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Issue

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भाकृअनुप
ICAR

राअस्ट्रैप्रसं
NIASM

FARM COORDINATOR

... कृषि तकनीकी समन्वय पत्र

भाकृअनुप – राष्ट्रीय अजैविक स्ट्रैस प्रबंधन संस्थान

ICAR-NATIONAL INSTITUTE OF ABIOTIC STRESS MANAGEMENT

बारामती, पुणे - 413 115, महाराष्ट्र, भारत

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Published by
Dr. Himanshu Pathak
Director
ICAR- National Institute of Abiotic Stress Management,
Baramati, Pune- 413115, Maharashtra

Contributors
Dr. Pravin Bhimdeo Taware, Asst. Chief Technical Officer & Farm Manager
Mr. Rushikesh Shivaji Gophane, Technical Officer (Hort)
Mr. Patwaru Ranbhid Chahande, Technical Officer (Agril)
Mr. Sunil Vishnu Potekar, Technical Officer (Agro.Met.)
Mr. Aniket Tukaram More, Technical Assistant (Farm)
Mr. Pravin Hari More, Technical Officer (Computer)

Compiled and edited by
Dr. Pravin Bhimdeo Taware, Asst. Chief Technical Officer & Farm Manager

Contact Details
Director
ICAR- National Institute of Abiotic Stress Management,
Baramati, Pune- 413115, Maharashtra
Phone: 02112-254055/57/58, Fax: 02112-254056
Email- director.niasm@icar.gov.in
Website- www.niam.res.in

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भाकृअनुप ICAR

राअस्ट्रैप्रसं NIASM

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निदेशक के लेखनी से...

मानसून की शुरुआत जून महीने को खास बनाती है क्योंकि न केवल किसान बल्कि हर आम आदमी भी इसके प्रदर्शन में दिलचस्पी रखता है। वर्षा छाया क्षेत्र होने के कारण, इस महीने के दौरान वास्तविक वर्षा दिवस का अनुभव एक दुर्लभ घटना है। जून 2022 के दौरान, परिसर में केवल तीन बारिश की घटनाओं का वह भी प्री-मानसून की बारिश का अनुभव किया गया था, जिसमें कुल 109 मिमी वर्षा का मापन किया गया। इसने हवा के तापमान को कम करने में मदद की लेकिन भारी हवाओं के कारण, मासिक कुल खुले पैन वाष्पीकरण कुल मिलाकर 193.3 मिमी दर्ज किया गया। पहले की भविष्यवाणी को देखते हुए, आइए इस साल औसत मानसून की उम्मीद करें।

नियासम में अनुसंधान फार्म खरीफ सीजन की गतिविधियां प्राथमिकता सूची में थीं और इन्हें अनुसूची के अनुसार पूरा किया जा रहा है। पिछले वर्ष के परीक्षण के दौरान सराहनीय परिणामों के कारण खरीफ चना और चिया की खेती आकर्षण के केंद्र हैं। साथ ही, पशुओं के लिए चारे की खेती और क्लाइमेट स्मार्ट आईएफएस में बहुफसली खेती की गतिविधियां प्रगति पर थीं। लिफ्ट सिंचाई के माध्यम से सिंचाई की सभी जरूरतों को पूरा करना एक महत्वपूर्ण बैक स्टेज गतिविधि है जिसकी निगरानी कृषि कर्मचारियों द्वारा बहुत कुशलता से की जाती है। यह अनुसंधान को आसान और उपयोगी बनाता है। बागों में चंदवा प्रबंधन, पोषण और पौधों की सुरक्षा निरंतर और समयबद्ध गतिविधियाँ हैं। ये सभी सही रास्ते पर हैं लेकिन फिर भी कीट प्रबंधन पर अधिक ध्यान देने की उम्मीद है। मलद फार्म में काम ने अच्छी गति हासिल की है और मुझे उम्मीद है कि यह इसे विभिन्न आयामों के साथ एक और 'मॉडल फार्म' बनाना जारी रखेगा।

