मार्च / March 2021

Issue

13

FARM COORDINATOR

... कृषि तकनीकी समन्वय पत्र

भाकृअनुप – राष्ट्रीय अजैविक स्ट्रैस प्रबंधन संस्थान

ICAR-NATIONAL INSTITUTE OF ABIOTIC STRESS MANAGEMENT

मालेगांव, बारामती, पुणे - 413 115, महाराष्ट्र, भारत

Malegaon, Baramati, Pune – 413 115, Maharashtra, India

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भाकृअनुप ICAR

राअस्ट्रैप्रसं NIASM

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निदेशक के लेखनी से...

रबी और गर्मी के मौसम संक्रमण के चरण के दौरान, खेत कर्मचारी रबी फसलों की कटाई और थ्रेशिंग में व्यस्त रहे हैं, इसके बाद खाद की आपूर्ति और प्राथमिक जुताई का काम भी किया जा रहा है। स्थापित बागों का रखरखाव नियमित काम का एक हिस्सा है, लेकिन बागों में विविधता के कारण बागवानी प्रथाओं का बहुत समझदारी से पालन करना पड़ता है। नियासम परिसर में फार्म प्रबंधन न केवल इन अनुसूचित गतिविधियों को पूरा करने का काम है, बल्कि स्थानीय बजरी मिट्टी और पानी की कमी जैसे तनावों से निपटना भी है। 'फार्म समन्वयक' लक्ष्य और उपलब्धियों के प्रलेखन के साथ सभी कृषि प्रबंधन गतिविधियों के समन्वय में महत्वपूर्ण भूमिका निभा रहा है।

अप्रैल 2020 से, परिसर में जल भंडारण की सुविधा बढ़ाने के लिए पहल की गई थी और कुछ महीने पहले 'मल्हार' तालाब का पहला हिस्सा चालू किया गया था। मार्च 2021 के दौरान, दूसरे भाग के निर्माण और दोनों को जोड़ने का अगला कदम उठाया गया और पूरा होने पर; मल्हार तालाब की क्षमता लगभग 19.5 दशलक्ष लीटर होगी। यह नियासम फार्म की सिंचाई पानी की जरूरतों को पूरा करने की दिशा में एक बड़ा कदम है। अगला कदम आगे की आवश्यकताओं को पूरा करने के लिए पानी की बैलेंस शीट बनाकर पानी का सही ऑडिट करना है।

मैं डॉ. प्रविण भिमदेव तावरे, वरिष्ठ तकनीकी अधिकारी (फार्म), उनकी टीम और योगदानकर्ताओं को इस उपयोगी प्रकाशन को लाने के लिए बधाई देता हूं।

From Director's Desk...

During the transition phase between rabi and summer season, farm staff has been busy in harvesting and threshing of rabi crops followed by farm yard manure application & primary tillage operations. Maintenance of established orchards is a part of routine work but it's a bundle of horticultural practices to be followed very wisely due to diverse collection of orchards. Farm management at NIASM campus is a task of not only to complete these scheduled activities but also to tackle local edaphic & water scarcity stresses. 'Farm Coordinator' is playing important role in coordinating all farm management activities with documentation of targets and achievements.

Since April 2020, initiative was taken to increase water storage facility at the campus and the first part of Malhar pond was made operational a few months back. During March 2021, next step to construct and wisely connect the second part was taken up and on completion; the capacity of Malhar pond will be about 19.5 million liters. This is big step towards fulfilling the irrigation water requirements of NIASM farm. Next step ahead is to make strict water audit to fulfil the requirements efficiently.

I congratulate Dr. Pravin Bhimdeo Taware, Senior Technical Officer (Farm) & Farm Manager, his team and the contributors for bringing out this useful publication.

मार्च / March 31, 2021

हिमांशु पाठक / Himanshu Pathak

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Fruit set in Sweet orange

- Harvesting of experimental rabi crops viz., chickpea, sunflower, wheat, chia, etc. was carried out during this month and threshing was facilitated with the help of thresher machine or through manpower. Previously threshed material was stored properly after sun-drying and cleaning.
- Primary tillage operations of ploughing were carried out in fields after harvesting. Some of these fields will be maintained fallow as a part of soil health and irrigation water management.
- Sowing of summer mung bean was carried out in C3 field by preparing ridges and furrow layout for research purpose.
- Procurement of farm yard manure could be achieved during this after receiving office order for 140 brass. It has been placed at desired locations in orchards as well as in south farm fields. Its application and soil incorporation are targeted for next month.
- Installation of micro-irrigation system for field crops was planned and material for the same has been procured in the form of PVC pipes, laterals, drippers and micro-sprinklers. The process of installation has been started already.
- Simultaneously installation of drip irrigation system in various plantations like mango/ ber/ sandal and changing of drip system in some established orchards has been initiated already.
- Harvesting and disposal of grape, amla, tamarind was done during this month.
- Development of second phase of 'Malhar Pond' was started this month and major earth work has been completed. Unique technique was exploited to increase storage capacity without disturbing the water supply from the first phase. After completion its storage capacity will be about 20 ML. The finishing work and HDPE sheet laying will be completed next month.


