



FARM COORDINATOR

... कृषि तकनीकी समन्वय पत्र

भाकृअनुप – राष्ट्रीय अजैविक स्ट्रेस प्रबंधन संस्थान

ICAR-NATIONAL INSTITUTE OF ABIOTIC STRESS MANAGEMENT

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निदेशक के लेखनी से...

मई का महीना आम तौर पर बारामती परिसर के सबसे शुष्क महीनों में से एक माना जाता है। इस माह में सबसे कम आर्द्रता 30% दर्ज की गयी। मार्च 2022 के बाद से ही गर्मी की लहर के सबूत सामने आते रहे और इस महीने का उच्चतम तापमान 41.1 °से दर्ज किया गया। इस पृष्ठभूमि में, प्रक्षेत्र प्रबंधन के लिए सिंचाई और उपयोगिता जल आवश्यकताओं की पूर्ति एक महत्वपूर्ण लेकिन कठिन कार्य था। सुशी हैं कि नीरा नहर से लिफ्ट परियोजना और परिसर में जल भंडारण सुविधाओं के माध्यम से पानी की निर्बाध आपूर्ति की जा सकती। संवेदनशील बागों पर गर्मी के तनाव के प्रभाव को कम करने के लिए जैविक आच्छादन का प्रयोग मददगार पाया गया।

मानसून दरवाजे पर हैं और खरीफ फसलों की बुवाई की गतिविधियां पहले ही शुरू हो चुकी हैं। अप्रैल में यह तय किया गया था कि खरीफ गतिविधियों को निर्धारित समय में पूरा करने पर ध्यान देना है। इसलिए प्राथमिक और द्वितीयक जुताई का कार्य प्रगति पर था। बागों में पौधों की सुरक्षा के साथ-साथ सिंचाई और छत्र प्रबंधन महत्वपूर्ण कार्य थे। अंगूर में बैक प्रूनिंग के बाद, शूट थिनिंग और सबकेन विकास कार्य प्रगति पर थे। फल के नए मौसम के लिए अमरूद और सहजन की छटाई पूरी कर ली गई है। खाद बनाने के लिए और जैविक आच्छादन के रूप में अधिक से अधिक कृषि-अपशिष्ट का उपयोग करने के लिए एक अच्छा कदम पहले ही उठाया जा चुका है। विशेष रूप से परिधीय वृक्षारोपण से एकत्र किए गए नारियल के पत्ते प्रचुर मात्रा में थे और उचित कतरन के बाद उनका भी उपयोग किया गया।

अनुसंधान के लिए काली मिट्टी के खेतों की मांग को देखते हुए मलद फार्म में गतिविधियों को और गति देने की जरूरत है। अनुसंधान उद्देश्य के लिए भूमि के न्यायिक उपयोग के लिए फाइन-ट्यून टीम गतिविधियां महत्वपूर्ण हैं क्योंकि मुख्य परिसर में नई परियोजनाओं को समायोजित करने की कुछ सीमाएं हैं। जैविक कृषि और प्राकृतिक खेती पर शोध हर जगह मांग में हैं और योजना के अनुसार उपचार लागू करने के लिए प्रोटोकॉल के अनुसार जून से शुरू किया जाना है।

‘फार्म समन्वयक’ गतिविधियों को प्रस्तुत करता है, उपलब्धियों का आकलन करता है और भविष्य के लक्ष्यों के लिए योजना बनाने में मदद करता है। मुझे पूरी उम्मीद है कि इस प्रयास से नियासम और अन्य जगहों पर अनुसंधान फार्म प्रबंधन में सुधार होगा। इस प्रकाशन को नियमित रूप से प्रकाशित करने के लिए डॉ. प्रविण तावरे और पूरी टीम को उनके समर्पण, कड़ी मेहनत और निरंतरता के लिए, मैं धन्यवाद देता हूँ।

From Director's Desk...

The month of May is generally reported to be one of the driest months of Baramati and the lowest RH recorded was 30%. Since March 2022 number of evidences of heat wave were increasing and the highest temperature of this month was recorded to be 41.1 °C.

On this background, fulfillment of irrigation and utility water requirements was an important but difficult task for farm personnel. Thanks to the uninterrupted supply of water from Nira canal through lift project and water storage facilities at campus. Use of organic mulch was found helpful to mitigate heat stress impact on sensitive orchards.

