MAHATMA PHULE KRISHI VIDYAPEETH, RAHURI

All India Coordinated Research Project on Fruits

1.Name & complete address of Research scheme/centre :

All India Coordinated Research Project on Fruits
Department of Horticulture, Mahatma Phule Krishi Vidyapeeth, Rahuri Dist.
Ahmednagar-413722

2.Year of Establishment : 2013

3.Major objectives/Mandate for establishment of Research Scheme/Centre :

a. Identification and release of varieties and hybrids for mandated fruits through multi-locational testing (MLTs).
b. Maintenance of safety duplicates besides evaluation and augmentation of germplasm in mandated fruits with National Active Germplasm Sites (NAGS).
c. Evolving technologies for improved input-use-efficiency and plant health management of mandated fruits under different agro-climatic zones.
d. Partnering in need-based service oriented support to National Agriculture Research System (NARS).

4. Historical background :

The complexity of citrus decline problem during the last few decades has been assigned to many factors which gave birth to the scheme originally captioned as "Citrus Dieback Research Scheme" in the year 1956 at Pune, with the prime object to investigate the causes and to suggest remedial measures. The sole of the project was to find out factors responsible for citrus die back in Western Maharashtra and to standardize the control measures. The scheme was later on shifted to Shrirampur in 1959. The Scheme was merged into All India Co-ordinated Research Project on Tropical Fruits in 1970 with revised technical programme. Subsequently, the Head quarter of the Scheme was shifted to Rahuri in 1987. In the 7th five year plan, research on Acid Lime was also allotted in addition to the work on Sweet Orange. Presently, the research work is conducted both at Rahuri and Shrirampur only on the evaluation and production technology aspects.

The AICRP on Sub Tropical Fruits was established at the end of VIIth five year plan (1989) and started its functioning since June, 1990. The project started with the mandate of collection, conservation of germplasm, besides evaluation of the suitable crop production and plant protection technology of Grapes. To cater the research need of local problems of grapes in the state was one of the objectives. In due course of time valuable and needed recommendations

were given by the project. Further, more two crops *viz.,* Guava and Mango were added to the centre and suitable recommendations on these crops were also given. Thus, need based recommendations on Grape and Mango have been released by the project either through ICAR or University (state) experiments.

These two projects i.e. AICRP on Sub-Tropical Fruits and AICRP on Tropical Fruits were merged to form as AICRP on Fruits as per circular No. L1/Change (STF-TF) 2013 /129/dated. 21.8.2013 received from the Director & Project Coordinator (Fruits), Indian Institute of Horticultural Research, Hessaraghatta Lake Post, Bengaluru-560 089. In its present form the project is functioning under the Department of Horticulture, MPKV, Rahuri w. e. f. 21.8.2013. Presently the project is conducting research work at Rahuri and Shrirampur on Citrus (Sweet Orange and Acid Lime), Grape, Mango and Guava pertaining to evaluation and production technology.

5. Details of the sanctioned posts :

Sr.No.	Designation	Sanctioned post
1	Officer In-charge and Horticulturist (Associate Professor of Horticulture)	1
2	Horticulturist	1
3	Jr. Horticulturist (Assistant Professor of Horticulture)	2
4	Junior Entomologist cum Nematologist (Assistant Professor of Entomology)	1
5	Junior Plant Pathologist (Assistant Professor of Plant Pathology)	2
6	Sr. Technical Assistant (Senior Research Assistant)	2
7	Technician (Agril. Assistant)	2
8	Field men (Agril. Assistant)	2
9	Lab Assistant (Agril. Assistant)	1
10	Typist cum clerk	1
11	Mali	3
12	Budder	1
13	Lab Attendant	2
	Total	**21**

6. Significant/innovative activities and programmes implemented by the Research Scheme/Centre :

- The Research Project on AICRP on Fruits, MPKV,Rahuri centre has contributed a lot for the farmers of Maharashtra by developing three varieties of fruit crops (Acid lime-2 and Sweet orange-1) and many more different technologies.
- Since from the year 2000, this research project has developed 69 technologies in the field of crop improvement, crop production and plant protection.

- AICRP on Fruit project had generated funds through product testing and production of planting material (Revolving fund) and these funds are utilized for strengthening of the project.
- Along with important research work, the scientists working in the scheme are actively involved in dessimination of newly developed technologies in grape, guava, mango and citrus crops on farmers field.
- Scientists are actively involved in the activity by participating in different melas, delivering lectures in different farmers training programme, farmers-scientists forum, diagnostic visits, delivering TV talks, radio talks and timely resolving the queries of the farmers.

