

ASLP II Citrus Project

**Agricultural Research Institute, Tarnab Peshawar
(ARI)
Khyber Pakhtunkhwa**



Objectives

1. To improve nursery production practices and introduce germplasm to extend the marketing season
 - 1.1 Selection & establishment of superior germplasm
 - 1.2 Screenhouse establishment and nursery training
 - 1.3 Evaluation of germplasm
2. 'Best Practice' orchard management focussing on crop management and irrigation management
3. Research & extension capacity

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

Problem industry based on:

1. Sour orange which is susceptible to tristiza & phytophthora
2. One variety (blood orange), narrow market opportunities and harvest
3. Unclean budwood that produces unhealthy diseased trees at planting that result in rapid orchard dieback



Solution:

1. Develop clean budwood system by insect proof screen house
2. Introduce new scion and rootstocks



Establishment of Screenhouse

Built 2010



1.2 Screenhouse establishment and nursery training

Screenhouse & germplasm

- **14** Varieties and **10** rootstocks from Australia
- 2 of each variety (clean mother trees) remain in screenhouse
- Mother blocks established at **ARI** and **GPU Sherkhana**
 - Budwood ready trees 2018
 - Some trees for fruit/yield evaluation
 - Scion/rootstock combination research
 - Rootstocks seed available in 2018

Scions
Cara Cara Navel
Hockney
Daisy Mandarin
Fremont
Arnold Blood
Harvard Blood
Mc Mahan Valencia
Ryan Navel
Clementard
Beyenda Valencia
Caffin
Nules
Berri Valencia
Salustiana

Rootstocks
Cox Mandarin
Troyer Citrange
Carrizo Citrange
Poncirus Trifoliolate
Cleopatra Mandarin
C-35
Benton
Fraser Hybrid
Rangpur Lime
Volkamariana



Screenhouse & germplasm outcomes

- **1521** clean trees produced
- **504** trees distributed to nurserymen and growers
 - Nurserymen plants for private mother blocks and demo sites
 - Grower plants demo site (6 trees each variety)
 - Grower & nursery trees will bear 2018-2019



1.1 Selection & establishment of superior germplasm

ARI Nursery Training

- Nursery propagation and orchard management: Dec 2012 - 30 participants
- Nursery management & Citrus root stocks: Dec 2012 - 35 participants
- Media preparation and water testing techniques: Mar 2013 - 45 participants

Australian
AID



ACIAR
austr.gov.au

Citrus Nursery Management

ASLP-II Citrus Training Package



NSW Department of
Primary Industries



ARI Nursery Training

- Citrus Nursery Raising Techniques: Feb 2015 - 30 participants
- Citrus Nursery Management and Pruning: Apr 2015 – 73 participants



1.2 Screenhouse establishment and nursery training

Germplasm Research (ARI & GPU)

Aust. Scion/Rootstock evaluation

(Trials commenced, 2012)

Trials treatments: Number of scions: 7

Number of Rootstocks: 4

Results: Tree growth data has been collected



Local Scion/ Aust. Rootstock evaluation

(Trials commenced, 2012)

Trials Treatments: Number of Scions: 3

Number of rootstocks: 4

Results: Tree growth data has been collected



Lemon and Lime/Cox Rootstock

(Trials commenced 2013)

Trials Treatments: Number of Scions: 3

Number of Rootstocks: 1

Results: Tree growth data has been collected



1.3 Evaluation of Germplasm

Germplasm Research (Screenhouse)

Rootstock trial on Blood orange (Started: 2012)

- 2 X replicates
- Rootstock: Cox, Troyer, Carrizo, sour orange
- To-date: Tree growth data

Potting media (Trial commenced, 2013)

- 3 X replicates
- Media: 3 ratios - Bagasse, sand, coconut coir
- Rootstock: Carrizo Citrange, Volkamariana, Begarade, Rangpur Lime, Cleopetra Mandarin, Troyer Citrange
- To-date: Tree growth data



Pots Filled with Media



Seedling growth in Different Media Combinations



Training of 2 nurserymen in Australia, Oct 2012



3. Research & extension capacity

Training of 5 nurserymen/women in Thailand Nov 2014



3. Research & extension capacity

Nursery adoption outcomes

- Eight nurseries adopt: new media, plastic pots & hygiene
- One nursery built screenhouse



1.0 Germplasm, screenhouse & nursery management

Objective 2

'Best Practice' for orchard management

2.1 High density planting & crop management

2.2 Irrigation management

Objective 3

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

High density planting

Conventional orchard

- 110 trees/acre (20 x 20 ft)

