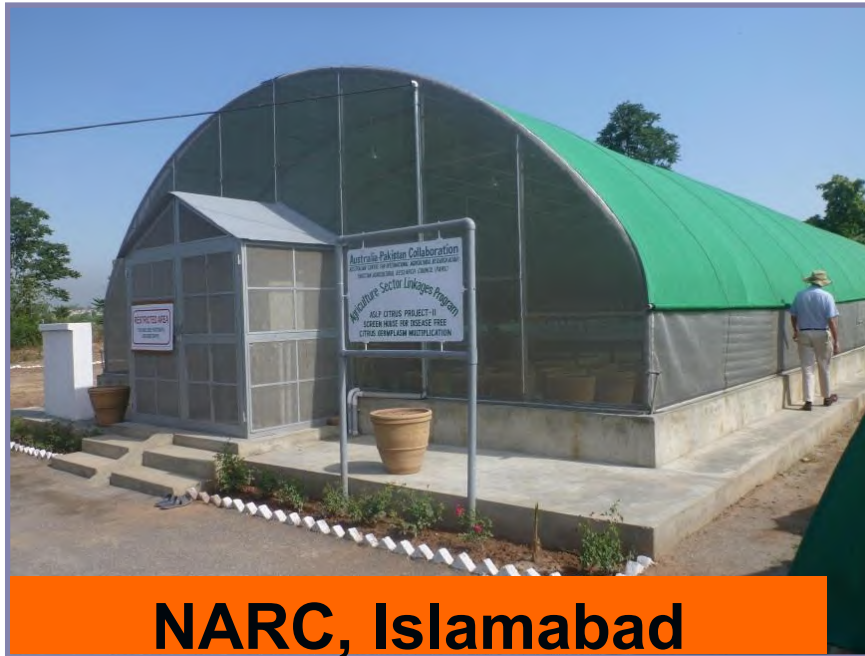


Nursery Management

Problem : unhealthy trees at planting and mature tree dieback

- Insect proof screen house
- Nursery training: growing healthier trees

Screenhouse completed at 3 sites



NARC, Islamabad

- CRI – Sargodha
- ARI – Peshawar
- NARC - Islamabad

Outcomes

- Propagation from mother trees in clean environment
- Industry nursery is based on clean budwood



CRI, Sargodha May 2012

Nursery management training (494 trained)



Nursery outputs and outcomes

- **7** new varieties & **8** rootstocks established
- **7** key private nurseries provided new budwood
- 8 mother blocks for varieties and rootstocks established
- 3000 planted/reworked at grower at properties, nurseries and mother blocks
- **3** GPUs in Punjab and KP were provided with germplasm from Australia
- 19 nurserymen/woman trained in Thailand and



Commercial Outcomes

Sultan Nursery Farms, Sargodha



Commercial Outcomes

Provide 50% discount for screenhouse construction

**Fazal Malik Nursery
Sherkhana, KP**



Agri-business support fund (ASF; US Aid)

- Sohail Aftab, Kot Momin, Punjab (completed)
- Latif-ur-Rahim (KP) has submitted his application



**Latif-ur-Rahim's
nursery, KP**



Objective 2

'Best Practice' orchard and irrigation management

Vision/outcome –

Improve yield and returns for growers

- *Improved production practices to reduce fruit blemish and obtaining higher fruit prices*
- *Increase yield by raising plant density*
- *Improve irrigation management and reduce water stress*

Crop phenology

Problem : lack of crop phenology knowledge and its application

- Phenology calendars developed; growers trained in phenology and posters distributed

Outcome

>15% growers has started to practice management practices in their orchard



Tree pruning

Problem : Pruning is not a common practice

- Encourage new healthy branches
- Improve fruit quality for higher returns
- Reduce crop load and alternate bearing

Training provided in tree pruning

- Jan 2013 – Feb 2015



**> 498 growers
trained**

**Pruning is being widely
adopted among growers**



Fruit thinning

Problem : alternate bearing - high crop load of small fruit followed by low crop next year (low returns)

Reduce alternate bearing

- Thinning trials
- Crop load estimate training ARI & CRI
 - Identify a high crop load to take action

107 trained



Good quality & size

2010 - trees thinned



2011 - trees unthinned, high crop load, poor size



2012 - no crop due to high 2011 crop

Reworking

Problem : long time to change & assess new varieties

- Grafting new variety on a mature tree
- Quick to grow new tree for variety assessment and higher fruit production

Practical reworking workshop for growers



470 trained



Irrigation management

Efficient use of water to :

- Reduce water usage
- Reduce root disease (waterlogging)

- Short term : furrow irrigation
- Long-term : pressurised (sprinkler, drip)

604 trained

On-farm furrow irrigation



Furrow irrigation



Flood irrigation

Treatment	Yield (kg)/tree	Mean fruit size mm	Gross returns/acre (Rupees)	Gross returns/T	Gross returns/T difference
Furrow	121	70	529,412	37,200	7300
Flood	98	66	344,272	29,900	

Nutrition management

Problem : Lack or poor knowledge of citrus nutrition

- Improve efficiency of fertiliser use and application (reduce costs and healthier tree)
- Improved soil salinity management (productivity)

Nutrition workshops



225 growers/ extension officers



High density orchards

Problem : Low tree densities and lower yields

- Increase density will increase yield

Growers high density orchards at KP

Converted grower

- From 288 (conventional) to 555 trees/ha
 - Interplant trees

New orchard

- 494 trees/ha

High density site: Punjab

**DEMONSTRATION BLOCK
HIGH DENSITY
CITRUS FRUIT PLANTATION**

FARMER NAME : **M. ILYAS WARAICH ADVOCATE** VILLAGE : **83 S.B SARGODHA**
AREA : **1 ACRE** MANAGEMENT PRACTICES : **5.OCT.2011**
NO. OF PLANT : **172** (18(ROW TO ROW) X 14' (PLANT TO PLANT)) VARIETY : **KINNOW**

WITH THE COLLABORATION OF :
**FRUIT & VEGETABLE DEVELOPMENT PROJECT PUNJAB +
CITRUS PROJECT, AGRICULTURE SECTOR LINKAGE PROGRAMME
(AUSTRALIA + PAKISTAN)**

SUPERVISED BY: DEPUTY DIRECTOR AGRICULTURE (F.V.D.P) SARGODHA.