7. Major improved/hybrid varieties, agriculture technologies developed at Research scheme/centre

Varieties released : Three varieties

Crop	Name of variety	Year of release
Acid lime	1. *Sai Sharbati*(RHR-L-49)	1994
	2. *Phule Sharbati*(RHR-L-124)	2008
Sweet orange	1. *Phule Mosambi*	2008
Sweet orange	2. Selection-7	Pre-release in 2023-24

8. Major agricultural technological recommendations released by research scheme/Centre

a. Standardization of stage wise water requirement in sweet orange: Irrigation at 80 % evaporation through drip for all growing period (January-October) with water stress in November-December is recommended for better growth, yield and quality fruits with efficient utilization of irrigation water in *Ambia bahar* of sweet orange in Western Maharashtra.

b. Identification of critical stages of water requirement in Citrus: Irrigation at 80 % evaporation through drip for all growing period (January-October) with water stress in stage VI (November-December) is recommended for better growth, flowering, fruit development, yield and quality citrus fruits with efficient and timely utilization of irrigation water using micro-irrigation systems in *Ambia* flush of mandarins, sweet orange and acid lime growing states of India.

c. Studies on irrigation and nutrient interaction in Citrus: Irrigation schedule at 80-90 % Evaporation Replenishment (ER) with 70-80 % RDF fertigation through drip irrigation system during the flowering to fruit development in summer months (January-June) with water stress in December is recommended for better plant growth, higher yield and quality fruits with efficient utilization of irrigation water and fertilizers in *Ambia bahar* of mandarin, sweet orange and acid lime in India.

d. Organic production of Citrus - sweet orange: Application of 75 % Vermicompost (On N-equivalent basis of RDF) + *Trichoderma harzianum* (30-40 ml/plant) + Azadirachtin (1 % at 3-4 ml/litre as spray) + *Pseudomonas fluorescence* (30-40 ml/plant) in the month of January is recommended for better growth, yield, quality, shelf life of fruits with improvement in soil

health, minimum pest population and disease incidence in *Ambia bahar* of sweet orange planted in medium black soils of Western Maharashtra.

e. Standardization of stage wise water requirement in acid lime: For acid lime growing under Western Maharashtra**,** irrigation at 60:80:60:80:60:80 % ER during January to December is recommended for better growth, yield, fruit quality with efficient water use.

f. Residual and cumulative effect of nutrients in Sweet orange

Application of 1/10th of RDF for 1 to 10 years followed by application of 100% RDF after 10 years helped to obtain higher yield in Mosambi orchards of different age groups to save about 25% nutrients in long run.

g.Evaluation of substrate dynamics for IPNM in Guava : Application of 50% recommended dose of fertilizers along with 25 kg of FYM and 250 g of Azatobactor was found effective to increase the yield by 30 per cent with highest cost benefit ratio of 2.6 in guava variety cv. Sardar.

h. Fruit bagging in Mango cv. Kesar : For quality fruit production and more monetary returns from mango Cv. kesar it is recommended to bag the mango fruits with scurting bags (fruit bag) at egg stage.

i. Ultra high density planting of mango cv. Kesar : The Ultra high density planting system in mango (Cv. Kesar) along with following packages of practices is recommended for Western Maharashtra to get higher yield.

- ✓ Planting of mango at a distance of 3X2 m (1666 plants/ha)
- ✓ Application of Paclobutryazole @ 0.5 ml/running feet of plant canopy in the month of August (3rd year onward)
- ✓ Spray of KNO_3 @ 20 g/l of water after 1 month of flowering. (3rd year onward)

j. Beheading in mango cv. Kesar : It is recommended that old, senile, high density (5x5m) planted mango orchard cv. Kesar should be beheaded at 1.5m height from ground level for higher fruit yield during November December in western Maharashtra.

k.Evaluation of Arka Microbial Consortium (AMC) for guava

The treatment of 75% RDF + AMC application (12.5 kg/ha) twice a year along FYM was recommended to increase fruit yield and quality with 25% saving of RDF in guava

Crop Protection

l. Management of Citrus psylla in sweet orange : Foliar application of novaluron 10EC (0.005%) @ 0.5 ml/l or azadirachtin (1%) @ 4 ml/l or petroleum oil spray (5 ml/l) twice at 15 days interval coinciding with peak activity of the pest was recommended against Citrus psylla up to 14 days in sweet orange

m. Management of leaf miner in Citrus (Nursery/ young orchards) : Foliar application of neem formulation 10000 ppm @ 5ml/l followed by spinosad (0.002%) or thiamethoxam (0.025%) at 7 days interval during the new flushing perio effectively manage citrus leaf miner up to 14 days after spraying.