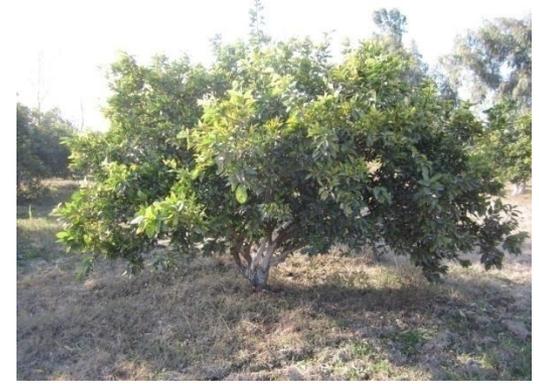


New high density orchard

- 290 trees/acre (15 X 10 ft)
- **3 X grower 1 acre demo site**
 - Currently non bearing 3-4 year old



Canopy management



Problems:

- Deadwood scratches fruit = wind blemish and disease entry
- Biennial bearing – unbalanced canopy
- Small or large fruit

Solution: Pruning



Pruning training workshops

1. Pruning in citrus trees : Feb, 2012 - 37 participants
2. Pruning in citrus orchard: Feb, 2013 – 30 participants
3. Pruning in citrus orchard, Mar, 2014 – 105 participants
4. Pruning techniques, Jan, 2015 – 24 participants

Pruning is adopted by 35% growers



Crop management Training, Australia, 2015



3. Research & extension capacity

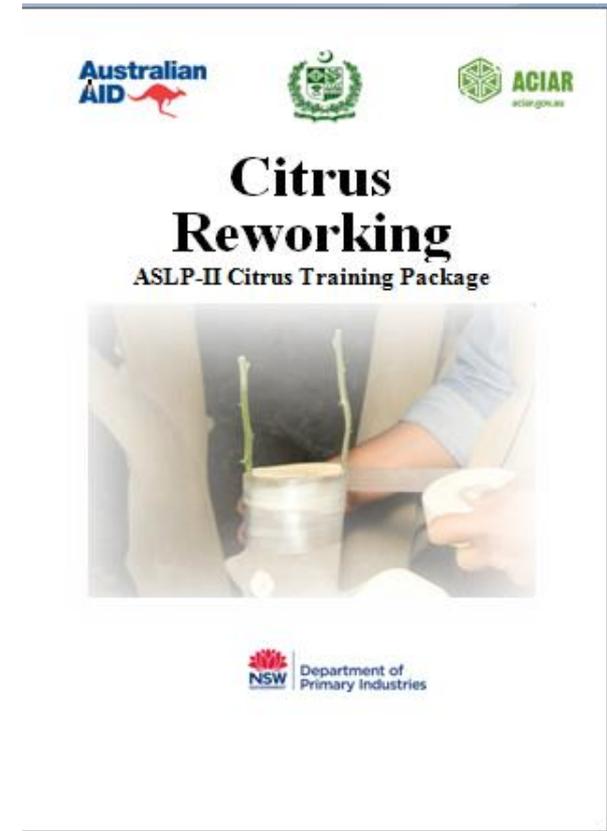
Reworking

- New variety establishment takes 6 -7 years
- Reworking takes 2-3 years



3. Research & extension capacity

2 X Reworking training 2012-13



- **74 growers trained**
- **Skills used to rework 3 X grower demo trials**
- **Skills better utilized when bulk budwood releases in 2018**

3. Research & extension capacity

Irrigation management

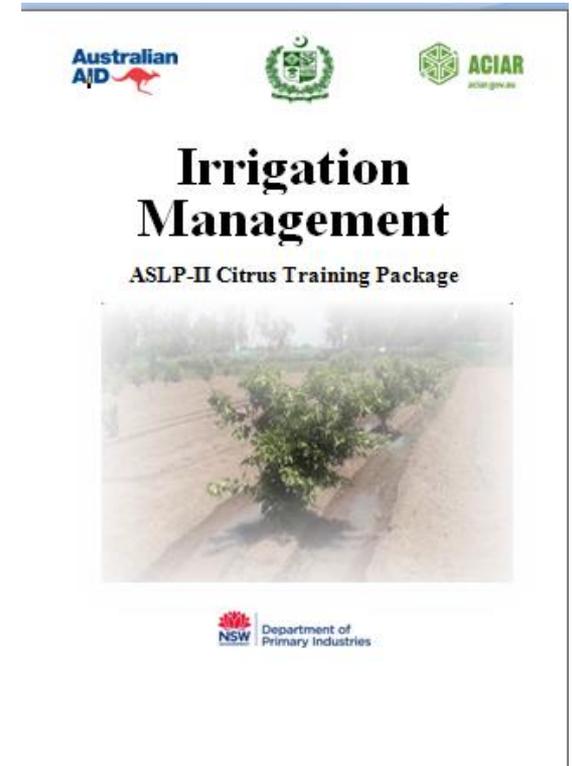
Flood irrigation is the common method of irrigation in KP

The disadvantage of flood irrigation are;