डॉ. प्रवीण भि. तावरे के नेतृत्व में फार्म अनुभाग की पूरी टीम को फार्म संचालन की समयबद्ध, विशिष्ट और आवश्यक गतिविधियों को पूरा करने के लिए मैं धन्यवाद देता हूं। इस महत्वपूर्ण प्रकाशन को नियमित रूप से और इतने सुंदर ढंग से प्रकाशित करने के लिए मैं उनका विशेष धन्यवाद करता हूं। मुझे विश्वास है कि वे भविष्य में खेत प्रबंधन में नवाचार लाएंगे।

From Director's Desk...

The onset of monsoon makes the month of June special because not only the farmer but every common man also is interested in its performance. Being the rain shadow area, actual rainy day experience during this month is a rare event. During June 2022, at the campus only three rain events that too of pre-monsoon showers were experienced measuring total 109 mm rainfall. It helped to down the air temperature but due to heavy winds, the monthly total open pan evaporation aggregated to be 193.3 mm. Looking in to the earlier prediction, let's hope for average monsoon this year.

At NIASM research farm *kharif* season activities were on priority list and these are being completed as per schedule. *Kharif* chickpea and the chia cultivation are points of attraction due to appreciating results during the last year trial. Simultaneously, the activities for fodder cultivation for livestock and multiple cropping at Climate Smart IFS were in progress. Facilitating all irrigation needs through lift irrigation is an important back stage activity being monitored by farm staff very efficiently. This makes the field experimentation easy and fruitful. In orchards, the canopy management, nutrition and plant protection are continuous and time bound activities. All these are on right track but still I expect more attention on insect pest management. Work at Malad Farm has achieved good pace and I hope it will continue to make it another 'Model Farm' with different dimensions.

I thank the whole team of the Farm Section led by Dr. Pravin B Taware for accomplishing the time-bound, specific & essential activities of farm operation. My special thanks are for them for bringing out this important publication very regularly & so elegantly. I am sure, they will bring new innovations in managing the farm in future.

जून / June 30, 2022

हिमांशु पाठक / Himanshu Pathak

Field crops' management:

- The *Kharif* season sowing was planned to complete in scheduled time, the secondary tillage operations for field preparation by using cultivator and rotavator were carried out on priority. The layout preparation was also completed to make fields ready for sowing.
- Sowing in B5 (rajmah), C1 (mung bean), C4 (chickpea), C6 (mung bean), C7 (dhaincha and chilli), D3 (turmeric) and E1 (chia) experimental fields was carried out as scheduled. Sowing in livestock unit C9-Fodder Jowar and C-11 IFS block was carried out simultaneously.
- Harvesting in B4- brinjal, C3- cowpea, C4- maize and cotton, C6- mung bean, C7- chilli and D1- bhindi was facilitated.
- Weed management in A2- ground nut, B4, B5-rejamah, C2-Mung bean, C3-Cowpea, C4-cotton, C6- mung bean, C7-chilli, D2- chickpea and E5- brinjal was done.
- Fertilizer application as basal dose in E1 and top dressing in B5, C4 & D2 experimental fields was implemented.
- Water management was managed through flood as well as drip irrigation.

Orchard management:

- Harvesting of karonda (I1), acid lime (I2), mango (J4) and jamun was continued.
- Canopy management: Shoot thinning and tipping activities were carried out in grape to retain required number of shoots (10 per sq.m.) to avoid crowding. The shoots drooping down were trained on canopy wires. In mango, after harvesting, pruning of shoots was carried out to manage size of the trees. Intermingling branches may lead to poor flowering in next season, therefore the previous season growth of shoots was plucked out. Removal of sun burnt, rotten and damaged shoots in dragon fruit.
- Some of the plants in pomegranate orchards (J3 & K5) were heavily infected. Those were roughed out and disposed of by burning.
- Nutrition management: Application of fertilizers in I5-drumstick (DAP 100g/plant), K6-guava & J6-custard apple (secondary nutrients 100g/plant) was carried out.
- Inter-cultivation with the help of tractor was carried out in Guava (K-6 & H-4), Sapota (K-7), Fig (H-3), Acid lime (I-2), Datepalm (J-7) and Aonla (G-3).
- Weed management in Aonla (G-3), Fig (H-3), Guava (H-4), and Dragon fruit (H-5 & I-4), Grape (J-5), Pomegranate (J-3) & Mango Diversity block was taken up.
- Drip irrigation system was operated every alternate day looking into the water requirement of fruit trees.
- Plant Protection: Collecting infested fruits in orchards. Spraying of pesticides in grape, ber and sweet orange.

