



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...

वित्तीय वर्ष के अंत में, यह समय वार्षिक उपलब्धियों के आत्म-विश्लेषण का है। आगे की चुनौतियों और लक्ष्यों पर ध्यान केंद्रित करके 'प्रगति के पथ' को रेखांकित करने का अवसर है। यह हमेशा कहा जाता है कि लिखित लक्ष्यों को अधिक आसानी से और बहुत स्वाभाविक रूप से प्राप्त किया जा सकता है, क्योंकि जब यह स्पष्ट हो जाता है कि क्या करना है और कैसे करना है, तो काम पहले ही आधा हो चुका होता है। अनुसंधान प्रक्षेत्र प्रबंधन में क्रमिक सुधार के लिए 'फार्म समन्वयक' इस दिशा में बहुत महत्वपूर्ण भूमिका निभा रहा है।

यह माह रबी फसलों जैसे गेहूं, चना और विवनोआ और चिया जैसी नई फसलों की कटाई और शेसिंग में व्यस्त था। गर्मियों और आगामी खरीफ मौसम की फसलों के लिए प्राथमिक जुताई और भूमि की तैयारी भी उपलब्धियों की सूची में हैं। बागों में अंगूर, सपोटा, नींबू की कटाई चल रही थी, जबकि आम, मौसमी, करोंदा, खजूर, आदि। फूल और फल वृद्धि की अवस्था में थे, और इसलिए सिंचाई, पोषण और पौध संरक्षण गतिविधियों पर अधिक ध्यान देने की आवश्यकता थी। पहले सप्ताह में, विभिन्न राज्यों के प्रतिष्ठित वैज्ञानिकों के हाथ से परिसर में 'स्वचालित सिंचाई और फर्टिगेशन सुविधा' के लिए नाम पट्ट का उद्घाटन किया गया। परिसर में सिंचाई का पानी बहुत कीमती है क्योंकि सिंचाई हेतु पास से बहनेवाले नहर पर पूरी निर्भरता है तथा बीच में लंबे समय तक नहर में पानी बंद रहता है। जल भंडारण क्षमता में सुधार और वितरण सुविधा, सिंचाई के पानी की कमी से संबंधित मुद्दों को हल करने की कुंजी है। फसलों की पानी की आवश्यकता के आधार पर सिंचाई जल बजट के माध्यम से विवेकपूर्ण योजना और सिंचाई के निष्पादन के साथ 'स्वचालित सिंचाई और फर्टिगेशन सिस्टम' की महत्वपूर्ण भूमिका रहेगी।

डॉ. प्रवीण तावरे के नेतृत्व वाली पूरी टीम को इस महत्वपूर्ण प्रकाशन को नियमित रूप से प्रकाशित करने में उनके समर्पण और निरंतरता के लिए, मैं धन्यवाद देता हूँ।

From Director's Desk...

At the end of financial year it is the time of self-analysis of the annual achievements. There stands an opportunity to sketch down the path for progress by focusing on challenges and targets ahead. It is always said that the,

written goals can be achieved more easily and very naturally, because when it's clear what is to be done and how, the work is already half done. The 'Farm Coordinator' is playing very important role in gradual improvements in research farm management.

This month was busy with harvesting and threshing of *Rabi* crops like wheat, chickpea and new crops like quinoa and chia. Primary tillage and land preparation for summer crops and also for upcoming *Kharif* season are in the list of achievements. In orchards harvesting in grape, sapota, acid lime was in progress, while mango, sweet orange, karonda, date palm were in flowering and fruiting stage needing more attention towards irrigation, nutrition and plant protection activities. In the first week, the display board for 'Automated Irrigation and Fertigation Facility' at campus was inaugurated with the hand of distinguished scientific fraternity from various states. Irrigation water is very precious at campus due to dependency on canal exhibiting prolonged closure in between. The improvement in water storage capacity and the distribution facility is the key to resolve the issues related to irrigation water scarcity. The automated irrigation and fertigation system will be play significant role, with judicious planning and execution of irrigation through irrigation water budgeting based on crops' water requirement.

