

New ANNUAL
PROGRAMME OF
RESEARCH WORK
2014-15

HORTICULTURAL
RESEARCH STATION,
SAHIWAL.

1. TITTLE.

COMPARATIVE STUDIES ON THE FOUR PIGMENTED GRAPEFRUIT VARIETIES UNDER LOCAL SOIL AND CLIMATIC CONDITIONS.

OBJECTIVE:

To study and compare the performance of three imported grapefruit varieties with Shamber grapefruit in terms of yield and fruit quality under local soil and climatic conditions.

RESEARCH WORKER(S).

i. Muzaffar Hafeez
ii. Muhammad Shahzad Zafar

PROJECT DURATION:

2005-2015

Location

Horticultural Research Station, Sahiwal.

Treatments:

T-1 Shamber
T-2 Flame
T-3 Star Ruby
T-4 Rio Red

PLAN OF WORK:

Lay out desing. RCBD
Replications. : 5
Treatments. : 4
No. of plants per unit : 2
Treatment.
Total No. of plants. : 40

General performance of the plants in terms of growth characters such as height, spread, canopy volume and stock/scion girth of individual trees will be studied. Yield and physico-chemical characteristics of fruit such as fruit weight, fruit size, peel thickness, juice percentage, TSS%, acidity and TSS/acid ratio will be studied.

PREVIOUS YEAR’S RESULTS

Characters.	T-1	T-2	T-3	T-4
Av. Height (M)	2.68	2.76	2.82	2.86
Av. Spread (M)	2.82	2.78	3.05	2.72
Av. Stock. Scion girth (cm).	40.42/38.94	41.68/41.42	46.98/45.52	42.82/43.6
Degree of Compatibility	1.8	0.74	1.94	1.18

Characteristic	T1	T2	T3	T4
Weight of Fruit (gms)	359.58	342.1	322.1	378.58
Size of Fruit (cm)	7.8/9.2	8.2/8.6	7.8/8.6	8.2/9
Peel Thickness (mm)	3.3	3.3	3.2	3.1
Weight of Peel (gm)	112.9	89.8	92.76	127.32
Weight of Juice (gm)	162.2	157.4	143.8	168.12
TSS (%)	6.2	7.24	6.26	5.5
Peel (%)	31.44	26.2	28.74	33.64
Juice Percentage	45.28	46.12	44.58	44.32
Rag (%)	23.28	27.68	26.68	22.04
Acidity (%)	1.18	1.1	1.3	1.2
TSS/acid Ratio	5.2	6.52	4.78	4.6

2. TITLE.	PERFORMANCE OF FOUR DIFFERENT GRAPEFRUIT VARIETIES ON CITRUMELO-4475 ROOTSTOCK .		
OBJECTIVE.	To increase the productivity and fruit quality of commercial Grapefruit varieties.		
RESEARCH WORKER(S)	Imran M. Siddique.		
PROJECT DURATION.	2009-2016.		
LOCATION.	Horticultural Research Station, Sahiwal.		
TREATMENTS.	Varieties. T-1 Star Ruby. T-2 Shamber. T-3 Flame. T-4 Redblush.		
PLAN OF WORK.	Lay out design. : RCBD. Replications. : 2 Treatments. : 4 No. of plants per rep. : 4 Total No. of plants. : 32 Data to be collected. Plant height, spread, canopy volume, stoinic compatibility, yield and fruit quality characters like fruit weight, size, peel/rind thickness, rind percentage, Total Soluble Solids, Acidity, Acid Ratio, Seediness will be the part of study.		
PREVIOUS YEAR’S RESULTS.	Plants have been shifted into the field during September, 2012.		

3. TITLE.	DEVELOPMENT OF NEW VARIETIES THROUGH BREEDING.		
OBJECTIVE.	To enhance the fruit quality of some existing citrus varieties.		
RESEARCH WORKER(S).	i. Muzaffar Hafeez ii. Mudassar Naseer iii. Imran M. Siddique.		
PROJECT DURATION.	2004-2014.		

LOCATION. Horticultural Research Station, Sahiwal

TREATMENTS.

	Parantage	Specific Objectives	Varieties to be improved
Cross-1	Honey mandarin X Fairchild. Fairchild X Honey mandarin	To enhance the exterior quality of Honey mandarin	Honey mandarin
Cross-2	Honey Mandarin X Fremont. Fremont. X Honey Mandarin	-do-	Honey mandarin

PLAN OF WORK

Crosses of the aforesaid combinations will be made involving 300 flowers in each of the individual crosses. After fruit set, number of seeds will also be counted of individual hybrid fruits. Seeds of hybrid fruits will be grown to study the desired characters.