Malad farm activities:

- Field preparation: Ploughing followed by secondary tillage by rotavator were carried out in 10 fields and made ready for horticulture and agro-forestry research.
- Erection of posts for fencing was carried out along north boundary side. Total 125 posts were fixed for protection of crops from stray animals.

Campus & landscape maintenance:

- Herbicide application along peripheral road and other road sides was started, looking into weed growth after rains.
- Peripheral plantation management included de-suckering of custard apple, removing dried leaves of coconut and soil pulverizing.

Layout preparation for field crops

Pruning in Mango after harvest

The long period average (LPA) mean temperature of June at Baramati is 28.3°C. During this month, daily mean temperature at NIASM, Malegaon varied between 26.1°C (28 June) and 30.9°C (5 June) and the monthly mean stood at 27.9°C. The highest temperature was recorded in the first week of the month and it ranged between 29.8°C (24 June) and 39.2°C (6 June). The minimum temperature fluctuations were ranged between 19.5°C to 23.7°C.

The details of weather during the June 2022 has been listed in Table 1 and depicted in following figure.

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

Weather Parameters	Week				Monthly	Max.	Min.
	1st	2nd	3rd	4th			
T Max (˚C)	36.5	33.5	33.9	31.1	33.7	39.2	29.8
T Min (˚C)	22.0	22.2	22.4	22.0	22.1	23.7	19.5
T Avg(˚C)	29.3	27.9	28.1	26.5	27.9	30.9	26.1
RH Mean (%)	60	67	64	77	67	86	51
WS (km/h)	10.4	8.2	9.7	8.0	9.2	13.3	5.0
BSS (h)	4.9	7.0	5.8	2.4	4.9	10.8	0.2
Total PE (mm)	60.4	43.3	49.8	28.3	193.3	12.8	3.0
Total Rain (mm)	77.2	28.0	0.0	4.0	109.2	39.0	0.0