I thank the whole team led by Dr. Pravin B Taware for their dedication and sincerity in bringing out this important publication very regularly.




Field crops' management:

- Harvesting of field crops was the main activity going on in *rabi* sown fields. Mainly chickpea and wheat were under field experimentation along with new crops like quinoa and chia. Harvesting of vegetables like brinjal, tomato and okra were facilitated at defined intervals.
- The sugarcane fields were cultivated through mulching for trash cutting by using SORF machine.

Orchard management:

- Harvesting of sapota, acid lime and grape was continued during this month.
- Mango flowering was delayed this year and was in fruit setting phase that required keen monitoring of irrigation, fertilizer application and plant protection.
- Insecticide (deltamethrin, thiamethoxam, azadirachtin) along with fungicides (carbendazim, wettable sulphur) were used at weekly interval to take care of hopper and fruit fly incidence and powdery mildew infection to panicles.
- Spraying of fipronil and carbendazim was carried out in Sweet orange to manage sucking pests and sooty mould formation on leaves.

Malad farm activities:

- Harvested chickpea crop grown during *rabi* season and brought to main campus for threshing. Deepened the pits along roadside that are meant for tree plantation. Physical exercise for soil depth measurement was tried and found loose soil up to 4m depth.
- The drip irrigation system material was procured during this period. However, proposals for farm pond development and solar pumping system were in process.

Campus cleaning & landscape maintenance:

- Campus cleaning was targeted during first week of March on finding some window from the field activities. The entry path starting from main-road and all internal roadsides were made weed free especially *Parthenium* free. Lawn and hedge cutting was executed as regular activity.
- The shredded material from disposal area along with agro-waste was used for mulching in orchards.



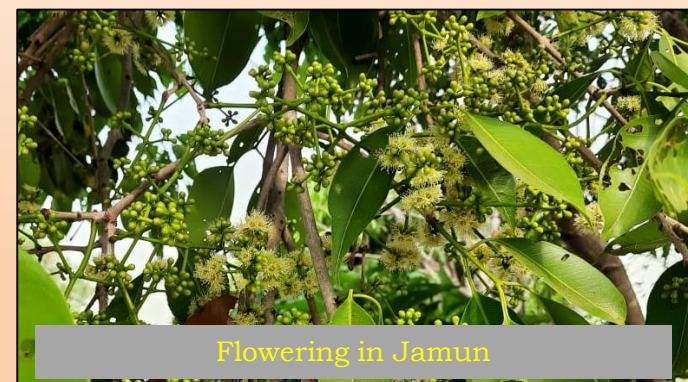
Harvesting of wheat crop



Wheat threshing



Mango fruit development stage



Flowering in Jamun

- Wide spread infestation of white aphids was observed in indoor as well as outdoor shrubs, hedges, etc. Initially washing with plain water as recommended was carried out to manage the pest followed by spraying of azadirachtin and dimethoate.
- Drip irrigation facility was extended to all peripheral plantations and operated on daily basis. Drip irrigation was started in custard apple biodiversity block after pruning.

The long period average (LPA) rainfall and average temperature of March at Baramati is 5.9 mm and 27.5 °C, respectively. The details of weather during the March 2022 has been listed in Table 1 and depicted in following figure.

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

Weather Parameters	Week				Monthly	Max.	Min.
	1 st	2 nd	3 rd	4 th			
T Max (°C)	34.2	33.5	37.8	36.9	35.9	39.4	31.6
T Min (°C)	16.2	19.0	18.1	21.6	18.7	25.0	14.6
T Avg (°C)	25.2	26.2	27.9	29.2	27.3	31.2	24.5
RH Mean (%)	46	54	43	49	47	62	33
WS (km/h)	4.6	5.3	6.1	5.7	5.5	8.0	3.9
BSS (h)	7.8	5.4	7.3	3.8	6.3	9.0	0.0
Total PE (mm)	44.8	42.6	54.6	45.5	217.8	10.8	4.1
Total Rain (mm)	0.0	0.4	0.0	0.0	0.4	0.4	0.0