Monsoon is at the door steps and activities for kharif crops' sowing have been already started. In orchards irrigation and canopy management were important operations along with plant protection. After back pruning in grape, shoot thinning and sub-cane development operations were in progress. Pruning in guava and drumstick was completed for fresh fruiting season.

Looking into the demands for black soil fields for experimentation, the activities at Malad Farm need more pace. Fine-tuned team activities are crucial for judicious utilization of land for research purpose as the main campus has limitations to accommodate new projects. Researches on organic agriculture and natural farming are in demand everywhere and the treatment imposition as planned have to be started from June onwards as per the protocols.

‘Farm Coordinator’ presents the activities, assesses the achievements and helps planning for the future targets. I sincerely hope that this effort will improve research farm management in NIASM and elsewhere. I thank Dr. Pravin Taware and the entire team for their dedication, hard work and sincerity in bringing out this publication regularly.




Field crops' management:

- Ground nut intercrop sowing in sugarcane (A1) was carried out as a research trial.
- Earthing up work ratoon sugarcane (B2 under CIMMYT project) was facilitated by using power tiller followed by soil sampling activities.
- Sowing of crops like Rajamah (B3), Chickpea (D2) and Turmeric (D2) under kharif sowing activities was completed.
- Facilitated harvesting of bhindi and brinjal (B4) followed by recut operation in brinjal.
- Maintenance of experimental field crops like mung bean (C3), cotton, maize, soybean, chickpea (C4) was done for irrigation, weed management and plant protection and treatment imposition.
- Harvesting and roughing of aged brinjal and tomato plants and maintenance of chilli crop was carried out along with irrigation and plant protection activities.
- Fall cultivation was continued with ploughing and secondary tillage operations immediately after harvesting of previous crops and some of the fields were prepared for sowing of early kharif crops.
- Maintenance of mung bean (C2), sunflower (C6) and soybean (E7) was carried out as a general crop.

Orchard management:

- Harvesting of karonda (I1) and acid lime (I2) was continued and initiated harvesting in Mango (J4).
- Removal of old plants of drumstick orchard (H2) was carried out prepare the field fresh planting. The recut of drumstick plants for ratoon crops was carried out in I5 orchard by retaining the stem up to 1.5M height.
- Shoot thinning in grape was taken up to retain maximum 30 shoots per vine. Simultaneously, pinching for sub-cane was carried out followed by removal of side shoots and suckers.
- Removed dried leaves and side shoots in date palm to make the trees accessible. All the removed material was shredded and used as organic mulch in same orchard.
- FYM application and pruning of guava (K6) was carried out by retaining branches at the height of 1.2m. The pruning was necessarily done to develop balanced canopy and targeted fruiting from of September to avoid fruit fly infestation.

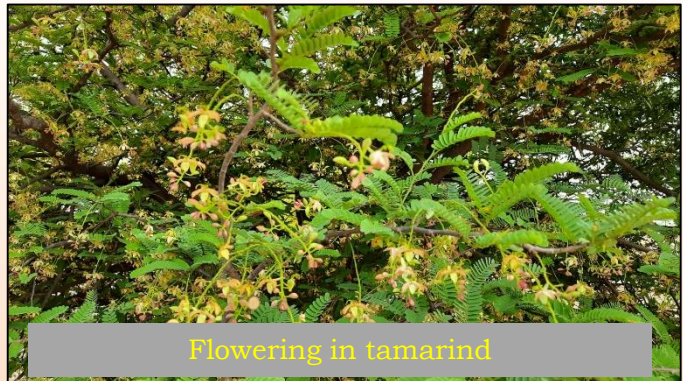
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Mung bean general crop



Sugarcane growth after earthing-up



Flowering in tamarind



Date palm in fruiting stage



Shredding agro-waste for organic mulch

The long period average (LPA) mean temperature of May at Baramati is 31.2 °C. The highest temperature was recorded in the month was 41.1 °C (10 May). The details of weather during the May 2022 has been listed in Table 1 and depicted in following figure.

Table 1. Summary of weather variables recorded during May, 2022.