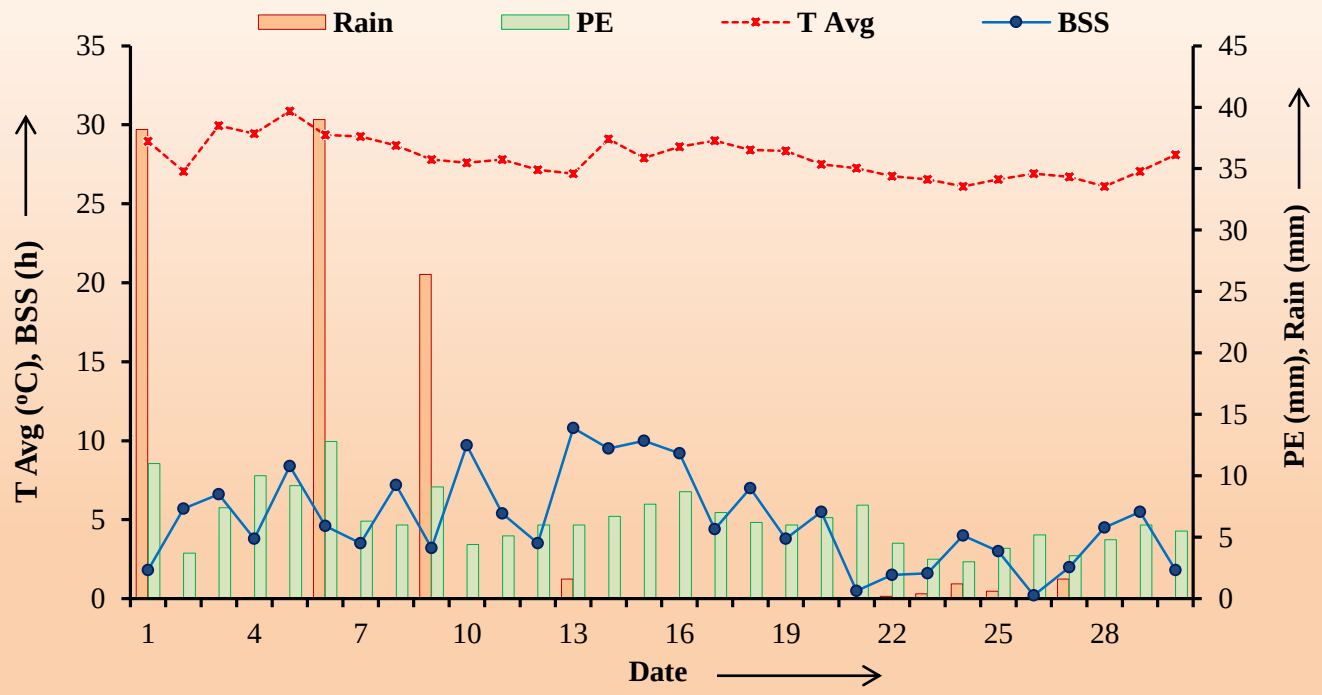


Fig 1. Variations of daily rainfall (Rain), pan evaporation (PE), mean temperature (T_{Avg}) and bright sunshine hours (BSS)duringJune, 2022 at ICAR-NIASM, Baramati.

Monthly mean relative humidity averaged over the month stood at 67 % and ranged between 51 % to 86 %.Total rainfall for the month,was measured as 109.2 mm which is very close to the long term monthly average value (109.6 mm). The surface winds are observed generally from south and southwest directions. Average wind speed for this month was 9.2Km/hr. Monthlytotal open pan evaporation aggregates to 193.3 mm with the average of PE 6.4 mm d^{-1}. During this month, the daily average of bright sunshine duration remained 4.9 hrs.

South farm maintenance activities:

- Some of the field crops are planned to be sown in late *kharif*. All the field preparation activities are completed and these are supposed to be sown during first fortnight of July as per need of the research.
- Maintenance of all *kharif* crops for weed management, fertilizer application, irrigation and plant protection have to be taken care as per the standard operating procedures and the research needs in consultation with respective PI's.

Orchard management:

- After harvesting of mango, light pruning has been completed and now application of Paclobutrazol is to be done on trial basis to induce early flowering in next season.
- Plant protection activities for management of humidity related diseases and management of insect pests like fruit fly will be continued during this period.
- Nutrition management will include use of fertilizers through soil application and fertigation.
- Canopy management in grape, drumstick and dragon fruit is necessary for shoot thinning and training operations.
- For weed management, machinery use in between rows will be preferred. Spot application of herbicides will be done to save manpower for manual weeding.
- Implementation of organic and natural farming treatments as per standard operating procedures in selected orchards.

Malad farm activities:

- Pit digging, filling and plantation of fruit and agro-forestry plants.
- Monitoring water storage tank development along with bore-well digging work to be initiated as the order is going to be ready soon.
- The fencing activities are to be continued along with peripheral plantations.

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.
- Pruning, lawn maintenance by weeding, mowing, regular irrigation and nutrition management.