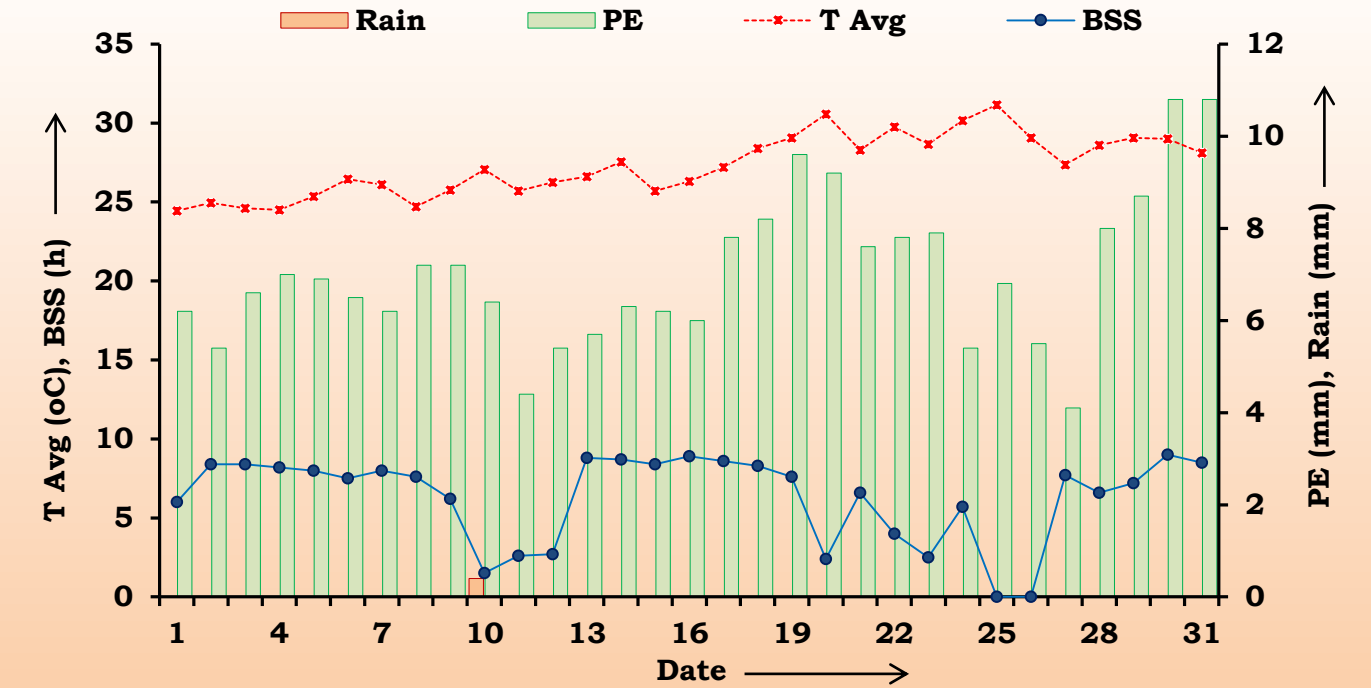


Fig 1. Variations of daily rainfall (Rain), pan evaporation (PE), mean temperature (T_{Avg}) and bright sunshine hours (BSS) during March, 2022 at ICAR-NIASM Baramati.



Crop maintenance activities:

Harvesting of *rabi* crops is at its completion. Experimental threshing activities for various treatment plots need to be carried out manually because of having very small quantity. Some of the summer crops are already done while remaining plots need to fallow cultivated. Being very hot period, irrigation water requirements need to be fulfilled on priority.

Orchard management:

Karonda, acid lime, sweet orange, mango, date palm, amla and ber are in flowering and fruiting stage. There is a need of much attention towards irrigation and plant protection for improved quality and quantity. The monitoring of fruit fly pest and its management through spraying of chemicals is to be taken up during early phase of fruit development.