Fine Art 3710148



Established orchard converted to HDP

New Orchard



Growers high density orchards in Punjab

Site 1 - 440 trees/ha



Site 2 - 740 trees/ha



Best practice & quality payment

Aims

Increase farm gate returns to grower

- Produce more A grade quality fruit by improving crop management
- Paid on volume of quality fruit

Locations

3 X Punjab & 2 X KP



Best practice & quality payment

Method

- Best practice management on one ac grower block

Results

- 33% improvement in A grade fruit
- 25% increase in income (contract payment)
- 50% increase income (quality payment)

**> 1860
growers trained**



Linkages to other projects and programs

- ASLP Social science project
- UNIDO
- Flood rehabilitation project (KP)
- Commercial nurseries in KP and Punjab
- ASLP Mango project - Nursery
- Agriculture training institute, Sargodha
- Agri-business support fund (ASF)
- FSC&RD

Objective 3

Research, extension and production capacity of Pakistan citrus institutions and industry

Vision/outcome –

Trained personnel to continue the professional development of the industry

- *Pakistani scientist and extension staff*
- *Research outputs extended to growers*
- *International training institute linkages*

Project visits (2011-15)

11 Australian team to Pakistan

6 Pakistan staff to Australia, Thailand and Spain

55 Pakistan staff (Scientists, extension officers, growers, nurserymen, nurserywoman, postgraduates)



Publications/conference(2011-15)

12 papers presented at the ISHS, Brisbane

2 papers presented at the ISC, Spain



- **Farmer Field Days technology transfer**
 - 4 field days: **900 growers**
 - Mega field day (May 2012): **500 growers**
 - UAF field day : **200 growers**



Citrus grower's conference, 9-10 May 2012



Day 1 : 200 participants

Day 2 : 150 participants



10 Postgraduate students linked to citrus project



Fareeha Shirin



Nergis Fatima



Sadia Afzal



Waqar Shafqat



Arif Kamal



Muneer Rehman



Asfandyar Khan



Irfan Khan



Imtiaz Malik



Rizwan Ullah

Postgraduate students linked to citrus project

- 1 student has been awarded JAF for a PhD at Curtin University WA, Australia



Muneer Rehman

Extension strategy ASLP 2 Citrus

Australian team trains Pakistani officers

Punjab

KP

Extension (incl. FDVP) & research officers

Extension & research officers

Extension FDVP

1800 growers

4450 growers

Sarghoda

M.B. Din

T.T. Singh

Layyah

Malakand

Nowshera

Mardan

Swabi

Haripur

Project outputs and impacts

- Training of FVDP extension staff



- **Capacity building through Farmer Field Schools (FFS)**

- 4 sites, 177 schools/year, **4450 growers**



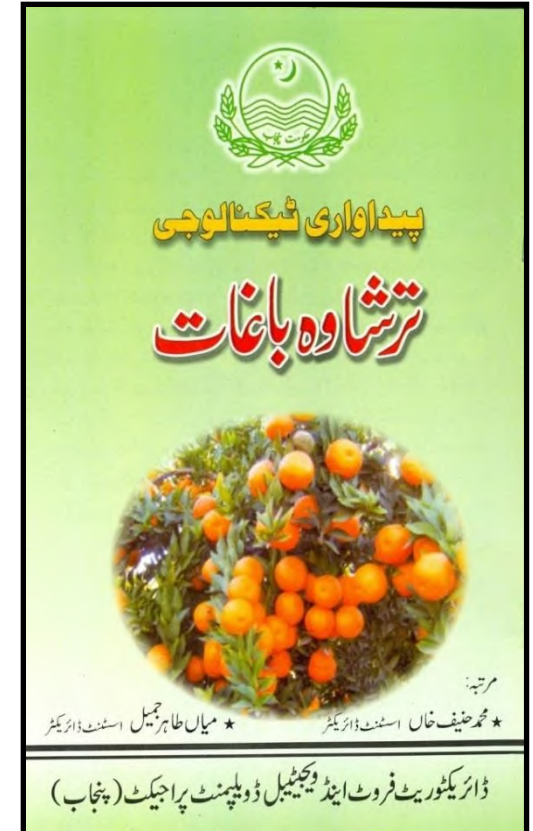
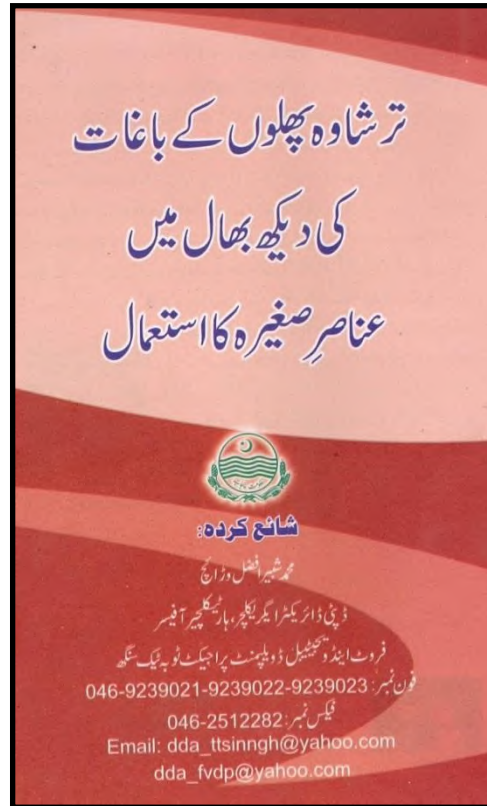
Demonstration cluster sites

- 4 X Best management practices (BMP)
- 4 X High density plantation with high efficiency irrigation system.
- 4 X Canopy management of citrus orchard.



• Distribution of technical material

- 12 citrus training manuals
- 300 leaflets on BMP



Posters, videos and newsletters

ASLP Citrus Factsheet Australian AID
Australia-Pakistan Agriculture Sector Linkages Program

NSW Primary Industries Australian Government Australian Centre for International Agricultural Research March 2013

Budding in

Mr. Tauseef Tahir
UAF, Pakistan

The species of citrus do not differ in budding we use buds from one tree and use them to change the other tree into one like the one we want. Budding is practiced for the following reasons:

1. The tree starts to bear fruit earlier.
2. The fruit will be of the same quality as the tree the bud was taken from.
3. The root system becomes more adapted to the soil conditions.
4. Trees grown from buds have better resistance to diseases and pests.
5. The good fruit do not drop.

