

FARM COORDINATOR

... the technical newsletter



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From Director's Desk...

The onset of south-west monsoon may aptly be called as the beginning of 'Agricultural New Year'. It brings a ray of hope for overall agriculture community and the country. This time the 'Agricultural New Year' has been very happy. The south-west monsoon has arrived on June 11 i.e., on time. It is predicted that there will be a good rainfall this year. At NIASM farm, preparations for *kharif* season were already initiated, some sowing has been completed. Maintenance of orchards especially canopy management, plant protection and nutrition management are in progress as per requirement.



(Himanshu Pathak)

Being an Institute working on abiotic stress management; the onset, performance and withdrawal of monsoon is very important, particularly under climate change scenarios. The researchers should observe it very carefully and plan their project activities to minimize the stress effects. 'Farm Coordinator' is an initiative to sketch all these efforts on a gray canvas. It presents the activities, assesses the achievements and plan for future targets. It also provides some basic but very important information on crop management for the coming month.

I sincerely hope that this effort will improve research farm management in NIASM and elsewhere. I thank Dr Pravin Taware and the team for their dedication and sincerity.

June 30, 2020



Dragon fruit in bloom

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Plan For Progress

Onset of monsoon at campus has been reported from 11th June with initial showers followed by windy and cloudy weather. Being a rain shadow area here is a common phenomenon of dry spell with intermittent drizzling. So far about 158 mm rainfall is recorded this month at campus. The prediction says that it is likely to have good rain during July and August. Therefore, experimental sowing for *Kharif* season is the main priority ahead. In view of this, preparatory tillage and layout preparation works have been already started.

This period is characterized with flowering in dragon fruit orchard. Thinning of shoots as a part of canopy management was completed before flowering for proper ventilation in orchard and ease in accessibility for various cultural operations, plant protection and harvesting. Similarly, at the end of fruiting season, its time to take up canopy management operations in mango. Being in high density planting system, it is very much necessary that the trees should be shaped for better utilization of sunlight and reduce the incidence of pest and diseases. Looking into prevailing cloudy weather, use of biological agents was started for management of pests and diseases in orchards and it will be continued further.

Development of water storage facility at southern side of the farm was in progress. Related earthwork has been completed and it will be ready soon. This is going to help in efficient use of irrigation water in farm.



Preparations for Kharif season sowing: As planned earlier field preparation for Kharif season was given priority during the month of June 2020. Fallow cultivation after crop harvesting was continued that included plough work followed by use of fine tillage implements like harrow and cultivator. When the fields were at fine tilth, final layout preparation was taken up that included ridge-furrow layout and flat beds preparation. Water channels were prepared to facilitate flood irrigation. Seed sowing was initiated in some fields e.g. dhaincha sown in B-4 field, mungbean in D-1,2 and soybean in C-6, D-5,6 and E-5 fields. Seed, fertilizer and agrochemicals procurement for general crops sowing is already in progress.

Irrigation activities: Lift irrigation system was operated full time for irrigation to standing crops. All the orchards were at their peak water requirement stage, therefore pumping water to store in water balancing tank was given priority. Engine pump was operated during load shading.

Development work of water storage tank was an important task that was initiated last month. The earth work was completed with the help of hired machinery. Fine finishing of the slopes as per standards has been taken up with the help of institute's machinery.





Threshing for preserved seeds: Seeds for experimental sowing of soybean varieties were preserved from last season in the form of pods. Seed separation from soybean pods, wheat from individual earheads was carried out manually. Soybean seeds were to be used for sowing during this season and wheat seeds are to be preserved for *rabi* season. Selective threshing of wheat and quinoa was also carried out for seed preservation purpose.

Trash remains after harvesting and threshing of wheat, maize and quinoa was collected for decomposing at composting unit. All other agro-waste material was also shredded with the help of tractor operated machine and used for composting.



Peripheral plants maintenance: During heavy winds last month, few coconut leaves have fallen down on road and dried up. A round was taken twice during this period to remove these leaves and clean stems. Round to rough out weeds along peripheral road was also completed.

General campus cleaning: There was vigorous weed growth due to intermittent pre-monsoon and monsoon showers. Wherever possible tractor tillage was used to turn down weeds. Hand weeding was taken up to rough out weeds that was handed over for fodder purpose or for composting.