Harvesting in grape is over and back pruning will be taken up after 15-days rest period. Meanwhile basal dose of fertilizers along with FYM will be applied as recommended practice. The orchards at G4 (Grape) and G6 (Mandarin orange to Pomegranate) are to be re-established, wherein the developments activities are needed on priority.

Malad farm activities:

The target have been fixed to initiate experimental sowing and planting from June onwards. Therefore, the major facility development through water storage tank, pumping and distribution system have to be started on war foot. The re-indenting and other administrative processes and follow-up of all the developments is much necessary. Field preparation also have to be carried out during this period through fallow cultivation.

Garden maintenance & other activities:

Much attention is also required towards the pest management as there is widespread infestation of white aphids on various indoor as well as outdoor shrubs and trees. Washing the plants with plain water or soapy water is the best remedy recommended for its management. Coconut flowering flush is emerging. The plant basins will be pulverized followed by application of fertilizers. Drip irrigation system is already installed to all the peripheral plantation that needs to be operated consistently.



Summer mungbean field research



Karonda fruiting



Acid lime growth under drip irrigation



Amla in flowering stage



Naxatra Udyan development view

Mitigation of Heat Stress Impact on Plants

Month of April and May are known for high temperature with low relative humidity. The ensuing heat stress (HS) severely impacts plant growth, endangering ecosystem quality and world food security. Plant growth, physiological processes and final amount of edible products are affected by HS to an extent that reflects the physical damages, physiological commotions and biochemical alterations incurred at various growth stages.

- At NIASM farm orchard shrubs are standing basaltic rock base with very less soil available for root development. The air temperature and bright sunlight affects the plant canopy by sun-burn and providing very little window for physiological processes.
- In case of dragon fruit, being a CAM plant, the stomata are closed during day time leading to no transirational cooling of the plant. Due to this the temperature inside the succulent leaves increases to such a extent that leads to tissue necrosis.
- The rock and soil around the plants gets heated up with increasing air temperature. When the roots touch heated rock, white root development is hampered, showing negative impact on plant growth, appearance and performance.
- Simultaneously, the irrigation water provided through drip system, is lost immediately due to evaporation. Therefore, some measures need to be taken up to alleviate the heat stress impact on plants.
- Use of live mulch is being suggested to cool down the soil temperature. Especially, the agro-wastes and pruned biomass have to be shredded and used as a soil cover in the basins of the plants.
- Shedding the sensitive plants with shedding net or managing partial tree shade for protecting main crop is also advised especially in dragon fruit.
- Operation of micro-irrigation systems in morning and evening period and at frequent intervals can be one of the measure to minimize losses.
- In case of field crops too, shrewd management of crop practices is still helpful to improve plant resilience to HS. Suitable sowing time, seed priming, bacterial seed treatment, nutrient and water management, exogenous application of osmo-protectants, and conservation of soil moisture are important tools to improve plant behaviour under the critical HS scenarios determined by climate change and global warming.



Trash management in ratoon sugarcane



Rain-pipe irrigation system



Use of agro-waste as mulch



Medicinal plants with drip irrigation

Automated Irrigation and Fertigation Facility

ICAR-NIASM farm rely on NIRA canal for irrigation water, flowing from about 1200 meter to north. There is no ground water availability at campus and 30-40 day canal closure is also experienced in between. Therefore, the lift irrigation facility has been designed very consciously. It includes automation of irrigation centrally.

