

RESEARCH FACILITIES ON CITRUS FRUIT IN PAKISTAN WHAT MORE IS NEEDED

*Niaz Ahmad Chaudhary**, *Tanveer Ahmad Mohar***, *Muhammad Ishfaq ***

* Horticulturist

** Assistant Horticulturist, Citrus Research Station, Sargodha

Citrus is mainly grown in Sargodha, Faisalabad, Multan, Bahawalpur and Gujranwala Divisions and to some extent in Hyderabad and Peshawar Divisions. Although a reasonable area had been brought under Citrus and it is on increasing trend, yet production per unit area is much less, if we compare the yield with other Citrus growing countries of the world. Growing of Citrus is highly a technical job and its successful and profitable cultivation totally depends on the scientific cultivation technologies.

A number of problems namely, non availability of disease free planting material; general neglect, irregular bearing, scarcity of water for irrigation, poor water management practices, cultivation in unsuitable soils, improper use of rootstock, imbalance use of fertilizers, non availability of proper gene pool, monoculture incidence of pests and diseases, improper handling of fruits are being faced by the citrus growers. To address these problems a systematic research is the need of the day. The present research activities on this important fruit crop are too meager to overcome the day to day problems. At present the following research stations have been assigned the duties to conduct research on Citrus.

Horticultural Research Station, Sahiwal

History

Established in 1935 as Sub-Station. Upgraded in 1971 as Research Station, with Sub-Station at Sargodha.

Objectives

- Rootstock standardization
- Introduction of superior varieties
- Determination of nutritional requirements.
- Survey for bud selection
- Production of pedigreed nursery plants.
- Advisory services.

Research Staff

Horticulturist	One
Assistant Horticulturist	Two
Assistant Research Officer	Three

Research Area 87 acres

Gene Pool available with the Station

Citrus Group	No. of varieties
Sweet Orange	38
Grape Fruit	11
Mandarin	17
Tangerine	6
Tangelo	5
Lemon	19
Sweet Lime	3
Lime	3
Ornamental	6
Rootstock	
Local	22
Exotic	23
Total	153

On Going Research Programme

1. Varietal trial on sweet orange varieties imported from Italy.
 - a. Washington navel
 - b. Navelina
 - c. Sanguinello

- d. Tarocco
- e. Moro
2. Studies on the nutritional requirements of kinnow in pre-bearing, early bearing and full bearing ages.
3. Studies to find out the best time for the application of Nitrogen to kinnow in pre-bearing, early bearing and full bearing ages.
4. Varietal trial on sweet orange varieties imported from USA.
 - a. Atwood Early Navel
 - b. Hamlin
 - c. Olinda Valencia
 - d. Tarocco-
 - e. Hinckley
5. Varietal trial on Grapefruit varieties imported from USA.
 - a. Frost Marsh
 - b. Reed
 - c. Shamber
 - d. Ruby Red
6. Effect of double grafting on the vigor, yield and quality of scion varieties.
 - a. Inter stocks used (Kinnow & Orlando)
 - b. Control (Plants directly budded on rough lemon)
7. Effect of different rootstocks on the yield and quality of kinnow mandarin.
 - a. C-35 Citrange
 - b. Rubidoux trifoliolate
 - c. Rough lemon
8. Evaluation of new Citrus varieties through hybridization.
 - a. Orlando x kinnow
 - b. Kinnow x Hamlin
 - c. Orlando x Fairchild
9. Effect of different rootstocks on yield and quality of kinnow mandarin.
 - a. Rough lemon
 - b. Volkameriana
 - c. Rangpur lime
 - d. Eustis lime
 - e. Kinnow
10. Response of Sweet orange to Diazotrophic (Azotobacter + Azospirillum) inoculation.
11. Effect of different rootstocks on growth, yield and quality of Salustiana sweet orange.
 - a. Gada Dehi
 - b. Carrizo Citrange
 - c. Troyer Citrange
 - d. Mithi
 - e. Kharna Khatta
 - f. Jamberi Ceylon
12. Effect of different rootstocks on yield and quality of Musambi sweet orange.
 - a. Rough lemon
 - b. Volkameriana
 - c. Rangpur Lime
 - d. Eustis Lime
 - e. Kinnow
13. Effect of different sowing methods on the germination and survival percentage upto their transplanting for various Citrus rootstocks.
14. Effect of different sowing dates on the germination and polyembryony of Citrus rootstock seeds.
15. Studies on the high density plantation in Shamber Grapefruit.
16. Studies on the high density plantation in kinnow mandarin.