ASLP Citrus Factsheet Australian AID
Australia-Pakistan Agriculture Sector Linkages Program

NSW Primary Industries Australian Government Australian Centre for International Agricultural Research March 2013

Hand T

Mr. Tauseef Tahir
UAF, Pakistan

Introduction: Pruning is a very important part of citrus cultivation. It helps in maintaining the tree's structure, improving air circulation, and increasing light penetration. Pruning should be done during the dormant season, typically in late winter or early spring. The main objectives of pruning are to remove dead, diseased, and damaged wood, to open up the canopy for better light penetration, and to maintain a balanced and productive tree structure.

ASLP Citrus Factsheet Australian AID
Australia-Pakistan Agriculture Sector Linkages Program

NSW Primary Industries Australian Government Australian Centre for International Agricultural Research March 2013

SOIL SOLUTION ANALYSIS

Mr. Tauseef Tahir UAF, Pakistan	Mr. Wajid Ali ARI Tarnab, Pakistan	Mr. Steven Fallvine NSW DPI, Australia	Dr. Tahir Khurshid NSW DPI, Australia
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Introduction: Soil solution analysis is the extracting of the soil water by various instruments and then analysing the soil solution for nutrient concentrations. It can help you identify if you are fertilising too heavily and washing and wasting your nutrient and your soil or under irrigating and concentrating salts within the root zone and increasing

Enhancement of citrus value chain production in Pakistan and Australia under the AusAid Program

Background: Citrus production is a major agricultural sector in both Australia and Pakistan. The Australian Government, through AusAid, is supporting the development of the citrus value chain in Pakistan to improve the livelihoods of citrus growers and processors. This project aims to enhance the efficiency and profitability of the citrus value chain through various interventions including research, extension, and marketing support.

Objectives: The project has several key objectives, including:

- To improve the quality and yield of citrus production in Pakistan.
- To enhance the marketing and export opportunities for Pakistani citrus products.
- To build the capacity of citrus growers and processors in Pakistan.
- To facilitate trade and investment between the citrus sectors of Australia and Pakistan.

Project: The project is implemented through a series of activities, including:

- Technical assistance and training for citrus growers and processors.
- Market research and analysis to identify export opportunities.
- Development of marketing and branding strategies.
- Facilitation of trade missions and business-to-business meetings.

ASLP Citrus Factsheet Australian AID
Australia-Pakistan Agriculture Sector Linkages Program

Australian Government AusAID NSW Primary Industries Australian Government Australian Centre for International Agricultural Research MARCH 2013 VI

ٹینشیو میٹر کا

توصیف طائر

(پراجیکٹ آفیسر)
(اے، ایس، ایل، پی)

سٹیون فینوین (سٹریٹس توسیع آفیسر)
این ایس جلیو، ڈی پی، اینی، ٹیرٹن
آسٹریلیا
جرمی گیننگز (ماہر آبپاشی)
این ایس جلیو، ڈی پی، اینی، ٹیرٹن

ٹینشیو میٹر ز مین کی نمی جانچنے کا آسان ذریعہ

ٹینشیو میٹر پانی سے بھرا ایک بند پائپ ہے۔ جو کہ سیرامک ٹیوب ایک طرف اور ویکووم پمپ دوسری طرف لگا ہوا ہے۔ جس سے پانی خشک ہوتا ہے۔ وہ سیرامک ٹیوب سے نکلتا ہے اور پائپ میں خلا پیدا کرتا ہے۔

Australian Government
Australian Centre for International Agricultural Research

Australia-Pakistan
Agriculture Sector Linkages Program

**CITRUS GROWERS
CONFERENCE**

ASLP Citrus Project
May 9-10, 2012

Organized by:
Agriculture Research Institute (ARI)
National Horticulture Research Centre (NHRC)
Pakistan Horticulture Research Centre (PHRC)
University of Agriculture, Faisalabad
Faisalabad, Pakistan
Phone: +92 300 251 2200
Email: hort@uaf.edu.pk





PAKISTAN EXPORT CITRUS HARVEST GUIDE



PREPARATION

Clothes, bags and gloves
Wear appropriate clothing

Size and colour
According to your supervisor's instructions pick fruit to size and colour specifications

Double snip picking
Use when first learning snip picking and/or when fruits are not within comfortable reach

USE CORRECT SNIPS

Wide blade snips are not suitable. They are difficult to cut short stems and are prone to cut fruit

FRUIT HANDLING

Place fruit in crates
Crates will stop soil diseases, insects and other contaminants spoiling the fruit

Check crate
Reset any broken or chemically contaminated crates to your supervisor

Fill crates properly
Fruit should just reach top of crate

Unloading the picking bag
Use a cloth at least 120cm wide to make the picking bag. The ends should be inside the rest hole as wide as possible

FRUIT HANDLING

Take care when Handling fruit
Citrus fruit can damage or bruise easily

Do not pass fruit down

Do not overfill bags (maximum 10kg)
They are a health hazard and can damage fruit

Carrying crates carefully
Get help when lifting and lowering crates, carry crates carefully

SAFETY

Position your ladder
Use a ladder and position it in a stable manner

Food safety
Wash hands with soap after using the toilet

Exercises
Carrying that works the lower spine (discs) and back muscles. Prior to starting work conduct stretching exercises.

Arm stretch
Push arms forward

ACCIDENTS

In case of accident or injury:

- Do not put yourself in danger to help required, wait until the danger has been removed or stopped
- Take the injured person away from the danger. Try not to move them if they have a possible neck or spine injury, wait for professional help
- For a major injury immediately call the supervisor, for other injuries report to your supervisor and seek first aid

MANUAL HANDLING

Manual handling
Warm up your muscles (i.e. warm up exercises or other low exertion activities)

OLEOCELLSIS

Oleo-cellulosis is a mild injury that can occur when handling too roughly (i.e. fruit impacted or bumped) or during an unstable weather conditions

پاکستان میں کنو کی نشوونما کے مراحل

1. چھانسی کا انتخاب
2. چھانسی کا کٹنا
3. چھانسی کا پھیلنا
4. چھانسی کا پھلنا
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9. چھانسی کا پھلنا
10. چھانسی کا پھلنا

Dr. Tahir Shaukat
2018-2019
Mr. Steven Williams
2018-2019
Mr. Assaf Alami
2018-2019
Mr. Razaq
2018-2019