Weather Parameters	Week				Monthly	Max.	Min.
	1 st	2 nd	3 rd	4 th			
T Max (°C)	39.2	38.9	37.5	35.7	37.7	41.1	30.0
T Min (°C)	20.7	23.6	23.6	22.8	22.6	25.5	18.9
T Avg (°C)	30.0	31.3	30.5	29.3	30.1	33.3	27.0
RH Mean (%)	42	47	52	54	49	70	30
WS (km/h)	8.3	11.8	10.2	15.7	11.7	19.4	6.0
BSS (h)	9.6	2.5	3.0	8.4	5.9	10.7	0.0
Total PE (mm)	73.0	75.8	63.3	74.8	317.4	13.5	5.2
Total Rain (mm)	0.0	0.8	0.0	0.0	0.8	0.8	0.0

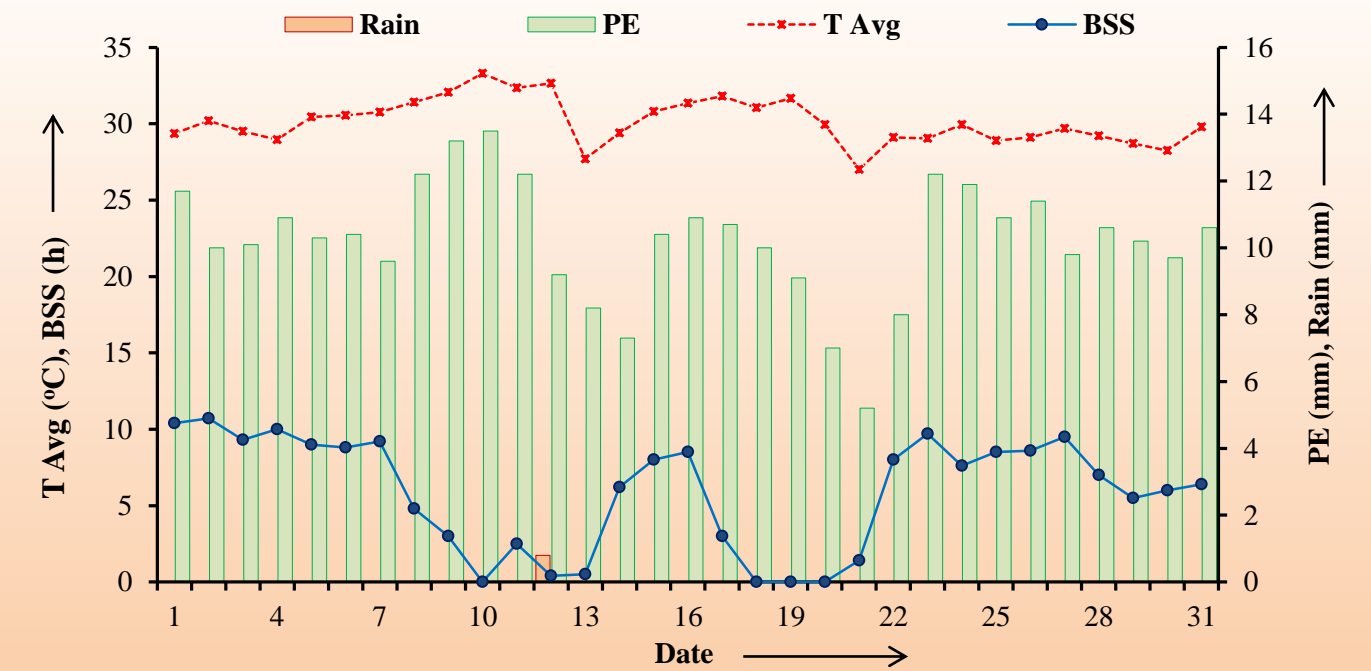


Fig 1. Variations of daily rainfall (Rain), pan evaporation (PE), mean temperature (T_{Avg}) and bright sunshine hours (BSS) during May, 2022 at ICAR-NIASM Baramati.

Month of May is generally one of the driest months of Baramati and this time highest and lowest Rel. humidity varied from 30% to 70%, respectively. The long period average (LPA) rainfall of May at Baramati is 37.0 mm however the whole month went dry baring 12-May when it rained a total of 0.8 mm. The surface winds are generally from north and northwest. Sometimes, during afternoon strong and gusty wind were observed. During morning hours (0730 IST) wind blew mostly from two prominent sectors, viz. west of north-west to north of north-west and west to south-west directions. On the other hand, wind directions showed higher variability during the afternoon observations at 1430 IST and prominent directions were north-west, north-east, west and south-east. Average wind speed was 11.7 Km/hr.