CITRUS RESEARCH STATION, SARGODHA

History

- Established Horticultural Research Sub-Station during 1974 under the Scheme “Intensification of Research on Citrus Fruits in Punjab”.
- Started research work during 1977 with the posting of Assistant Horticulturist.

- The Sub-Station was upgraded to the full-fledged Station with effect from August 28, 2001.
- The station started its function of research work after posting of Horticulturist and other technical staff during July, 2002.

Objective

- To conduct survey for selection and collection of seedless kinnow strains
- To develop modern technology for high quality kinnow production for export
- To provide certified/true to type healthy nursery plants of Citrus to the growers
- To ascertain the field problems of Citrus growers and feed back remedial measures to the Extension Staff.

Research Staff

Horticulturist	One
Assistant Horticulturist	Two
Assistant Research Officer	Five
Research Area	42 acres

Available Gene pool

Orange

Musambi, Pineapple, Jafa, Blood red, Valencia late, Newhall, Nevelina, Navelate, Taracco, Salustiana, Moro, Washington navel, Sanguinello, Ruby blood, Hamlin, Succari

Mandarin

Feutrell's early, Kinnow, Fremont, Fairchild, Clementine, Clauslino, Muroctt, Satsuma, Honey.

Grapefruit

Shamber, Redublush, Foster, Marshseedless, Ruby red.

Lemon

Eurika

Sweet lime

Palestine

Acid lime

Kaghzi, Eustis, Tahiti

Tangelo

Orlando, Pearl, Mineola

On Going Research Programme

1. Studies on the effect of micronutrients on yield and quality in Kinnow
2. Comparison of four different methods of irrigation in Kinnow orchard
3. Studies on Canopy Management in Citrus high Density Plantation
4. Control of Weeds in Citrus orchard through Weedicides and Regular Ploughings
5. Survey for the Selection of less seeded Kinnow
6. Studies on the Propagation of Citrus Plants in Polyethylene Bags
7. Studies on the effect of different root stocks on Kinnow yield and Quality
8. Screening of Fungicides for the control of diplodia Associated Diseases in Kinnow
9. Studies on the control of Phytophthora induced diseases with Fungicides in Kinnow Orchard
10. Studies on the Epidemiology of diseases in Citrus orchards
11. Comparative efficacy of different insecticides for the control of Citrus Psylla.
12. Control of Pre-harvest fruit drop in Kinnow
13. Effect of different intercrops in young Citrus orchards

HORTICULTURIST, AYUB

AGRICULTURAL RESEARCH INSTITUTE, FAISALABAD

Horticulturist	One
Assistant Horticulturist	One
Assistant Research Officer	Three
Research Area	12 acres

Objectives:

1. Introduction of superior varieties
2. Determination of nutritional requirement
3. Production of Pedigreed nursery plants.
4. Advisory services.

Research Material for Citrus with Horticulturist Ayub Agricultural Research Institute, Faisalabad includes

1. Orange varieties
2. Mandarin varieties
3. Grape fruit

Research Work

1. Breeding
2. Nutritional studies
3. Agronomic studies
4. Orchard Management studies

**BARANI AGRICULTURAL
RESEARCH INSTITUTE,
CHAKWAL**

Research Staff

Horticulturist	One
Assistant Horticulturist	Two
Assistant Research Officer	Two
Research Area	5 acres

Objectives

1. Introduction of superior varieties
2. Determination of nutritional requirements
3. Production of pedigreed nursery plants
4. Advisory Services

Varieties under Trial

Sweet Orange	14
Mandarin	10
Grapefruit	5
Sweet lime	2
Tangelo	2

On Going Research Programme

1. Studies on behavior of sweet orange varieties
2. Introduction and acclimatization of Mandarins
3. Varietal trial on Grape fruits
4. Observation trial on Sweet lime varieties.

**FUTURE NEEDS FOR
DEVELOPMENT OF CITRUS**

Research Needs

- Improvement in manpower.
- Improvement in research facilities
- Improvement in plant materials
- Encouragement of the Scientists

I- IMPROVEMENT IN MANPOWER

a) There could be no doubt that without trained and competent manpower, research or development activities cannot be effectively pursued. In spite of rapid increase in area and problems associated with cultivation of citrus in Pakistan. Only one research station at Sahiwal with a limited staff remained functioning for Citriculture research. No. sincere efforts were made for staff development. It is thus imperative that to improve the research and development work on citrus improvement in manpower should be brought about at the earliest.

b) Regular interaction with foreign Research Institutions

At present there are no effective interactions of Pakistan Citrus Research Institutions with the institutes of repute in the world. It is the need of the time that citrus specialists of our country should.