Shoot thinning and sub-cane pinching in grape: One month after back pruning during initial shoot growth stage, shoot thinning was carried out to maintain about 30-36 shoots per grapevine (J5). All downward facing shoots were removed along with abnormally vigorous and weak shoots to maintain desired canopy size. Since early June, due to cloudy weather and increased humidity, shoot growth was very vigorous. Therefore, immediately after shoot thinning, shoot tips were pinched at 7th bud to develop sub-canes. This is required to ensure fruit bud differentiation in the canes during more shoot vigour. Water withholding for a week was also practiced to harness shoot vigour.

Dragon fruit plant canopy management: Being long day plant, flowering in dragon fruit generally starts from June. Therefore, training and pruning of dragon fruit plants was taken up. The shoots damaged due to sunburn and near ground growth were removed completely. There were large number of shoots on some plants resulting crowding. Therefore, into shoot shoot thinning was also carried out for sparse shoot density to maintain proper ventilation. It will facilitate ease in cultural operations, plant protection and harvesting. The onset of flowering was reported from June 15, 2020 and fruit harvest will start from mid-July.

Harvesting in Orchards: Sweet orange and karonda fruits were harvested during this period. Initially disposal of fruits was managed through campus sale only. From second fortnight the APMC market was opened, sweet orange was sent to market after campus sale. In case of mango, though flowering was abundant, fruit set was less and also there was much fruit drop due to two thunderstorms during month of may.



Farm Yard Manure application: Farm yard manure supply continued from mid May to the first week of June 2020. Simultaneously its application in orchards was started and continued during this month. Rings were opened along the plants considering its growth and 20-30 Kg FYM was applied in ring. Total 75-brass of FYM was procured during this period and applied in selective orchards.



Plant Protection Measures:

- In pomegranate late *ambe bahar* fruits were in development stage. Copper oxy chloride 2.0g/L and Chlorpyriphos 1.5 ml/L were sprayed to take care of blight and fruit borer incidence.
- Due to drizzling rains in second week there was chance of anthracnose and downy mildew in grape. Therefore, sprayed Mancozeb 2.0 g/L along with Buprofezin 25SC 1.25 ml/L to get rid of sucking pest.
- Spraying of Azadirachtin 1% 1.0ml/L was carried out in dragon fruit as preliminary measures for fruit fly management.
- Foliar spraying of nutrients through 0:52:34 2g/L along with micronutrients was carried out in sweet orange & grape.
- Both pomegranate and grape orchards were sprayed twice during 2nd fortnight with biological control agents like *Trichoderma harzianum*, *Pseudomonas fluorescens* and *Metarhizium anisopliae*.

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Kharif crops sowing activities: Field preparation has been already completed. Now priority is for layout preparation and sowing of general as well as research *kharif* crops during first half of July. Field allotment was completed well before in May 2020 so as to facilitate field preparation as desired by project leaders. In view of this targets for next month are as follows;

- Layout preparation as soon as the dry spell is observed for some period
- Research field sowing of soybean, mungbean, pigeon pea, maize, etc. by dibbling method
- General sowing of soybean and maize mechanically with seed drill
- Sowing of dhaincha in some general native soil fields those exhibit poor performance during previous season
- Use of permitted pre- and post- emergent herbicides for weed management in general fields
- Facilitating inter-cultivation, irrigation, fertilization, spraying operations in research fields.
- Sowing and plantation program in Climate Resilient Integrated Farming System will be carried out as planned by PI.



Agro-waste Composting program: Lots of agro-waste is being collected every day from field crops, tree prunings, weeds, etc. Effective plan will be implemented to compost all this material for reusing as organic manure. Tractor operated mulcher and shredder machine will be used to cut waste material into small pieces. Suitable microbial decomposers along with chemical additives will be used for easv decomposition. Vermicomposting and manure enrichment techniques will be practiced for better results.



Irrigation activities: Operation of lift irrigation pumps in two shifts to fulfill water requirements of field crops as well as filling water balancing tank for use in orchards, medicinal garden and landscape garden. Both electrical and diesel engine operated pumps will be operated as per load shading timings. The water storage tank at southern side of farm will be ready in another 15days. This tank will be made operational to derive and store more water to avoid water scarcity during canal closure period.

Maintenance of Peripheral and other **Plantations:** Coconut trees along periphery require regular maintenance especially to take benefit of rainy days. Permitted herbicides will be used to make area weed free followed by hand weeding. Removal of dried leaves, cleaning stems along with treatment for Rhinoceros beetle and red palm weevil infestation is required during this period. Also soil pulverization, fertilizer application and basin repairing is on target. The gaps in between two coconut trees are being filled by planting hardy plants like custard apple and acid lime. Training and pruning of other peripheral plants viz., jamun, sapota, Terminalia plants. Gap filling in fruit tree plantations near admin building and training of plants to be done.