Citrus Reworking

It's vital to source growers in the possession of reworking citrus trees

Produced by NSW Department of Primary Industries
Author: Steven Williams
Editor: Steven Williams
Designer: Steven Williams
Illustrator: Steven Williams
Printer: Steven Williams

9 project Newsletters were produced during the project life (Dr Jaskani)

CITRUS NEWSLETTER

Implemented by ACIAR, funded by AusAID Issue 2, 2011

ASLP Citrus Project

ENHANCEMENT OF CITRUS VALUE CHAIN PRODUCTION IN PAKISTAN AND AUSTRALIA THROUGH IMPROVED ORCHARD MANAGEMENT PRACTICES

Objectives

1. To introduce germplasm and develop germplasm evaluation capacity to extend the marketing season and assist in improving nursery production practices for maintaining

Citrus is the one of the major fruit crops of Pakistan. Pakistan is currently an important global producer and increasingly, an exporter. Of the total citrus production, approximately 10% is exported, 2% is processed, 20-40% suffers from post harvest loss and the remainder is sold in the domestic market. Most of the citrus production in Pakistan is reliant on a mandarin type, cv. Kinnow, 95% of which is produced in the Punjab

- **SMS best practice citrus production messages**
 - **42 messages : 1150 growers/per message**

v Business Promoter - MultiBasic Edition (Corporate SMS Solution)

Home View Tools Window Help

Manage Settings Manage Groups Manage Contacts Manage Templates Start Send SMS Import Messages Import Contacts Exclude My Number Application Skins Send Enquiry Exit

Start Page

Getting Started with v Business Promoter (MultiBasic)
Ultra High Speed Corporate SMS Solution

Contact
We always welcome our customer's suggestions and feedback. Here is how to get in touch with us +923334875405,+923454040004
Email: info@visionon-tech.com Visit: www.visionon-tech.com

4/20/2012 2:59:10 PM

Next Big Product "Cut Off Queue" Enables Doctor Appointments Via Web, SMS
Virtual Business Promoter can connect GSM mobile phone / GSM Modem to a computer to help us get rid of the restrictions on thumbs to create SMS with a computer at any place to send fast sms to or share some humorous ideas with your friends or customers by a unique and new way of communication.
Virtual Business Promoter supports the business of marketing, management, and mobile blog professionals, and SMS lovers.

Summary

There are 997 contacts in your contact book
There are 6 groups in your database
There are 1 messages in your message templates
There are 0 Excluded Numbers in your Exclude My Number List

Text messaging is the fastest growing marketing channel.

Information & Help

What's New?
Find out about new features and enhancements.

Help
Access online help for v Business Promoter. Remember you can get help any time by simply pressing the F1 key.

Products
Learn about our current and upcoming products and find out how they can help you.

Our Clients

ICMAP

Licensed to Fruit Vegetable Development Project No Phone Connected

Powered by VisionOn Technologies | www.visionon-tech.com

- Fortnightly E-newsletter
 - 43 E-newsletters sent to **399** growers
- Monthly advice through FVDP website
www.fvdp.gov.pk
 - also regularly updated on Facebook & Twitter.



Fruit & Vegetable Development Project Govt. of Punjab - Official Website

ASLP
 Agriculture Sector Linkage Programme is a joint venture of Governments of Australia and Islamic Republic of Pakistan for the enhancement of the quality and productivity of mandarin and orange in both the countries.

FVDP Activities

Introduction
 Fruit & Vegetable Development Project was launched by Government of the Punjab, Agriculture Department as a pilot project in 10 districts from July 2005 to June 2010, with two main missions:

AIMS & OBJECTIVES

Germ Plasm Units

INTRODUCTION
 Fruit & Vegetable Development Project was launched by Government of the Punjab, Agriculture Department as a pilot project in 10 districts from July 2005 to June 2010, with two main missions:

Mission 1: Enhancement of quality production of fruits and vegetables with value addition for sustainable supply from farm to fork, with ultimate goal to increase the farmer's profitability and alleviation of poverty by educating the farming community through the well defined approach of Farmer Field School (FFS).

Mission 2: Production of true to type and disease free quality fruit plants by establishing germplasm Units (GPU) of mango, citrus & beaches according to the international standards.

FVDP Activities in Motion

Monthly Recommendations

001825
 FVDP Web Counter

Fruit & Vegetable Development Project © 2011. All rights reserved | Designed at: AL-FAROJAN COMPUTRONICS

Radio extension

Radio Sursebz Pakistan (Live)

- 3 Jan 11
 - 23 Jan 11
 - 20 July 11
 - 28 Jul 11
 - 25 Aug 11
 - 22 Sep 11
 - 13 Oct 11
 - 16 Feb 12
 - 24 Jan 12 – Voice of America
 - 29 Mr 12 (Sabawon)
-
- **Australian ABC Radio (Tahir)**
 - 24 Apr 12
 - 26 Apr 12



There were radio programs in 2013, 14 and 15

TV Programs (27)

Dr Samad
Dr Hafeez
Dr Nabi
Asif Khan
Altaf-ur-Rehman



Crop management
Reworking
Fertigation
High density orchards
Fruit thinning
Green Farms



SUMMARY

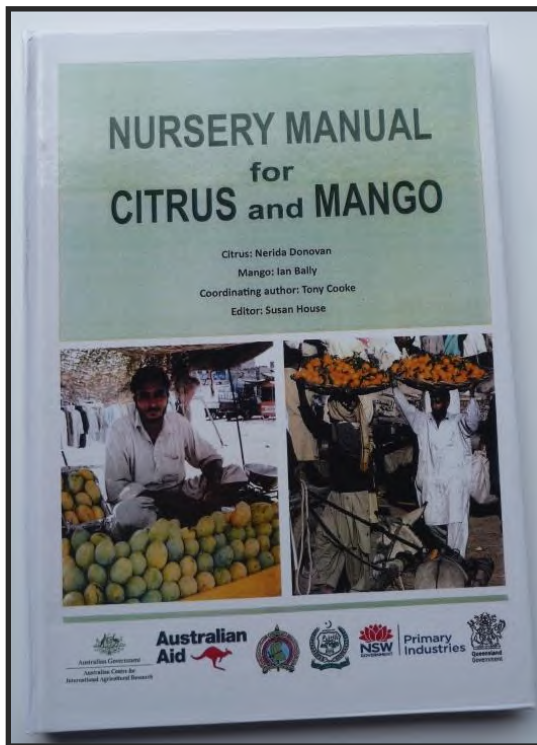
- 7 new varieties to extend & expand marketing period
- Clean & healthy planting material
 - Training & screenhouse (established)
- Practice change to improve production efficiency
 - On farm adoption: pruning, thinning, nutrition & furrow irrigation
- Capacity building : growers & extension