South farm maintenance activities:

- *Kharif* season sowing has been started already and remaining sowing operations are targeted in the first fortnight of June. Accordingly secondary tillage operations will be carried out for preparation of layouts.
- Maintenance of all *kharif* sown crops like soybean, sunflower, chickpea, rajamha, etc. will be looked after along the perennial plantations especially sugarcane. The work will include weed management through manual weeding as well as spraying of herbicides, plant protection sprays, fertilizer application and irrigation during dry spells.
- Harvesting of summer mung bean to be done in first fortnight of month.
- Due to pre-monsoon and monsoon showers weeds will flourish in the fields. Integrated weed management through cultural, manual and chemical ways will be taken up.

Orchard management:

- Plant protection for management of humidity related diseases like downy mildew and anthracnose in grape, leaf spots in pomegranate, sweet orange, dragon fruit and management of insect pests like fruit fly and borers in fruiting orchards will need attention during this period.
- Nutrition management through soil application of primary and micronutrient fertilizers and also by use of water soluble fertilizers through fertigation.
- Shoot thinning and training operations will be continued in grape. Shoot thinning will be required in drumstick for ratoon crop.

Malad farm activities:

- Field preparation for sowing of *kharif* crops and fodder crops.
- Agroforestry and orchard plantation.
- Water storage tank development along with bore-well digging work to initiated if the order is placed.
- Peripheral plantation and partial fencing work priority.

Garden maintenance & other activities:

- Maintenance of peripheral coconut and other plantations through soil pulverizing, training-pruning, removing dried leaves and fertilizer application. The gap filling activity to be initiated at locations.
- Removing or pruning old and damaged hedges and shrubs for rejuvenation.
- Pruning, lawn maintenance by weeding, mowing, regular irrigation and nutrition management.

Early *kharif* soybean growth

Sunflower growth in general field



Flowering in Custard apple starts

1st flower bud appearance in dragon fruit

Flowering in apple-ber

Irrigation Management during Dry Spells & Canal Closure

Monsoon is at the doorstep and *kharif* season sowing will start soon. The area being rain shadow, dry spells are very common especially during June to August period. In tropical regions, the prediction resolution and accuracy with respect to rain occurrence is still very low. Most of the time farmers sow the crops before monsoon showers in anticipation of rains. The crops get affected due to dry spells in between if supplementary irrigation facility is not available. Earlier, at NIASM campus too, there happened to be similar situation as this period generally coincides with canal closure. There used to be difficulties in aligning with sowing dates and irrigation treatments in field experiments. However, with ample storage facility developed at campus, now the crops can be sown at desired time and in spite of canal closure for about a month, irrigation can be provided during dry spells. Only difficulty arises to attend indents from more number of fields arriving all together. To tackle such conditions, one by one the fields are being brought under drip irrigation so as to reduce irrigation time and interval. Further it is necessary to determine actual water requirements of the specific crops so as to use available water judiciously. The irrigation water budgeting has to be followed thoroughly by measuring quantum of irrigation water used on every day basis.



Water storage facility



Drip irrigation facility in field

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- Fertilizer application in grape, sweet orange, acid lime and custard apple was done by using di-ammonium phosphate and sulphate of potash 100g each per plant by band or ring placement method.
- Hygeine maintenance by collecting destroying infested fallen fruits, and pruned biomass from sapota (K7) and sweet orange (I3, J1) orchard was continued.
- Collected agro-wastes from the campus and used it by shredding as an organic mulch in various orchards.

Plant protection activities:

- Sprays done in grape (J4) were ZnSO₄ @ 1g L⁻¹ + Buprofezin @ 1.5 ml L⁻¹ on Grape (J5), Copper oxy chloride @ 2.5 g L⁻¹ + Fipronil 1.25 ml L⁻¹, CCC 500 ppm (Thompson seedless only),
- Spraying of Calciboron @ 2 g L⁻¹ on Pomegranate (J-3 & K-5) plots.
- Spraying of Deltamethrin @ 0.5 ml + 12:61:00 @ 2.5 g L⁻¹ on Mango (J-4).

Malad farm activities:

- Field cleaning activities were continued for roughing out *Prosopis* bushes and other weed shrubs.
- Tillage operations like ploughing were carried out for preparing fields for kharif sowing.

Campus cleaning & landscape maintenance:

- Replacing indoor plants with new pots and maintenance of removed pots was looked after for improving plant health and aesthetics.
- The general campus cleaning was continued to remove *Parthenium* and unwanted shrubs. Collection of plastic and other foreign wastes from landscape garden area was looked after various functions.
- Maintenance at 'Naxatra Udyan' by training and staking of plants to avoid lodging and application of organic mulch to save the plants from heat stress.