PREVIOUS YEAR’S RESULTS.

Year of cross.	Cross No.	No. of fruits.	No. of seeds.	Hybrids Produced
2013	Cross-1	18, 21	80, 300	Seeds have been sown, germination is awaited.
	Cross-2	27, 13	25, 95	Seeds have been sown, germination is awaited

Three hybrids of cross-2 (Honey Mandarin X Fre-Mont) produced during 2008 have been planted into field. One hybrid plant has beared fruit first time. This year total No. of fruits present of that plant are 18.

4. TITLE. **BREEDING OF NEW CITRUS ROOTSTOCKS.**

OBJECTIVE. To develop disease and salt tolerant rootstock for different commercial varieties.

RESEARCH WORKER(S).
i. Muzaffar Hafeez.
ii. Mudassar Naseer
iii.Imran M. Siddique.

PROJECT DURATION. 2002-2013.

LOCATION. Horticultural Research Station, Sahiwal

TREATMENTS.

	<u>Specific Objectives</u>	Rootstocks Varieties to be <u>improved.</u>
PARENTAGE		
1.Cleopatra mandarin X Poncirus trifoliate	Phytophthora tolerance in Cleopatra mandarin.	Cleopatra mandarin
2. Rough lemon X Poncirus trifoliate.	Phytophthora and Nematode tolerance in Rough Lemon.	Rough lemon
3.Volkameriana X Rangpur lime.	To induce salt tolerance in Volkameriana.	Volkameriana

PLAN OF WORK. Crosses of the aforesaid combinations will be made involving 200 flowers in each of the individual crosses. After fruit set, number of seeds will also be counted of individual hybrid fruit.

After the development of the rootstock their degree of susceptibility or tolerance would be studied in comparison to the local rootstock of Rough lemon. The most tolerant rootstock to Phytophthora, footrot and salt conditions would be subjected for further studies.

Year of cross.	Cross No.	No. of fruits.	No. of seeds.	No. of hybrids produced
2013	Cross-1	11	37	Seeds have been sown and germination is awaited.
	Cross-2	15	265	Seeds have been sown and germination is awaited.
	Cross-3	9	260	Seeds have been sown and germination is awaited.

14 Hybrids produced previously in cross No-2 have already been shifted into plot No. 3B Sq. No.2 during 2011.
8 Hybrids produced in Cross No- 2 during 2012 will be shifted into the field after attaining proper height.

5. TITLE. **STUDIES ON SUITABILITY OF DOUBLE GRAFTING TECHNIQUE IN CITRUS.**

OBJECTIVE. To study the effects of different stock/inter stock combinations to address the problem of soil salinity and fruit quality degradation of Kinnow mandarin.

RESEARCH WORKER(S). Muzaffar Hafeez.
Mudassar Naseer.

PROJECT DURATION. 2004-2013.

LOCATION. Horticultural Research Station, Sahiwal.

TREATMENTS. T-1 Rangpur lime as rootstock and Sweet lime as inter stock.

T-2 Rangpur lime as rootstock and C-35 Citrange as inter stock.
T-3 Rangpur lime as rootstock and Carrizo Citrange as inter stock.
T-4 Plants directly budded on Rangpur lime rootstock.

PLAN OF WORK. Lay out design. : RCBD.
Replications. : 4
Treatments. : 4
No. of plant per unit : 1
Treatments.
Total No. of plants. :4x4x1=16

On pencil thick rootstock seedlings of Rangpur lime; bud-wood of individual interstock will be grafted during August-September and in the succeeding spring season scion variety would be grafted on individual interstock. Plants will be permanently shifted in the field during next September-October and the observation on rootstock, inter stock and scion congeniality, rate of growth of plants, tolerance of the seedlings to the salinity and observations on yield and quality will be the part of the experiment.

PREVIOUS YEAR’S RESULTS.