- Wastage of Water
- Loss of nutrient
- Root rot (Phytophthora)
- Root suffocation
- Encourage weeds
- High cost of managing problem

Solution

- Promote furrows & drip/sprinklers instead of flood irrigation
- Adoption of furrow irrigation system on an area of **1365 acres** in three districts of Khyber Pakhtunkhwa



Irrigation Research

- Water application
 - Flood vs furrow
 - 20-30% water saving
 - Citrus and stone fruit

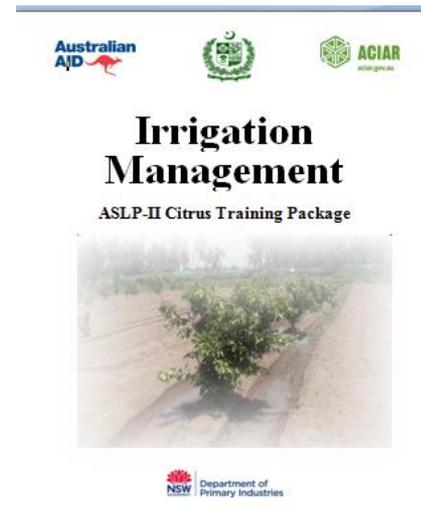


Irrigation management

TRAINING WORKSHOPS

391 growers trained

1. **Flume Flow Meter**, May 2012 – 20 participants
2. **Furrow Irrigation**, Sep 2014 - 191 participants
3. **Furrow Irrigation**, Jun, 2014 – 165 participants
4. **Soil/water nutrition**, June, 2012 – 15 participants



3. Research & extension capacity

Training of Extension Officers

- 7 full package training workshops conducted
 - 78 Extension officers trained



Radio & TV Talks (17 Nos.)

Radio Talks (13 Nos.)

- 16th Feb 2012.
- 24th Jan, 2012.
- 29th March 2012.
- 19th May 2012.
- 4th June, 2012.
- 5th of Nov, 2012.
- 18th of Feb, 2013.
- 5th of Mar, 2013.
- 18th of Apr, 2013.
- 4th February, 2014.
- 10th Dec, 2014.
- 29th Dec, 2014.
- 27th August, 2015

TV Talks (5 Nos.)

- 14th Jun, 2013.
- 18th Dec, 2013.
- May, 2014.
- 29th Jan, 2015.
- 7th July, 2015.



NEWSPAPER ARTICLES

(2 Nos.) The Newspaper "daily Aaiyeen"



صوبائی وزیر اکرام اللہ خان گنڈاپور تراب ریجرج انٹینٹیوٹ میں پودوں کا معائنہ کر رہے ہیں

GRADUATE AND POST GRADUATE

1. Performance of sweet orange varieties on Begarade rootstock. Nisar Naeem
2. Performance Of Citrus Rootstocks In Different Potting Media. Muneer Rahman
3. Growth response of Australian sweet orange Varieties on different rootstocks. Zia Ur Rahman
4. The Response Of Lemons Cultivars On Cox Mandarin Rootstock. Muhammad Naeem
5. Response of sweet orange cultivars budded on citrus rootstocks. Imtiaz malik
6. Comparison of growth Performance of different citrus rootstocks. Muhammad Irfan
7. Effect of growing media on germination and seedling growth of citrus rootstock. Arif Kamal



8. Determination of the soil moisture with the help of Tensiometer Mohammad Ullah
9. Effect of different methods of irrigation on the vegetative growth of sweet orange. Fazalullah
10. The effect of furrow and flood irrigation system on water use efficiency and yield of sweet orange. Wajid Ali
11. Influence Of Gibberellic Acid (GA_3) On Fruit Set and Growth of Sweet Orange Rizwan Ullah
12. Understanding the growth rate in sweet orange or to establish the total amount of nutrients in sweet orange fruit. Kazim raza
13. Effect Of Different Level Of Pruning On Growth, Yield And Quality Of Sweet Orange. Saad khan
14. Soil Sampling For Citrus Orchards. Saleem khan
15. Soil sampling collection regarding nematode in citrus orchards. Zahid Ullah
16. On to study the fruit growth performance and development of sweet orange varieties vs. Summer growth flush in blood red sweet oranges



Future plan

1. Budwood distribution from GPU (2017 : demand driven by nurseries)
2. Continue evaluation of scion and rootstock varieties
 - Results from 2020
3. Germplasm field days
 - Transition Sour orange rootstock to modern rootstocks
 - Adoption of new varieties (trial trees bear 2017)
4. Nursery management training one per year
 - Pots & media, budding, irrigation, nutrition and plant protection etc
5. 1st year crop management & irrigation workshops (6 sites X 50 growers)= total 300 growers
 - Ongoing (2 sites X 40 growers)= total 80 growers

Thank you