Integrated Pest Management- II

Prevention is the first tool in pest management because it is the most effective, least expensive, most environmentally friendly solution. Choosing a healthy plant that thrives in the desired location with the available light, planting it carefully, and ensuring that it has adequate water and nutrients prevents stress and minimizes pest problems. Stressed plants can attract pests. The second most important tool in pest management is early intervention. Being present and observant in the field ensures early detection. Reacting to problems quickly, before they have time to multiply, requires a less dramatic intervention. The third most important tool is tracking what happens in the field to recognize patterns and make informed decisions. Record planting dates, varieties, purchase location, dates of problem onset, weather conditions, management strategies and their effectiveness.

Many safe, practical, nonchemical methods of plant protection and pest management may reduce or eliminate the need to spray. To implement management practices correctly and to minimize losses, farmers should be aware of the types of pests that attack plants and understand pest biology. Scouting methods, equipment selection, timing, and other pest management practices all depend on an accurate knowledge of the pest. Pest management methods fall into four groups: cultural, mechanical, biological, and chemical.

Cultural Management

- Keeping plants healthy and preventing plant stress helps plants to better withstand and repair the damage caused by an insect or mite pest. The healthy plants resist infestation by pests better than plants with low vigour. The most effective and most important of all practices is to observe what is going on in the field. Many serious disease or insect problems can be halted or slowed by regularly visiting the field, knowing what to look for, recognizing potential problems, and early intervention. Cultural methods of suppressing insect and mite problems in the field include *preparing the soil*; *choosing plants* that are adapted to the site conditions, that are not attractive to pests, and that are tolerant of insects and diseases; rotating crops; intercropping; planting/ sowing time to avoid pests; managing weeds; and planting 'trap' crops.

Soil Preparation

- Providing a favourable soil environment encourages the growth of healthy roots, increasing access to water and nutrients,

preventing stress, and making the plant more resistant to pests and diseases. Covering the soil with several inches of organic mulch protects the plant in several ways: reducing soil water loss to evaporation, minimizing weed competition, providing nutrients, and creating a suitable environment for earthworms and microorganisms.

- Keep organic mulch, shredded agro-waste a few inches from the trunk of a plant. Do not use manure or compost that has not thoroughly decomposed.
- Tilling the soil is detrimental to soil structure. If tilling is deemed necessary, consider doing it in the fall when the life cycles of many pests brings them near the surface. At the surface, pests become exposed to the weather as well as birds and other natural enemies.

Plant Selection

- Use disease-free and insect-free certified seeds and plants if available. Select plants that are sturdy and have well-developed root systems. Consider planting cultivars identified as resistant to pests. Genetic engineering offers potential for incorporating genes into plants that reduce plant's susceptibility to infestation

Crop Rotation

- Planting two similar crops in successive years tends to increase pest problems. Many vegetables are closely related and have the same pests and diseases. Do not grow the same kind of vegetable in the same place each year. Crop rotation is most effective on pests that develop on a few plants.



Guava ready for pruning



Heavy pruning in guava



Foliar nutrition in mango



Pesticide spray in grape

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Intercropping

- Avoid placing all plants of one kind together; instead spread them throughout the field. If an insect lays eggs or otherwise attacks a species, the presence of unrelated plants in the area can interrupt the attack's progress by diluting the attractive odour of the preferred plants. Marigolds and garlic are two plants recommended as insect repellents.

Planting/ Sowing Time

- Some insects do not overwinter locally but migrate from southern states each year. Time plantings so that most of the crop avoids the peak of insect infestations. Delay planting warm weather crops until after the soil has warmed to avoid seed and root rots and promote growth.

Weed Management

- Weeds and grasses can harbour both pests and beneficial insects. Spider mite problems are fewer, for example, if broadleaf weeds near fruit trees are removed. If the weeds are closely related to the crop plants, they can harbour pest insects and should be removed.

- Pests with a wide host range often inhabit weedy areas and can move to nearby desirable plants. It is important to remove weeds before a crop is established to prevent insects from moving to the desirable plants.
- Weeds can be a forage, nectar, or pollen source for beneficial organisms. Weeds that attract insects can be a host for birds.

Trap Crops

- Another way to manage insect pests is to plant a crop that is very attractive to insects and then treat the trap crop with insecticide.