Characteristic	T1	T2	T3
Height of Plant (M)	2.7	2.65	2.5
Spread (M)	1.7	2.3	2.4
Scion girth (cm)	28.6	40.1	42.3
Inter stock girth (cm)	28.7	44.5	44.1
Stock girth (cm)	25.75	35.37	38.7
Weight of Fruit (gms)	156.5	167.9	157.5
Size of Fruit (cm)	5.8/6.2	5.7/6.3	5.7/6.4
Juice Percentage	44.68	36.64	43.8
TSS(%)	13.1	12.1	13.35
Acidity (%)	0.71	0.82	0.78
TSS/acid Ratio	18.47	14.67	16.9

6. TITLE. **EFFECT OF CANOPY MANAGEMENT ON THE YIELD AND FRUIT QUALITY OF KINNOW.**

OBJECTIVE: To increase plant population, yield per unit area and to facilitate orchard management practices.

RESEARCH WORKER(S) Imran M Siddique.

PROJECT DURATION. 2004-2013.

LOCATION. Horticultural Research Station, Sahiwal

TREATMENTS. T-1 Canopy of plant will be maintained at 7 feet height and 9 feet Spread around the stem with regular pruning. Planting distance will be 12x12 feet (288 plants/acre)
T-2 Canopy of plants will be maintained at 9 feet height and 11 feet spread around the stem with regular pruning. Planting distance will be 16x16 feet(168 plants /acre).
T-0).Control (No pruning with planting distance of 24x24 feet (72 plants/acre).

PLAN OF WORK.	Lay out design.	: RCBD.
	Replications.	: 4
	Treatments.	: 3
	No. of plant per unit	: 2
	Treatments.	
	Total No. of plants.	: $4 \times 3 \times 2 = 24$

Kinnow plants of T-1 will be kept at the height of 7 feet and spread of 9 feet around the stem and plants of T-2 at the height of 9 feet and spread of 11 feet around the stem. For this purpose pruning will be done after fruit harvest every year. Fruit yield of all the treatments will be compared at the time of fruit maturity.

PREVIOUS YEAR'S RESULTS.

Rep. No.	T-1	T-2	T-3
Av. Height in feet	7.24	9.13	11.5
Av. Spread in feet	9.2	11.15	12.05
Av. Yield (Nos).	220	225	242
Av. Yield / acre (Nos)	63432	37856	17424

7. TITLE. **PERFORMANCE OF LESS SEEDED KINNOW UNDER SAHIWAL CONDITIONS.**

OBJECTIVE: To evaluate & explore the performance of less seeded Kinnow regarding market value & consumer demand.

RESEARCH WORKERS

i. Muhammad Shahzad Zafar
ii. Muzaffar Hafeez.

DURATION: 2010-2020

LOCATION: Horticultural Research Station, Sahiwal

TREATMENTS: T_1 = Seeded Kinnow
 T_2 = Less seeded Kinnow

PLAN OF WORK	Layout design	= RCBD
	No. of Treatments	= 2
	No. of Replications	= 5
	Plants per unit treatment	= 1
	Total No. of Plants	= 10

New less seeded & seeded plants will be raised at the distance 20x20 feet according to layout design. General performance in terms of growth characters

such as Plant height, Plant spread, No. of fruits per plant. Fruit Size, Fruit weight, will be studied.
Physico- Chemical characteristics of fruit such as peel thickness, No. of seeds per fruit, number of healthy seed, number of aborted seeds Juice Percentage, TSS %, Acidity and TSS & Acid ratio will also be studied.

PREVIOUS YEAR’S RESULTS.

Parameters	T1	T2
Av. Plant Height (M)	1.96	2.06
Av. Plant Spread (M)	1.02	1.29

Maximum height (2.06 M) and spread (1.29 M) was found in less seeded plants as compared to seeded plants.

8. TITLE. **EVALUATION OF VARIOUS CHEMICALS AGAINST CITRUS CANKER ON GRAPEFRUIT ‘SHAMBER’.**

OBJECTIVE: To find out most suitable chemical for the control of citrus canker for better quality fruit production

RESEARCH WORKER i.Muhammad Shahzad Zafar
ii. Muzaffar Hafeez.

DURATION 2010-2014

LOCATION: Horticultural Research Station, Sahiwal

TREATMENTS: T₀=Control
T₁=Aliette, 3g per liter of water.
T₂=Bordeaux mixture (1: 1: 100)
T₃=Flare. 1 gm/liter of water.
T₄=Bordeaux mixture + Flare.

PLAN OF WORK: Layout design. =RCBD
No. of treatments = 5
No. of Plants per treatment =1
No. of replications =5
Total No. of Plants =25
Healthy and vigorous grapefruit plants of same age will be selected and tagged according to layout design. The spray will be done in March and August with fifteen day’s intervals and data will be recorded after one month of second spray. After that data for affected leaves, lesions per leaf, affected twigs, lesions per twig, affected fruits and lesions per fruit will be recorded.