Dhaincha sown as a green manure crop

Cotton crop in research field

Sugarcane one month after earthing-up

Shoot growth in ratoon drumstick

Canopy management in grape

Issue of Poor Fruit Setting in Dragon Fruit

Dragon fruit cultivation in India is increasing with time as number of farmers showing interest in it. Earlier it was presumed that there are no any issues related to crop management in dragon fruit cultivation. However, the poor fruit set especially if it rains during flowering period has been highlighted through experience. Not only in terms of number of fruits per pole but also the fruit size and quality gets affected. Besides rains, canopy management aspect plays important role in fruit quality. Therefore, it is necessary to standardize the canopy parameters in terms of spacing and number of shoots per unit area along with number of flowers and fruits too. Drooping of shoots from support structure is very well understood for enhanced flowering and quality fruiting. But height of trellises need attention for further study and number of shoots should necessarily be considered as parameter to control.

Flowering in dragon fruit occurs in 5-6 phases of about month's interval during night. If at any flowering period it rains overnight, the fruit set is reduced due to corolla rotting, lack of good pollination and fertilization. The corolla being hygroscopic absorbs water leading to rotting and early fruit drop. Further, the rain washes out the pollen grains and reduces stickiness of stigma required for capture and retention of pollens till germination. It leads to poor fruit set or small fruit size. The technique of manual pollination has exhibited good results by increasing fruit set, increasing fruit weight and quality. In red flesh varieties, due to self-incompatibility, fruit set is less that necessarily requires cross pollination. This simple and easy technique was demonstrated at NIASM farm during last season and will be implemented on large scale during this season. More hands need to be trained for manual pollination.

Flowering in dragon fruit

Manual pollination and corolla removal

Recommendations of FAC June 6, 2022

- South farm field allotment was discussed based on existing research activities and fresh requisitions for field. The field allotment was finalized and circulated.
- It was decided to complete the *kharif* crops' sowing in scheduled time, with interaction with respective PI's.
- Treatments and Standard Protocols to be followed in selected orchards for organic and natural farming experimentation to be circulated.
- Plant protection issues at campus need integrated effort by frequent monitoring of the pest infestation and solutions to manage it.
- Procurement of materials required for plant protection, nutrition, etc. need to be compiled and indented at lease 3-month before actual requirement so as to give ample time for processing the indents.
- Development targets for Malad Farm: follow up of Irrigation facility development related process to be taken frequently to initiate the work, other development activities like land preparation, boundary side plantation and fencing work to be carried out on priority, research project plan to be prepared so as to target planting from *Kharif* 2022 season and planting material to be procured immediately.

Integrated Pest Management-III (Mechanical Management)

Handpicking

Inspect plants regularly for eggs, immatures, or adults of harmful insect pests and hand-pick those as many as possible. Almost all large non-venomous pests can be picked off at any stage. To avoid the risk of hand-squashing the pests, knock the insects and egg clusters into a jar with a small amount of water and a bit of detergent.

Traps

Insect traps can assist in detection and management of pests. However, many traps are of limited use or may lure pests to the field crops.

Light traps, which emit ultraviolet light that is highly attractive to nocturnal insects, are good insect monitoring tools but provide little or no protection for the crops. They usually capture a tremendous number of insects, both beneficial and harmful. Those insects attracted but not captured remain in the area, and the destructive ones may cause damage by infesting crops.

Pheromone traps are used for detecting the presence of pests or sometimes for disrupting insect mating habits. Rainfall, cool temperatures, wind speed, and wind direction can reduce the lures' effectiveness. The best success occurs when the pest density is low and movement is minimal.

Yellow sticky traps made with boards painted yellow and lightly coated with oil or grease catch whiteflies and cucumber beetles.

Barriers

Mechanical barriers can help to exclude some pests but are not effective if the pest population is large. Aluminum foil and other reflective mulches can repel aphids. Crushed eggshells or hydrated lime spread around plants discourages slugs.

Floating row covers of spun polyethylene are a little more expensive, but they can be quite effective at excluding insects.

Sticky barriers on the trunks of trees and woody shrubs prevent damage from some crawling insects.

Kaolin clay can be used to form a thin film on leaves and fruit and can protect plants from leafhopper, mite, thrips, and flea beetle. This film irritates the bodies of insects and reduces their feeding.