3050

- Quality marketing introduced
- Training packages

Launch of training Packages

Citrus Nursery Manual - Dr Nerida Donovan



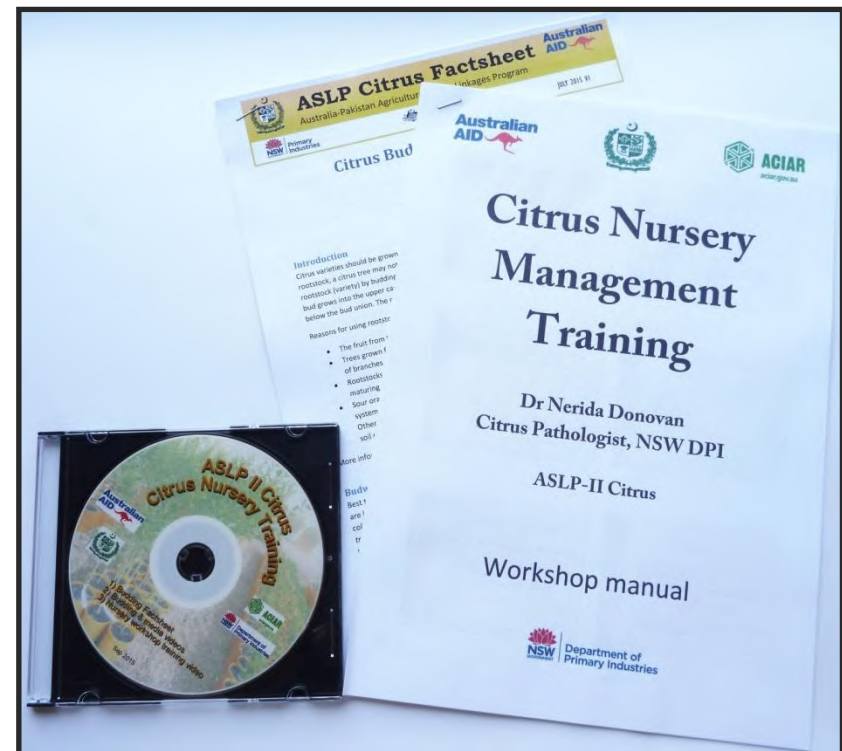
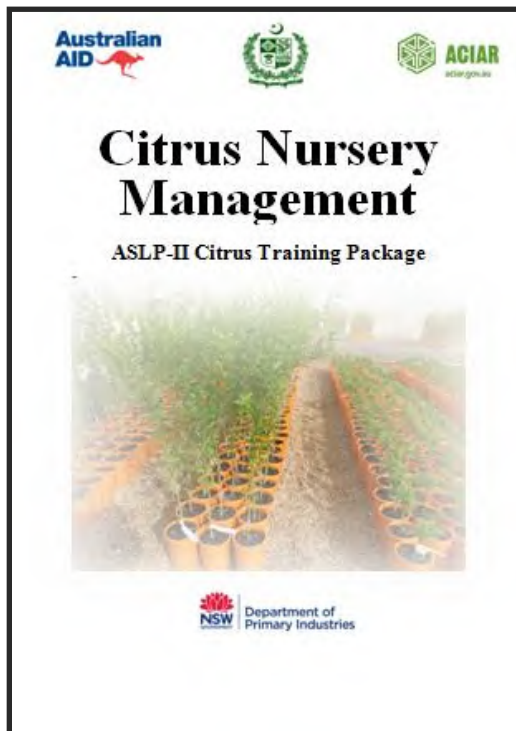
Training packages

- **Mr Steven Falivene**
- **Tauseef Tahir**
- **Wajid Ali**



Training package 1 - Nursery Management

- Chip budding fact sheet
- Chip budding video
- 1 video on potting media preparation
- Nursery manual
- 4 videos on potting media preparation



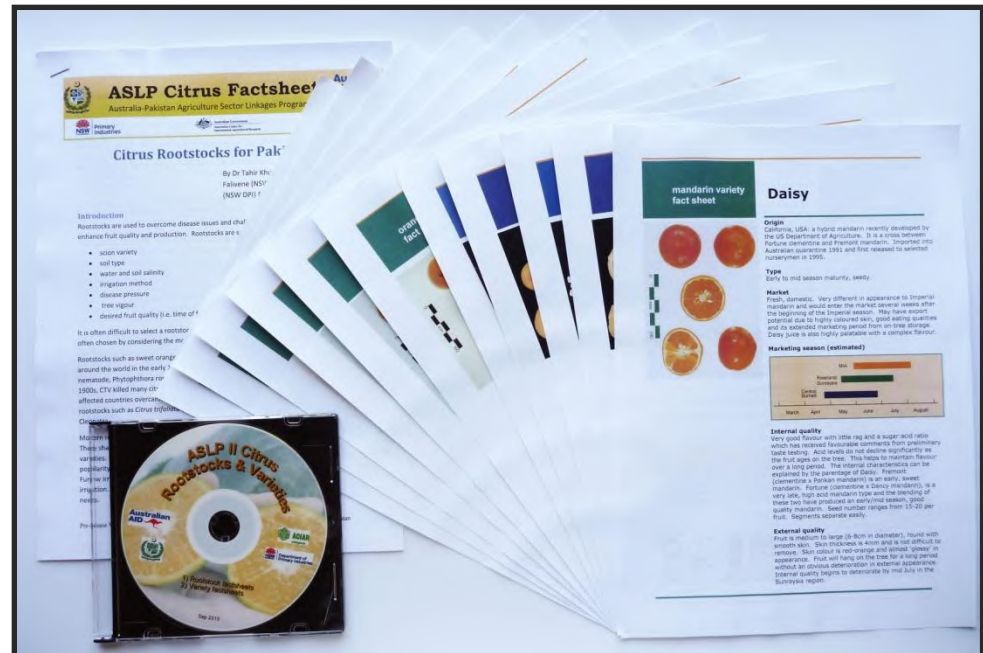
Training package 2- Varieties and rootstock