PREVIOUS YEAR’S RESULTS.

Treatments	Leaves		Twigs		Fruits	
	Affected Leaves (%)	Lesions per Leaf (%)	Affected Twigs (%)	Affected Leaves (%)	Lesions per Leaf (%)	Affected Twigs (%)
Control	8.4	0.9	0.2	8.4	0.9	0.2
Aliette	3.1	0.2	0.1	3.1	0.2	0.1
Bordeaux Mixture	3.7	0.4	0	3.7	0.4	0
Flare	5.3	0.7	0.2	5.3	0.7	0.2

Bordeaux Mix. + Flare	1.7	0.1	0	1.7	0.1	0
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Most beneficial result was found where Bordeaux Mix + Flare was sprayed followed by Aliette and Bordeaux Mixture while minimum effects were noticed where only Flare was sprayed as compared to Control.

9. TITLE.

EFFECT OF DIFFERENT ROOTSTOCKS ON THE QUALITY AND YIELD OF MAR’S EARLY SWEET ORANGE’.

OBJECTIVE:

To improve the productivity and fruit quality of promising sweet orange variety.

RESEARCH WORKERS

Muzaffar Hafeez.
Imran M. Siddique

DURATION:

2010-2020

LOCATION:

Horticultural Research Station, Sahiwal

TREATMENTS:

T-1 Rangpur lime.
T-2 Gada Dehi.
T-3 Volkameriana.
T-4 Rough Lemon.

PLAN OF WORK

Layout design = RCBD
Replications = 2
Treatments = 4
No. of Plants per replications = 4
Total No. of Plants = 32

General performance of the plants in terms of growth characters such as height, spread, stock/scion girth will be observed. Physico-chemical characteristics of fruit such as peel thickness, fruit size, juice percentage, TSS, acidity and TSS/acid ratio will be studied at the time of fruit maturity. Furthermore, contribution of different rootstocks to the yield potential will also be studied.

PREVIOUS YEAR’S RESULTS

Plants have been shifted into field during September 2012.

10. TITLE.

EVALUATION OF FOUR HYBRID ROOTSTOCKS EVOLVED AT SAHIWAL.

OBJECTIVE:

To evaluate and compare the performance of hybrid rootstocks (Rough lemon x Poncirus trifoliata)

RESEARCH WORKERS

M. Shahzad Zafar.
Mudassar Naseer.

DURATION:

2010-2020

LOCATION: Horticultural Research Station, Sahiwal

TREATMENTS: T-1 = HRS 1
T-2 = HRS 2
T-3 = HRS 3
T-4 = HRS 4

PLAN OF WORK Layout design = RCBD
Replications =1
Treatments =4
No. of Plants per replications =1
Total No. of Plants = 4

General performance of the plants in terms of growth characters such as height, spread will be observed. Physico-chemical characteristics of fruit such as peel thickness, fruit size, juice percentage, TSS, acidity and TSS/acid ratio will be studied when plants will start bearing. No of seeds per fruit, seed germination percentage will also be studies.

PREVIOUS YEAR’S RESULTS

Characteristics	T1	T2	T3	T4
Height (M)	4.1	4.4	3.4	4.3
Spread (M)	2.4	2.25	1.7	3.05
Girth (cm)	33.5	30	22.6	33.6

Maximum height was found in HRS 2 (4.4 M) while maximum spread was found in HRS 4 (3.05 M) while maximum girth was found in HRS 4 (33.6 cm)

11. TITLE. **EVALUATION OF LIME VARIETY MHR-173 UNDER SAHIWAL CLIMATE.**

OBJECTIVE: To evaluate and compare the new less seeded lime variety MHR-173 with Kaghzi Lime.

RESEARCH WORKER’S i. Muzaffar Hafeez, Horticulturist.
 ii. Mudassar Naseer

DURATION: 2011-2020

LOCATION: Horticultural Research Station, Sahiwal

TREATMENTS: T-1 – MHR-173.
 T-2 – Kaghzi Lime.

PLAN OF WORK Layout design = RCBD
Replications = 4

13. TITLE. **EFFICACY OF MICRONUTRIENTS AND POTASSIUM SPRAYS ALONE AND IN COMBINATIONS WITH WEED CONTROL TREATMENT ON WEED GROWTH, YIELD AND FRUIT QUALITY OF KINNOW.**

OBJECTIVE: To study and evaluate the effect of micronutrients and potassium with some weed control methodology on kinnow in terms of yield and fruit quality under local soil and climatic conditions.