Limitations of Cultural Management

- The use of cultural controls for pest management requires advanced planning.
- Although it may sound simple to plant resistant plants/ varieties, these varieties may not be available locally.
- Crop rotation is a valuable cultural method for reducing insect and disease issues, but many farmers do not have the room to sufficiently implement this practice.
- Where space is limited, it may be best to allow the field to lay fallow for a year.

प्रगति के पथ पर

बागवानी प्रथाएं समयबद्ध हैं और इन्हें कुशलता से क्रियान्वित करने की आवश्यकता होती है। फलों के पेड़ों को बेहतर गुणवत्ता और टिकाऊ उत्पादन के लिए चंदवा विकसित करने के लिए लगातार बांधना और छंटाई की आवश्यकता होती है। एक ही व्यक्ति हर समय उपलब्ध नहीं हो सकती है। इस कारण श्रमिकों के माध्यम से चंदवा प्रबंधन गतिविधियों को अंजाम देते समय, काम की गति और सटीकता प्रभावित होती है। इस स्थिति से निपटने के लिए अधिक संख्या में संविदा कर्मियों में आवश्यक कौशल विकसित करने की योजना है। चंदवा प्रबंधन एक विज्ञान है लेकिन यह प्रक्षेत्र स्तर पर कला बन जाती है। हालांकि चंदवा विकास के लिए मानक हैं, बांधना- छंटनी के संचालन के समय तर्क और साधारण नियमों को लागू करने की आवश्यकता होती है। अच्छी बात यह है कि कुछ कर्मचारी इन तकनीकों को शीघ्रता से समझते और कार्यान्वित करते हैं।

सभी कृषि-कचरे को कतरन, अपघटन और जैविक आच्छादन के रूप में पुनर्विक्रित करने के लिए योजना को क्रियान्वित किया जा रहा है। निपटान से पहले कृषि-कचरे को अलग किया जाता है। आम तौर पर बीज वाले खरपतवारों, कांटेदार और रोगग्रस्त सामग्री को जलाकर नष्ट कर दिया जाता है। सुखी लकड़ी को अलग किया जाता है और जलाऊ ईंधन के रूप में बेचा जाता है। और शेष सामग्री को कटर या मल्वर की मदद से काट दिया जाता है। इसके बाद इसका उपयोग बगीचों में खाद बनाने या मल्विंग के लिए किया जाता है। साहित्य से यह भी देखा गया है कि आच्छादन विशेष रूप से जैविक का उपयोग गर्मी के तनाव को बहुत प्रभावी ढंग से कम करने में मदद करता है। यह वाष्पीकरण के नुकसान को कम करने, मिट्टी के तापमान को नियंत्रित करने और खरपतवार के विकास को दबाने वाला माना जाता है। परिसर में लगभग 500 नारियल के पेड़ हैं और बहुत से सूखे पत्ते निपटान के लिए प्राप्त होते हैं। इन्हें आसानी से काटा जा सकता है और जैविक मल्व के रूप में उपयोग किया जा सकता है क्योंकि यह बहुत धीरे-धीरे विघटित होता है। इस गतिविधि को नियामक परिसर में उत्पन्न शत-प्रतिशत कृषि-अपशिष्ट, छंटे हुए बायोमास आदि के पुनर्विक्रण के लिए और व्यापक बनाया जाएगा।

Plan For Progress

Horticultural practices are time bound and need to be executed skilfully. The fruit trees need frequent training and pruning to develop canopy for better quality and sustainable production. While carrying out canopy management activities through casual labours, pace and precision of work gets affected when same persons are not available all along. To tackle this situation, plan is to develop required skills in more number of contractual workers. The canopy management is a science but it becomes art at field level. Though there are standards for canopy development, some logic and thumb rules need to be followed at the time of actual training-pruning operations. Good thing is that some of the workers do understand and implement these techniques quickly.

The plan is being executed to recycle all the agro-waste through shredding, decomposition and as organic mulch. The agro-wastes are segregated before disposal. Generally the weeds with seeds, thorny and diseased material is disposed of through burning. The wood material is separated and sold as fire wood and remaining material is shredded with the help of cutter or mulcher. This is then used for composting or mulching in orchards. It has been observed also confirmed from the literature that use of mulch especially organic one helps in mitigation of heat stress very effectively. It is supposed to reduce evaporation losses, regulate soil temperature and suppress the weed growth. There are about 500 coconut trees in campus and lot many dried leaves are received for disposal. These can be shredded easily and used as organic mulch as it decomposes very slowly. This activity will be broadened further to recycle cent percent agro-waste, pruned biomass, etc. generated at NIASM campus.