- Variety fact sheets
- Rootstock fact sheets
- Training and in variety and rootstocks (powerpoints)



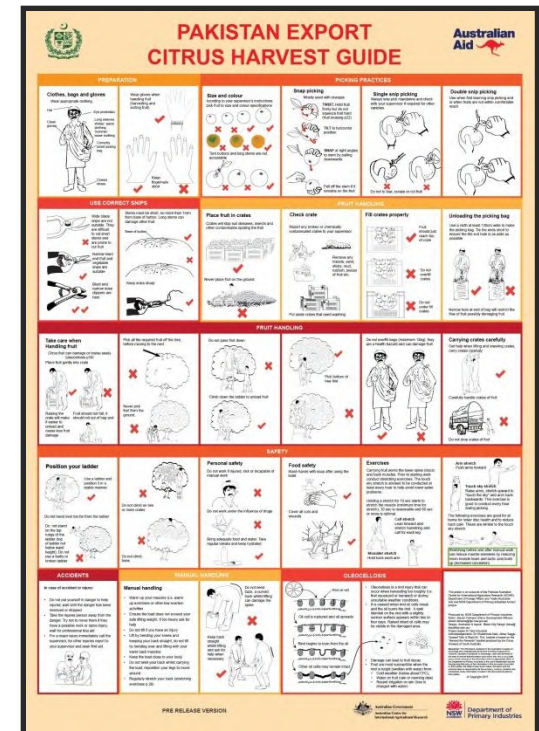
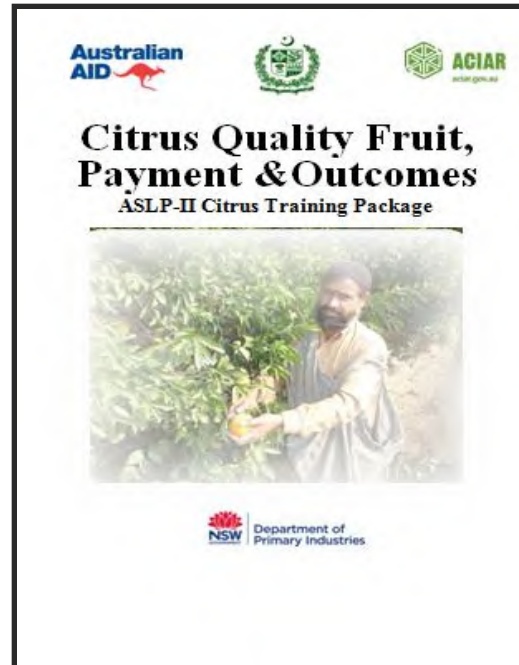
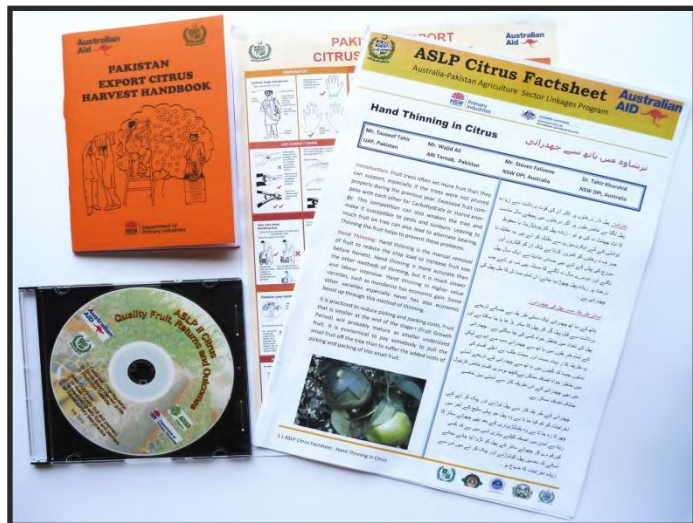
Citrus Rootstocks & Varieties

ASLP-II Citrus Training Package



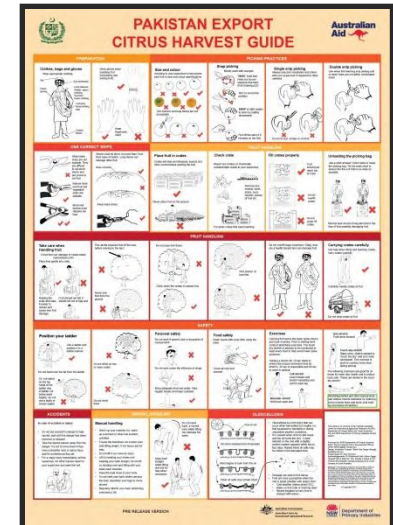
Training package 3 – Crop management adoption outcomes

- Crop regulation fact sheets
- Crop management calendar
- Phenology poster for Kinnow mandarin
- Phenology poster for Blood oranges
- Production Calendar
- Harvest handbook
- 3 growers videos