RESEARCH WORKER(S) i. Muzaffar Hafeez
ii. Muhammad Shahzad Zafar
iii. Mudassar Naseer.

PROJECT DURATRION. 2014-2019.

LOCATION: Horticultural Research Station, Sahiwal.

TREATMENTS: T-1 Control
T-2 Zinc (0.25%).
T-3 Boron (0.25%)
T-4 K₂O (1%).
T-5 Zinc + Boron
T-6 Boron+ K₂O.
T-7 Zinc + K₂O
T-8 Zinc + Boron + K₂O.
Weed Control Treatment
T-1 Control
T-2 Hand hoeing
T-3 Glyphosate (Roundup)

PLAN OF WORK: Lay out design. : RCBD.
Treatments. : 8
Replications. : 2
No. of plants per unit : 1
Treatment.
Total No. of plants. : 16

General performance of the plants in terms of growth characters such as height, spread and canopy volume of individual trees will be studied. Yield and physico-chemical characteristics of fruit such as No. of fruits per tree, fruit weight, fruit size, peel thickness, juice percentage, TSS%, acidity and TSS/acid ratio, No. of weeds will be studied.

14. TITLE. **REDUCTION IN FRUIT CRACKING IN SWEET ORANGE CV. MUSAMBI FOLLOWING A FOLIAR APPLICAION WITH PACLOBUTRAZOL AND ZINC SULPHATE.**

OBJECTIVE: To study and compare the effect of paclobutrazol and zinc sulphate on musambi in terms of yield and fruit quality under local soil and climatic conditions.

RESEARCH
WORKER(S). i. Muzaffar Hafeez
ii. Muhammad Shahzad Zafar
iii. Mudassar Naseer.

PROJECT
DURATRION: 2014-2019.

LOCATION: Horticultural Research Station, Sahiwal.

TREATMENTS: T-1 Control
T-2 Zinc (0.4%).
T-3 Zinc (0.5%)
T-4 Paclobutrazol (100 ppm).
T-5 Paclobutrazol (150 ppm)
T-6 Zinc (0.4%)+ Paclobutrazol (100 ppm).
T-7 Zinc (0.4%)+ Paclobutrazol (150 ppm).
T-8 Zinc (0.5%)+ Paclobutrazol (100 ppm).
T-9 Zinc (0.5%)+ Paclobutrazol (150 ppm).

PLAN OF WORK: Lay out design. : RCBD.
Treatments. : 9
Replications. : 2
No. of plants per unit : 1
Treatment.
Total No. of plants. : 18.

General performance of the plants in terms of growth characters such as height, spread and canopy volume of individual trees will be studied. Yield and physico-chemical characteristics of fruit such as No. of fruits per tree, fruit weight, fruit size, peel thickness, juice percentage, TSS%, acidity and TSS/acid ratio will be studied.

15. TITLE: **EFFECT OF FOLIAR SPRAYS OF VARIOUS MICRO AND MACRONUTRIENTS ON FRUIT SET, YIELD AND FRUIT QUALITY OF GRAPEFRUIT CV. SHAMBER.**

OBJECTIVE: To study and compare the effect of micro and macronutrients on grapefruit in terms of yield and fruit quality under local soil and climatic conditions.

RESEARCH
WORKER(S): i. Muzaffar Hafeez
ii. Muhammad Shahzad Zafar
iii. Mudassar Naseer.

PROJECT
DURATRION: 2014-2020.

LOCATION: Horticultural Research Station, Sahiwal.

TREATMENTS: T-1 Control
T-2 Zinc (1%).
T-3 Fe (0.5%)

T-4 K_2O (1%)
T-5 Zinc + Fe.
T-6 Zinc + K_2O
T-7 Fe + K_2O
T-8 Zinc + Fe+ K_2O .

PLAN OF WORK: Lay out design. : RCBD.
Treatments. :8
Replications. : 2
No. of plants per unit : 1
Treatment.
Total No. of plants. : 16

General performance of the plants in terms of growth characters such as height, spread and canopy volume of individual trees will be studied. Yield and physico-chemical characteristics of fruit such as No. of fruits per tree, fruit weight, fruit size, peel thickness, juice percentage, TSS%, acidity and TSS/acid ratio will be studied.