Net-covered cages over young seedlings help prevent insect, bird, and rabbit damage. Bird netting can be draped over fruiting plants to prevent predation when fruit is ripe. Use paper bags to cover ears of corn to keep birds and insects out.

Pruning and Raking

Some pests can be managed by pruning infected twigs out of infested plants and destroying them.

Raking the fallen twigs of trees in the fall removes the larvae of twig girdlers.

Water Sprays and Irrigation

Spraying infested plants with a strong stream of water dislodges and kills many spider mites, aphids, and other relatively fragile insects. Rain is one of the greatest natural management strategies for spider mites; populations tend to build up during dry weather. Cool, cloudy weather promotes fungal pathogens. Proper irrigation can help reduce the likelihood of pest problems.

Frightening Devices

Frightening is a tool that can vary greatly in its effectiveness. These include: reflective objects, noise makers, human or predator effigies, lights, lasers, pyrotechnics, guard animals, and ultrasonic devices. Insects do not register sight and sound the way birds and mammals do, so frightening is not a technique used in insect management.

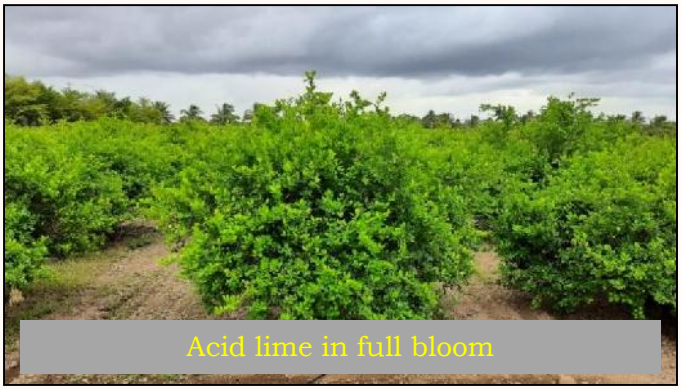
Limitations of Mechanical Management

Mechanical methods require time and can be more practical for small gardens. For example, the use of row covers to exclude pests can be effective. Depending on the size of the garden, however, it may be a large expense and time investment to place the row covers, remove them to allow for pollination, and replace after pollination.

Use of pheromone trap for fruit fly

Sunflower field at South farm

Experimental cotton crop



Acid lime in full bloom

Sweet orange fruit growth

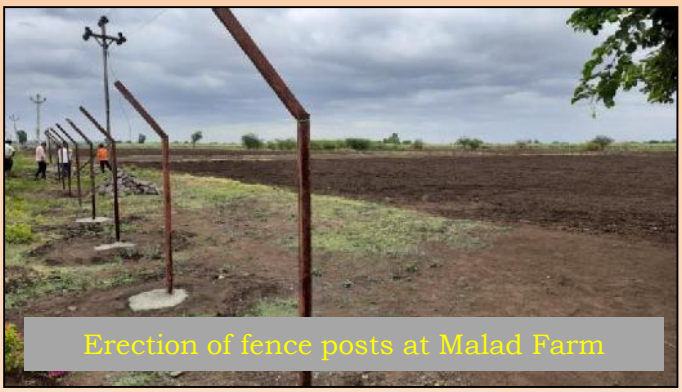
Amphitheatre lawn use #IDY 2022

Beautiful view due to avenue trees

Secondary tillage operations

Ready field and marking for planting

Post hole digger work at Malad Farm



Erection of fence posts at Malad Farm

प्रगति के पथ पर

खरीफ के मौसम का दौर चल रहा है और अधिकांश खेत फसलों की बुवाई गतिविधियां पहले ही पूरी हो चुकी हैं। पिछले मौसमों में यह अनुभव किया गया था कि नहर बंद होने की अवधि के दौरान पानी की अनुपलब्धता के कारण खरीफ की बुवाई में देरी होती थी। हालांकि, इस बार जून के अंत तक नहर चलती रही और साथ ही प्रतिकूल स्थिति में पूरक सिंचाई में मदद करने के लिए सभी खेत तालाबों में पानी का पर्याप्त भंडारण भी किया गया. नई लिफ्ट सिंचाई परियोजना और जल भंडारण संरचनाओं ने परिसर में पानी की आवश्यकताओं को पूरा करने में बहुत महत्वपूर्ण भूमिका निभाई है। इसके अलावा फसलवार जल बजट के माध्यम से उपलब्ध जल का विवेकपूर्ण उपयोग करने की योजना है।