Canopy management: Looking into cloudy **Plant protection:** Intermittent sunlight is a prerequisite.

- pinching is over. However, it will require to remove unnecessary lateral shoots.
- Mango harvesting is completed and its time for pruning of mango to check the • height and overall size of plant under high density system plantation. It has to be followed with three objectives viz., • skirting, opening and hygiene.
- As soon as karonda fruits are harvested, the plants have to be pruned to give • bushy shape and field accessibility.
- After harvest of sweet orange fruits, the plants have to be trained by pruning lower branches and water shoots if any have to be removed.
- Pomegranate is in fruiting stage. Lower, damaged, diseased and dried branches have to be removed. De-suckering and removal of water shoots will be done.
- There is lot of lateral off shoot growth on Date palm main stem. These shoots have to be removed and used for propagation
- Training- pruning in Guava is required to maintain balanced tree canopy
- Due to multiple stresses, some plants were damaged, it is targeted to replant these during this season.

Harvesting & disposal of farm produce: Sweet orange harvesting has been already started and to be continued further during July. First flush of dragon fruit will be ready for harvest during second half of July 2020. Protection of fruits from mechanical damage and bird damage to be taken care by using nets and fruit covers.



showers, weather during July 2020 maintaining cloudy weather along with some dry spells is canopy of fruit trees sparse enough for the prediction for month of July. This is a ventilation, easy penetration of sprays and favorable weather for fungal diseases and also physiological disorders. for Therefore. In grapes, shoot thinning and sub-cane following points need to be considered from the point of plant protection;

- In case of pomegranate there will be risk of Cercospora leaf spot, blight and fruit borer
- In grapes, anthracnose, downy mildew, powdery mildew and sucking pests will be a problem, IPM for mealy bug to be started
- Lemon butterfly and fruit borer have to be taken care of in sweet orange while citrus canker infection in acid lime
- Fruit fly incidence in dragon fruit will be predominant near harvest
- Use of biological control agents will be carried out for pest and disease management. Trichoderma harzianum, Pseudomonas fluorescens, Bacillus subtilis, Metarhizium Beauveria bassiana. anisopliae, etc. cultures will be used through spraying and drenching. Prevailing weather conditions with increased humidity will help to establish the biological cultures in orchards to manage disease and pests effectively.
- Simultaneously, broad spectrum contact fungicides like copper oxychloride and mancozeb will be used need based. Safe insecticides like Azadirachtin, Spinosad, Abamectin benzoate will be used.

Nutrition management: Farm yard manure application to be completed. Fertilizers for soil application and fertigation will be procured for general application. Looking in to the plants' requirement the fertilizer doses will be applied in split doses to avoid leaching losses. Deficiencies will be taken care of through nutrients spraying.

Canopy Management in Mango

Mango (Mangifera indica L.) is one of the oldest and most popular fruits having delightful flavour and taste of the tropical world. Despite India's share of 65 per cent in the world's mango production, it's share in world's fresh mango market is just 5.25 per cent in terms of quantity. However, all the mango importing countries are considering India as a source of quality mangoes due to its varietal wealth and availability. In this background, it is imperative to improve the productivity and quality of Indian mangoes. Canopy management of bearing plants plays an important role in improving productivity and quality of mango.

Ways to improve mango productivity

- Adopting a fitting planting system (High Density Planting or UHDP)
- Micro irrigation and fertigation system
- Better canopy management in mango
- Mechanization in crop cultivation
- post-harvest Pre- and handling like bagging of fruits
- Top working and rejuvenation
- Use of growth regulators on flower induction and setting

Principles of Canopy Management

Canopy management the is manipulation of tree canopy to optimize the production of quality fruits. It encompasses both training and pruning which affect the quantity of sunlight intercepted by trees, as tree shape determines the exposure of leaf area to incoming radiation. An ideal training strategy aims around the arrangement of • Economy in obtaining the required canopy plant parts, especially, to develop a better architecture that plant optimizes the utilization sunlight of and promotes productivity.