- The first stage of Lift Irrigation Project, the Sump Well cum Main Pumping Unit is located at the canal side. The canal water is fetched to sump well by gravity so as to maintain height of water column at least 2m above the pumps. Water entering into the sump well is thoroughly measures with the help of digital water meter.
- Two submersible pumps of 20 hp each are used to lift the water from sump well, which then through a HDPE pipe line reach to the farm storage pond 'Malhar' at campus. The 'Malhar' Pond of 19.5-million-liter storage capacity is the main source from where 'Manas' pond requirements and south farm irrigation, fishery and livestock needs are facilitated.
- The Manas pond at North Farm of 7.65-million-liter storage capacity is the source for irrigation to orchards, landscape garden and utility water supply. It has two submersible pumps of 12.5 hp and 15 hp capacity used through automated system for orchard irrigation. There are separate pumps for landscape garden irrigation and another for supply of utility water through over-head tank.
- Automated irrigation and fertigation system is installed at a Pump House near 'Manas' Pond. It consists of Electrical Panel, Filtration system, Fertilizer tanks, Fertigation System, Main control unit and distribution lines.
- The filtration system consists of assembly of 2 and 3 sand filters and disc filters. The filters can be cleaned automatically by scheduled program.
- The fertigation tanks serve purpose of use of different fertilizer grades that can be injected through irrigation water at desired doses through fertikit and main automation unit.
- The solenoid valves and hydraulic valves are placed at each field. These can be operated remotely by Automated Irrigation System through the program determined on the basis of crop water requirements.
- All the orchards, landscape and peripheral plantations have micro-irrigation facility since there establishment.
- Orchards have drip irrigation system designed to meet the varied requirements of water.
- Lawns are irrigated by using pop-up sprinkler system.
- In case of field crops, initially the crops were flood irrigated. However, one by one fields are being brought under micro-irrigation system. For example, surface as well as sub-surface drip irrigation for sugarcane, overhead sprinklers for vegetables, rain pipe irrigation system for dwarf crops and inline drip irrigation system for other field crops.
- The ultimate aim is to use available irrigation water precisely by water budgeting and Automated Irrigation and Fertigation facility.



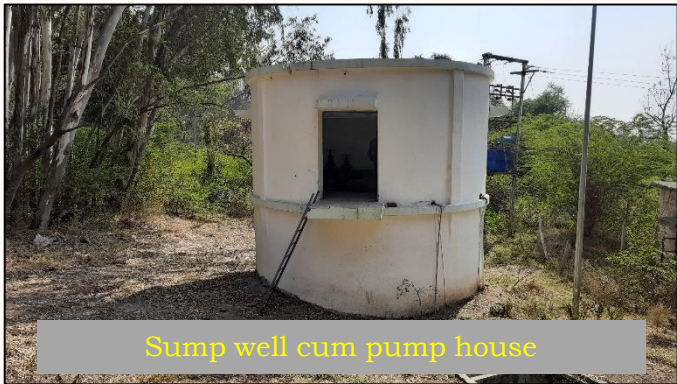
The Director elaborating about the project



Inauguration of the Varun Facility



Nira Canal- main source of water



Sump well cum pump house



Incoming water measurement



Water meter showing volume per hr.



Pipe network from submersible pumps



Incoming water to Malhar pond



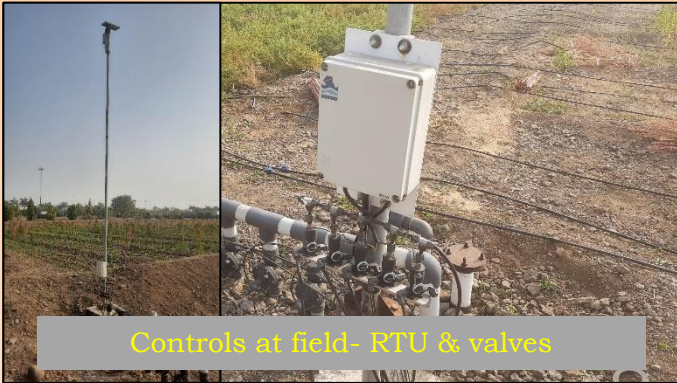
Pump house near Manas pond



Automated irrigation & fertigation facility



Main control unit



Controls at field- RTU & valves

प्रगति के पथ पर

संस्थान के स्थापना दिवस की अवसर पर फार्म समन्वयक का 24वां अंक विशेष अंक के रूप में लाया गया था। इसमें पिछले दो वर्षों के दौरान यानी इस प्रकाशन की शुरुआत से उपलब्धियां शामिल की गयी थी। इस प्रकाशन का मुख्य उद्देश्य किए जा रहे कार्यों के आवधिक मूल्यांकन के माध्यम से अनुसंधान फार्म प्रबंधन को नए आयामों में ले जाना, गतिविधियों की योजना बनाना और कृषि गतिविधियों की गुणवत्ता और क्षमता में सुधार के लिए तकनीकी कौशल विकसित करना है। कुछ हासिल किया गया है और बहुत कुछ दूरदर्शिता में है।