परिसर में अनुसंधान के लिए लगभग 20 अलग-अलग फल बागान हैं। बागों का रखरखाव एक जटिल और समयबद्ध गतिविधि है। कीट प्रबंधन पिछले तीन वर्षों से एक बड़ा मुद्दा बना हुआ है और आईपीएम की ओर अधिक ध्यान देने की आवश्यकता है। पिछले वर्ष के दौरान कुछ कदमों से स्थिति में थोड़ा सुधार हुआ है लेकिन अभी भी सुधार की बड़ी गुंजाइश है। कृषिक, यांत्रिक, जैविक और रासायनिक तरीके से एकीकृत कीट प्रबंधन के कार्यान्वयन के लिए एक ठोस योजना आवश्यक है। इसमें प्रभावित फलों और छंटे हुए बायोमास का उचित निपटान, खरपतवार प्रबंधन के लिए अंतर-खेती जुताई, जैविक और रासायनिक सामग्री के छिड़काव के साथ विभिन्न प्रकार के ट्रेप का उपयोग शामिल है। साथ ही, तुलनात्मक अध्ययन के लिए चयनित बागों में जैविक और प्राकृतिक कृषि को अपनाया जा रहा है।

जैसा कि पहले योजना बनाई गई थी, मलद फार्म में विकास कार्य प्रगति पर है। विभिन्न बागवानी और कृषि-वानिकी वृक्षारोपण गतिविधियों के लिए खेत तैयार हैं। उपचार के अनुसार अंकन, संबंधित पीआई द्वारा पहले ही पूरा कर लिया गया है। गड्ढा खोदने, भरने और रोपने का काम जल्द से जल्द पूरा किया जाएगा। कुछ सीमावर्ती वृक्षारोपण के साथ-साथ खेत की बाड़ की सुरक्षा की जा रही है। आशा है कि इस मौसम से ही यह फार्म प्रभावी अनुसंधान के अधीन होगा। बहुत ही जल्द 'मलद फार्म' में काली मिट्टी के खेतों की मांग पूरी की जा सकती है।

Plan For Progress

Kharif season is in progress and most of the field crops' sowing activities have been completed already. It was experienced earlier seasons that the *kharif* sowing delays due to unavailability of water during canal closure period. However, this time the canal kept flowing till the end of June and simultaneously ample stock of water was also made in all the farm ponds to help supplementary irrigation in adverse situation. The new lift irrigation project and water storage structures have played very important role in fulfilling water requirements at campus. Further it is planned to use the available water judiciously through crop-wise water budgeting.

The campus has about 20 different orchards meant for research. The maintenance of orchards is a tedious and time bound activity. The pest management remained a big issue from last three years and more attention was needed towards IPM. Some steps during last year have improved the situation little bit but still there is a big scope for improvement. A concrete plan is necessary for implementation of integrated pest management by cultural, mechanical, biological and chemical way. It includes, proper disposal of infested fruits and pruned biomass, inter-cultivation for weed management, use of different types of traps along with sprays of biological and chemical materials. Simultaneously, organic and natural farming treatments are going to be imposed in selected orchards for comparative study.

As planned earlier, the developments at Malad Farm are in good progress. Fields are ready for various horticulture and agro-forestry plantation activities. The marking as per treatments has been already completed by respective PIs. The pit digging, filling and planting work will be completed at the earliest. The fence protection to farm is being erected along with some boundary side plantations. Hopefully, the farm will be under effective research activities from this season only. Very soon the requisitions for black soil fields could be fulfilled at 'Malad Farm'.