Light is critical for growth and development of trees and fruits. The green leaves harvest the sunlight to produce carbohydrates and sugars which are translocated to the sites where they are needed viz., buds, flowers and fruits. Better light penetration into the tree canopy improves tree growth, productivity, yield and fruit quality. The density and orientation of planting also impact the light penetration in an orchard. Generally, in close planting, quicker shading becomes a problem. Initial build-up of a strong and balanced framework of the tree is essential for further management. Therefore following points are considered during be canopy to management;



- Maximum utilization of light by regulating the growth
- Avoidance of built up microclimate congenial for diseases and pest infestation
- Convenience in carrying out the cultural practices
- Maximizing the productivity with quality fruit production
- architecture
- Formation of strong frame work having branches on all directions at equidistance
- Developing the canopy with centre opened so that it gets better exposure to sun light
- Controlling the structure of the plant to harness the maximum productivity
- Understanding phenological growth to take up operations at right time.

Canopy management in bearing trees:

Mango trees normally respond to pruning by sending out a vegetative flush. Mango trees are terminal bearers, *i.e.*, they flower from the ends of the branches and will only flower on mature wood, *i.e.*, shoots that are six weeks or older. Hence, pruning affects the flowering and yield. It is therefore most important to ensure that the trees do not have enough vegetative flushes with poor yield. It may not be necessary to prune mango trees every year. (cont. page 7)

Seasonal issues in Dragon fruit production

Dragon fruit plant (*Hylocereus undatus*) has low water requirements and adapts to different soil types. It requires long days to flower and in Maharashtra the blooming coincides with the beginning of rainy season in June and lasts until October; during this time six to eight overlapping flowering cycles happen. Now the fruiting season has been already started and following seasonal issues have to be taken care of;

- The fruit thinning has to be carried out immediately after fruit set; leaving only one fruit per shoot for better quality.
- As experienced for last three years, management of fruit fly in dragon fruit orchard is very big issue.
- As an IPM practice, clean cultivation is important.
- Spraying of biological control agents *Metarhizium* and *Beauveria* to be used in early phase. The prevailing rainy weather will help in its establishment

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The pruning can be done during two phases;

A. First pruning after harvest

First pruning should be done immediately after harvest and completed by the end of June-July. It includes:

<u>i. Skirting</u>: Removal of low hanging branches is known as skirting. It facilitates the operations such as fertilizer application and controlling of weed.

<u>ii. Opening up</u>: Removal of branches inside the tree which cross over or clutter up the centre of the tree restricting the penetration of sprays. One or two uprightly growing branches from center of tree are to be removed to reduce tree height significantly and to increase the availability of light inside the canopy for better photosynthesis. Not more than 25 per cent biomass should be removed at a time; otherwise it results in excessive vegetative growth with reduced flowering shoots.

<u>iii. Hygiene</u>: It involves the removal of any diseased or dead branches in the tree, which could be a source of infection. However, it is need based for trees having yield decline



- Install pheromone traps in orchard to trap fruit fly males.
- Spraying of neem based insecticide will also help in management of the pest.
- Being a soft skinned and attractive fruit, the bird damage is also more prevalent. Use of bird net or bagging of fruits will help to reduce this damage.
- Controlled watering is must or otherwise there will be fruit cracking.
- Harvesting of fruits to be carried out at perfect maturity.

B. Second pruning – pre flowering

Second pruning may be taken up in the middle of December and, if the timing is right, it is to be followed by a floral flush rather than a vegetative flush.

<u>i. Skirting</u>: Low hanging branches which could cause fruit to drag on the ground are to be removed.

<u>ii. Opening up</u>: Twigs and disorderly branches inside the tree are to be removed to have a open canopy. This not only facilitates spray penetration for better insect and disease control but also allows light into the tree, improving fruit colour.

<u>iii. Tip pruning</u>: It is a useful practice where the trees have had a vegetative flush just prior to flowering. The young flushes are cut back to mature wood; the resulting flush may result into a floral one. Tip pruning will also reduce tree size.

<u>iv. Hygiene</u>: It is essential to reduce the source of flower and fruit infection. Any diseased or dead branches should be removed before flowering.

(Ref- Canopy Management in Mango, TNAU agritech.tnau.ac.in) cm-mango-eng)









Lift Irrigation Project Updates:

New lift irrigation project which is being carried out through Department of Irrigation, Govt. of Maharashtra is almost at the end of completion. The Director, NIASM took updates of work in a meeting with Deputy Engineer, Pune Irrigation Division, Baramati on 22nd June 2020.

- Main pipeline from Nira canal to campus is already completed, sump well in progress
- Connection from South farm pond to water balancing tank in North farm is completed
- Installation of Remote Transmission Units (RTU) at desired places is completed
- Piping from RTU units to desired fields in in progress
- Installation main automation system and at pump house is going on
- Overall work will to be completed till August with testing target of Sept 1, 2020.

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