नए मूल्यांकन वर्ष में प्रवेश करते समय, हमेशा पिछले वर्ष की उपलब्धियों के दस्तावेजीकरण पर ध्यान केंद्रित किया जाता है। हालांकि, फार्म समन्वयक ने नए साल के लिए विकास की योजना बनाने का अवसर दिया जो अंततः उपलब्धियों की संरचना करता है। वर्ष 2022-23 की अवधि के दौरान, मलद फार्म विकास सबसे आवश्यक और जरूरी विषय होगा। सक्षम नेतृत्व में अनुसंधान गतिविधियां तेज गति से चल रही हैं, जिससे अनुसंधान के लिए भूमि की मांग बढ़ रही है। इसलिए इस फार्म को प्रक्षेत्र अनुसंधान गतिविधियों के लिए तैयार करना एक प्रमुख उद्देश्य होगा। इसके लिए नहर का पानी लाकर, बोअरवेल खोदकर, जल भंडारण संरचना बनाकर और ड्रिप सिंचाई नेटवर्क बिछाकर सिंचाई सुविधा के विकास की आवश्यकता होगी। इसके साथ ही परिसर में मुख्य फार्म के सभी खेतों को उपलब्ध पानी के कुशल उपयोग के लिए सूक्ष्म सिंचाई के तहत लाया जाना है।

इसके अलावा, प्रबंधन के संबंध में मानक संचालन प्रक्रियाओं; जैसेकी फसल की खेती, जनशक्ति प्रबंधन, मशीनरी रखरखाव, इन्वेंट्री अप-कीपिंग, सिंचाई संचालन, उपज निपटान, आदि को तय किया जाना है। नियासम प्रक्षेत्र में विभिन्न फसलें / फल उगाए जा रहे हैं। इन सभी फसलों की खेती के तौर-तरीकों, पौध संरक्षण, पोषण और सिंचाई से संबंधित तकनीकी जानकारी को फार्म समन्वयक के माध्यम से संकलित और प्रलेखित किया जाएगा। यह नए अधिकारियों के लिए सहायक होगा, अनुसंधान में विभिन्न संस्थाओं के बीच समन्वय में सुधार लाएगा और समग्र कृषि प्रबंधन के सुचारु कामकाज में मदद करेगा।

Plan For Progress

The 24th issue of Farm Coordinator was a special issue on the eve of foundation day of the Institute. It narrated the achievements during last two years i.e. from the inception of this publication. The main aim of this publication is taking the Research Farm Management to new dimensions through periodic assessment of the works being carried out, planning the activities and to develop technical skills for improving quality and efficiency of farm activities. Much more have been achieved and lot more is in foresight.

While entering into the new assessment year, one always focus on documenting the achievements of the past year. However, Farm Coordinator gave opportunity to plan the developments for New Year that ultimately structure the achievements. During the period 2022-23, developments at Malad farm will be the most needed and urgent topic. As the research activities are under great pace under the able leadership, requisitions for land for research are increasing. Therefore, making this farm ready for field research activities will be a prime objective. It will require development of irrigation facility by fetching canal water, digging bore-wells, creating water storage structures and laying of drip irrigation network. Simultaneously all the fields at main farm at campus is to be brought under micro-irrigation for efficient utilization of available water.

Besides this, standard operating procedures are to be chalked down in relation to Management viz; crop cultivation, manpower management, machinery maintenance, inventory up-keeping, irrigation operation, produce disposal, etc. Various crops/ fruits are being grown at NIASM farm. The technical information of all these crops related to cultivation practices, plant protection, nutrition and irrigation will be compiled and documented through the Farm Coordinator. It will be helpful to the succeeding officers, improving coordination between various entities in research and the smooth functioning of overall farm management.