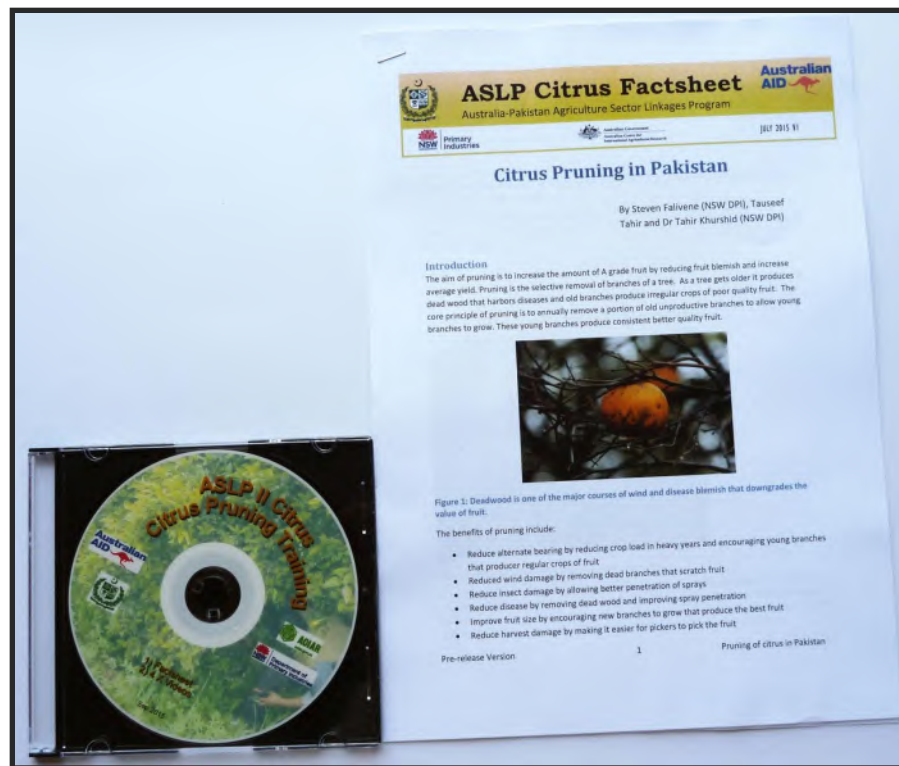
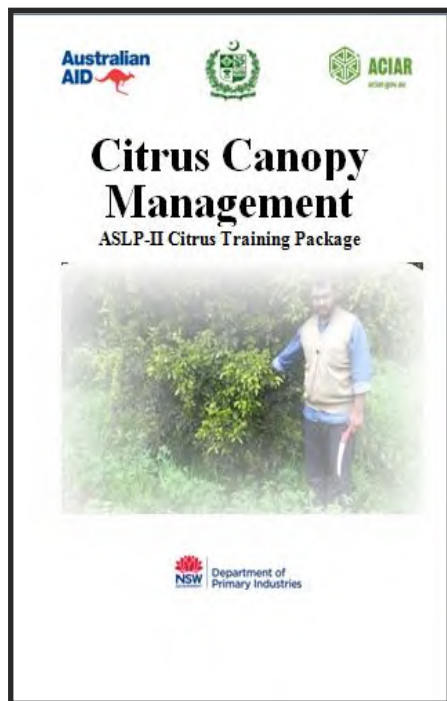
Training package 3 – Crop management adoption outcomes ...

- Crop regulation fact sheets
- Crop management calendar
- Phenology poster for Kinnow mandarin
- Phenology poster for Blood oranges
- Harvest poster for harvesting techniques
- Harvest handbook
- 3 growers videos



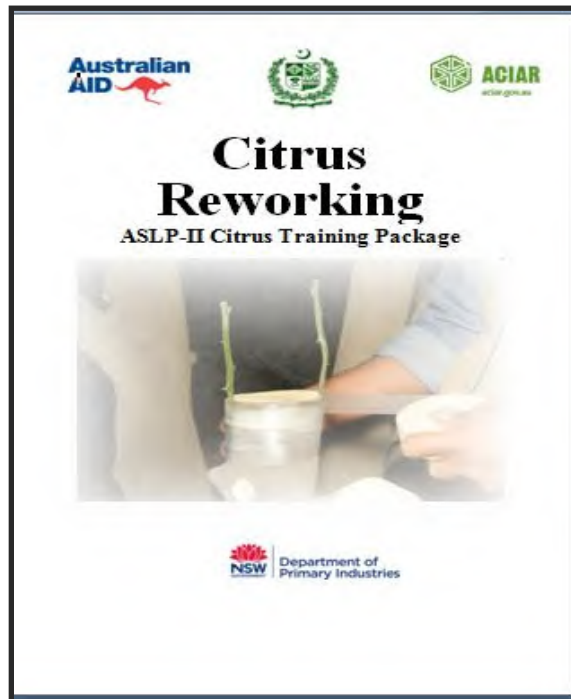
Training package 4 – Citrus canopy management

- 4 pruning videos
- Fact sheets on pruning citrus trees
- Powerpoint presentation (urdu)
- Powerpoint presentation (English)



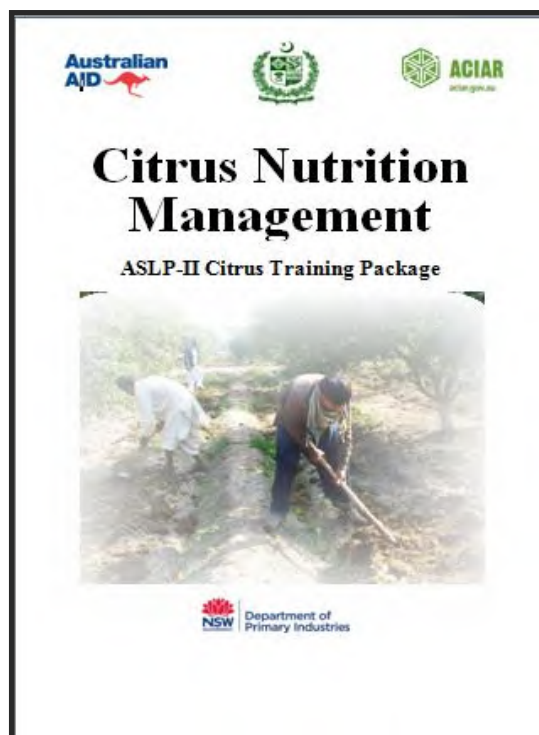
Training package 5 – Tree Reworking

- Fact sheets on reworking techniques
- 4 Videos on reworking techniques
- Powerpoints