n. Management of citrus thrips, aphids and blackfly : Application of Azadiractin 10,000 ppm @ 5 ml/l followed by spinosad 45 SC (0.002%) was found effective and recorded lowest population of citrus aphids and psylla population at 14 days after spray at Rahuri. However, at Tirupati, the spray schedule with neem formulation 10,000 ppm @ 5ml/l followed by

thiamethoxam 25 WG (0.025%) recorded lowest population of aphids, psylla and black flies. The residues of effective pesticides in all samples were found below detectable level.

o. Management of fruit sucking moth in sweet orange :

The application of Neem oil 1% @ 10 ml/l at colour breaking stage against fruit sucking moth reduced the fruit drop (10-24%) and enhanced the number of marketable fruits (21-54% in citrus).

p. Management of greening disease in citrus :

Two sprays of Tetracycline hydrochloride @ 6 g/10 lit. of water at an interval of 45 days in the month of October to December and soil application of 50% more than recommended dose of Phosphorus (along with recommended dose of nitrogen and postash) and 15 days later ZnSO4 (200g/plant), FeSO4 (200 g/plant) is recommended for effective management of greening disease of citrus.

q. Management of grape thrips, jassids and mealy bug : Soil drenching with imidacloprid 70 WG @ 0.45 g/l/ vine twice at 20 and 40 days after forward pruning is recommended against thrips, jassids and mealy bug in grapes

r. Management of guava anthracnose : Carbendazim + Mancozeb (2g/l) was found effective in reducing percent index of guava anthracnose.

s. Management of mango hopper : First spray of spinosad (0.004%) at panicle emergence stage followed by second spray (21 after first spray) with thiamethoxam (0.008%) and third need-based spray of Neemazal (10000 ppm @ 3 ml/l) was most effective at Mohanpur and Rahuri which recorded less number of hoppers per panicle (1.67 & 0.92/panicle).

t.Management of sucking pest complex with botanical formulations in mango

The combination of the treatments first spray with Azadirachtin 10000 ppm (3 ml/L) and second spray with Neem soap (IIHR product) at 10 g/L and third spray with Pongamia soap (IIHR product) at 10 g/L effectively managed the mango hopper with higher population reduction.

Spray schedule

1st Spray: At panicle initiation stage

2nd spray: 15 days after 1st spray

3rd spray: 15 days after 2nd spray

u. Cost effective management of post-harvest anthracnose of mango by pre and post-harvest treatments : Three sprays of Hexaconazole (0.1%) followed by hot water treatment (52ºC for 10 min) alone was found most effective in controlling post-harvest anthracnose of mango.

9. Future road map of the research :

- To address the evolving challenges in fruit cultivation, production and plant protection.
- Collection , conservation and characterization of germplasms of citrus, grape, guava and mango.
- To develop high-yielding, pest and disease resistant and climate-resilient fruit varieties that can be grown in diverse environmental conditions.
- Develop mobile apps that provide farmers with information on fruit crop cultivation practices ,production technology, pest and disease management.

- To evaluate drought, pest and disease tolerant rootstocks and cultivars that can thrive under extreme climatic conditions.
- Conduct studies on new and emerging pest and diseases on fruit crops
- Promote integrated pest management IPM practices in fruit crops and minimise the use of chemical pesticides.
- Studies on advance techniques using drones, remote sensors, and IoT devices for vineyard monitoring, including soil moisture, temperature, and grapevine health.
- Establish research networks with other universities and ICAR research institutions to address common challenges in viticulture.
- Conduct regular impact assessments to measure the adoption of new technologies and varieties by farmers and stakeholders.
- Publish research findings through scientific journals, extension and university publications.

10. Measures required for improvement/strengthening of the research scheme/centre.

- Develop automated systems for pruning and canopy management, harvesting in HDP mango to reduce labor costs and increase operational efficiency.
- Attraction of funds through product testing, production of planting material and adhoc projects on fruit crops
- Developing effective extension services to transfer research findings to farmers /fruit growers.
- Creating digital platforms or mobile apps to provide real-time advice on fruit cultivation, pest disease outbreaks and management.
- Evaluation of fruit varieties that can withstand extreme weather conditions like droughts or floods.
- Filling of the vacant posts for efficient and smooth functioning of the project.

11. Photographs of historical and innovative activities of the research scheme/centre

Phule Sharbati 	

Sai Sharbati 	
Phule Mosambi 	 Phule Mosambi
	

High Density Planting Technology in Mango