1. Get membership of international citrus organizations
2. Visit citrus growing countries of the world
3. Visit foreign research institution
4. Attend the international gatherings & seminars.

c) Specialists in Citrus Research Institution should be associated with teaching

This will provide the students with fresh on farm problems and limitations of fruit growers. The students will also be abreast with the research activities of research. This activity has been started for the last two years. But more time & devotion is needed.

II- IMPROVEMENT IN RESEARCH FACILITIES

a) Increase in operational Funds

It is estimated that for research a minimum of forty percent of the total budget allocation for any research institute should be earmarked for operational funds whereas at present the operational funds constitute only less than 15 percent of the total budget.

b) Provision of sufficient area for research

Unlike farm crops where the same area can be utilized again and again for different experiments, in Citriculture research experiments are laid out comparatively for longer period as such much more area is required for research on citrus fruits. Citrus is compound of many groups i.e. Mandarin, Oranges, Grape Fruit, Pomellos, lemon & limes, Tangerines, Tangelos and other hybrids. All these groups have so many varieties. Research activities on these varieties to cover other aspects of management and

production, the demand for more area is justified.

c) Up to date literature and Books

The book and journals at present cannot fulfill the requirements of scientist engaged in Citriculture research. The shortage of funds for this important issue is a hindrance. Provision of upto date literature will surely improve the research and development activities.

d) Use of Modern Equipment

Citrus research stations at Sahiwal and Sargodha have not been equipped with modern scientific equipments. Laboratory and field equipments for entomology, pathology, soil chemistry, post harvest and production section should be provided to citrus research institutes

e) Establishment of Laboratories

At present no laboratory at any Citrus research station exists for laboratory studies of pests, diseases, plant and soil analysis, post harvest studies etc. Appropriate building of laboratories with necessary apparatus should be provided.

f) Complicated system of payments

The present system of funds provision and disbursement is so complicated that most of the research staff remains busy in the business of purchases through District Accounts Offices. Government should trust on DDO's and an easy method of payments through Cheques may be introduced. The scientist in this way will pay full attention to research activities.

g) Strengthening of Post Harvest Research

Citrus production at present is more than two million tones. Pakistan is exporting a reasonable quantity of Citrus, yet modern post harvest techniques are practically not employed. If post harvest handling through comprehensive research is improved, the country can earn much foreign exchange from the Citrus export.

h) Establishment of new Research Stations

The Citrus cultivation was confined to Sargodha, Faisalabad, TT Singh, but now more area has been brought under Citrus cultivation in T.T. Singh, Multan, Bahawalpur and Vehari area. It is the need of the time to establish more research stations at T.T. Sing, Vehari and Multan to compete the day to day researchable issues.

III- IMPROVEMENT IN PLANT MATERIAL

a) Research on Breeding Aspect

A few crosses at university of agriculture, Faisalabad, Horticultural Research Institute at Faisalabad and Sahiwal were made, but no regular breeding programme could be started for evolution of new rootstock and scion varieties. It is suggested that in future breeding work be initiated to improve the present varieties for future.

b) Enrichment Germ Plasm

At present, majority of varieties in Citrus are introduced from few countries. It is necessary that scientists from Pakistan should visit the Citrus growing countries of the world and select the materials themselves for introduction and acclimatization in Pakistan, instead of booking orders on the basis of lists.

c) Encouragement of Scientists

Research provides the basis for improvement in productivity and quality.

Evaluation of the research work and the research workers should be regularly carried out and research workers be encouraged financially and status wise. At present promotion formula in agricultural research is so ineffective that a scientist may take 15-20 years or even more to be promoted to next grade.

Development Needs

1. Effective linkage between research and extension
2. Specialized extension for Citrus in Citrus growing areas.
3. Refresher courses/In service training for extension workers
4. Provision of proper machinery for citrus orchards management.

References

1. Annual Technical report. 2002-2003 Citrus Research Station, Sargodha. pp. 1-40
2. Annual Technical Report, 2002-03. Horticultural Research Institute, Faisalabad pp. 1-21
3. Annual Technical Report. 2002-2003. Barani Agricultural Research Institute, Chakwal pp. 1-14
4. Annual Research Programme, 2003-2004. Citrus Research Station, Sargodha. pp. 1-15
5. Daud A Khan. 1993. Problems and prospects of Horticulture in Pakistan.
6. Muhammad Hussain, 1993. Research and Development needs of tropical and sub-tropical Horticulture in Pakistan
7. Niaz, A. Chaudhary. 1999-2000. Status of Citrus Research in Punjab (Sahiwal) pp.1-17.