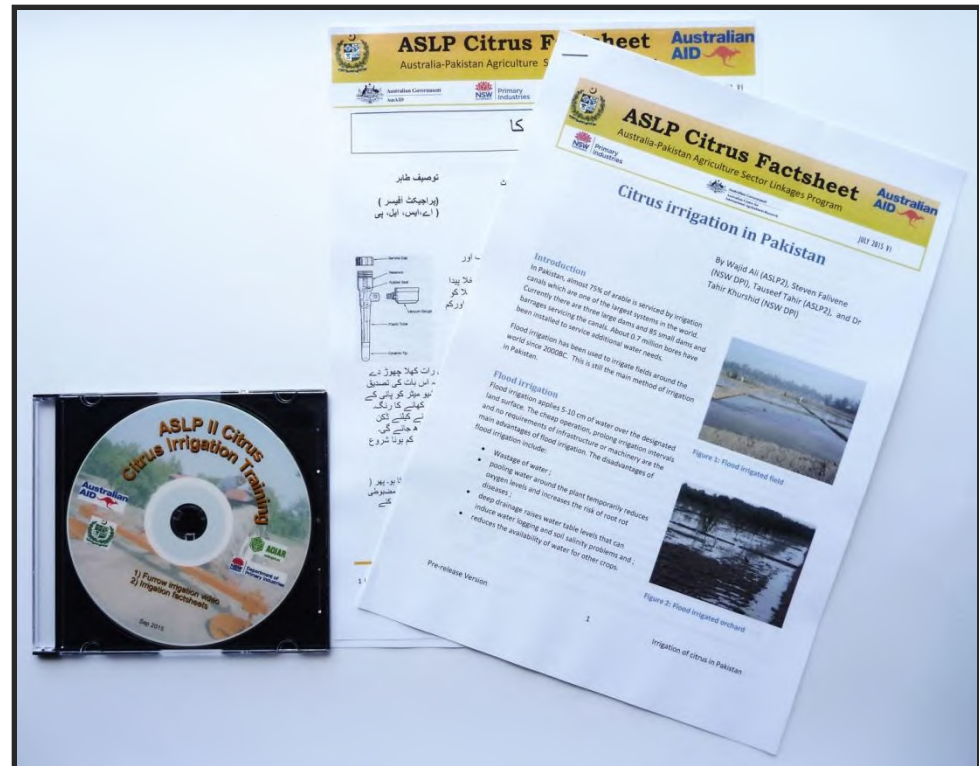
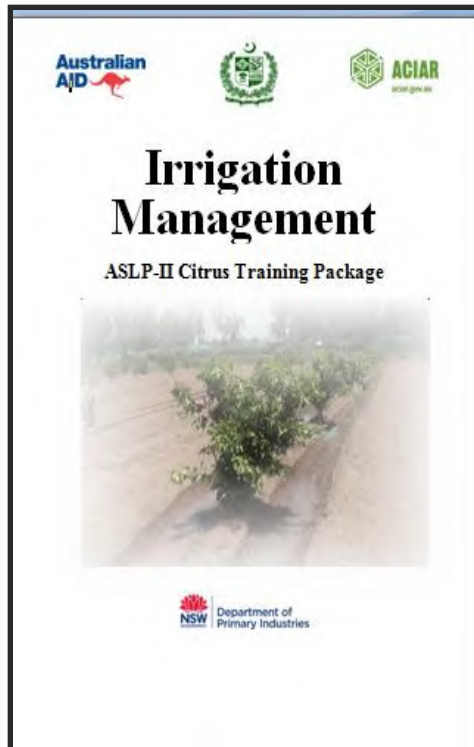
Training package 6 – Nutrition

- Nutrition manual
- 8 powerpoints on citrus nutrition workshops
- Leaf analysis videos



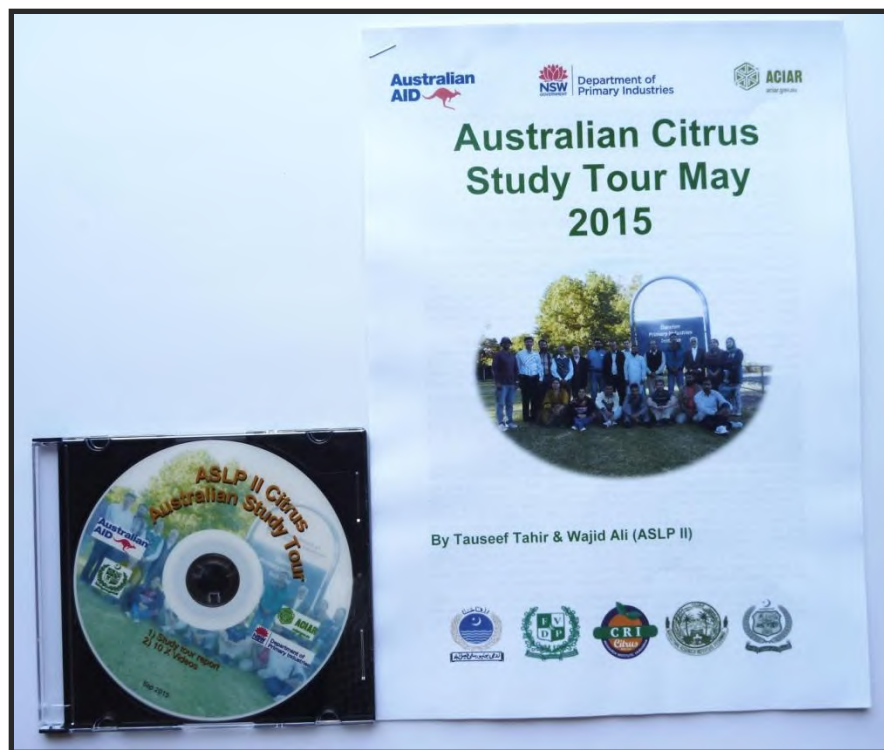
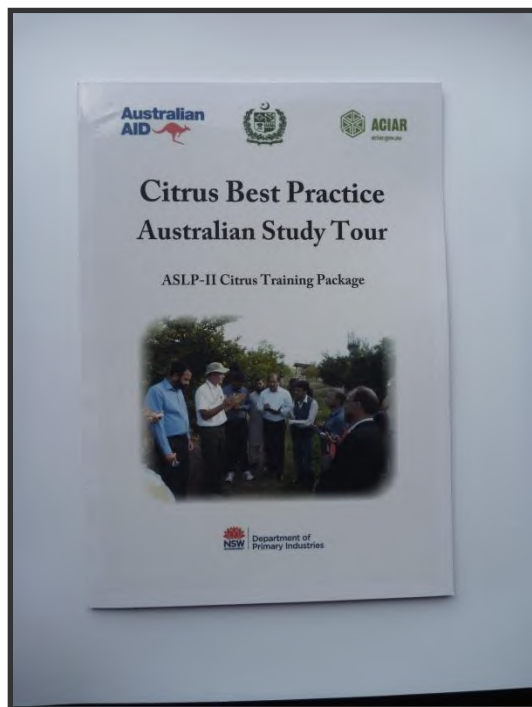
Training package 7 – Irrigation package

- Video on furrow irrigation system
- Irrigation in Pakistan fact sheet
- Tensiometer fact sheet



Training package 8 – The Australian study tour package

- Study tour report
- 10 videos



**Conclusion by
Dr Tahir Khurshid**

Issues need to be addressed in ASLP 3

- Postharvest value chain – reducing blemish and enhance quality
- Disease and quarantine pest issues
- Quality payment system

The end



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