Summer Mungbean field


Ber plant growth after recut


Training of dragon fruit plants


Farm Yard Manure for field application


Sugarcane field irrigation


Drip system for Mango Plantation

Weather Summary of March 2021 at ICAR-NIASM

Mr. Sunil V. Potekar & Mr. R.N. Singh

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 2021 has been listed in Table 1 and depicted in following figure.

Table 1. Summary of weather variables recorded during March, 2021.

Weather Parameters	Week				Monthly	Max.	Min.
	1st	2nd	3rd	4th			
T Max (°C)	35.6	36.0	35.7	35.3	36.0	39.1	32.2
T Min (°C)	16.4	17.1	18.3	18.9	17.7	20.3	15.2
T Avg (°C)	26.0	26.6	27.0	27.1	25.4	28.9	25.4
RH Mean (%)	39	39	42	46	41	61	32
WS (km/h)	4.6	4.9	5.0	5.7	5.2	8.8	3.6
BSS (h)	8.3	8.8	7.3	6.6	7.8	9.5	0.0
Total PE (mm)	48.2	53.0	51.3	45.1	224.8	10.0	4.6
Total Rain (mm)	0.0	0.0	1.0	0.4	1.4	0.8	0.0

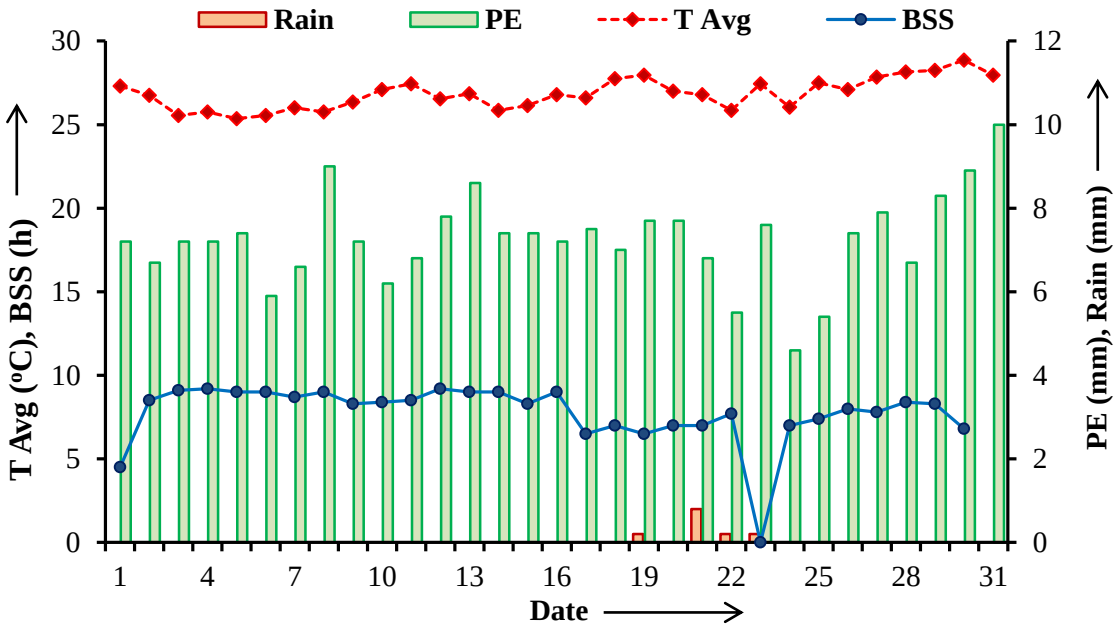


Fig . Variations of daily rainfall (Rain), pan evaporation (PE), mean temperature (T_{Avg}) and bright sunshine hours (BSS) during March, 2021 at ICAR-NIASM Baramati.

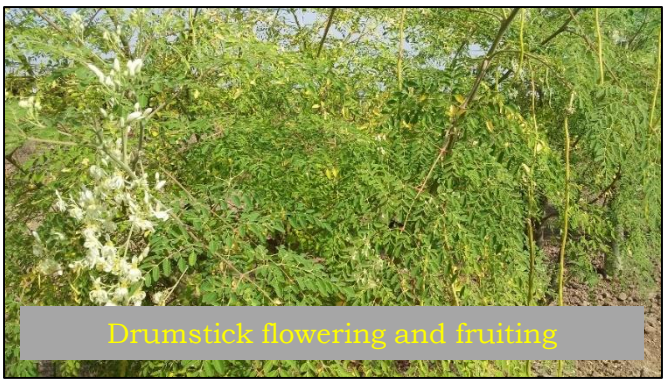
Grape plants for research purpose

New growth in Sapota

- Harvesting of experimental rabi crops and tillage operations after its harvest will be continued and completed during this month. The disposal of whole produce will be carried out as per the defined procedure through campus sale counter & by sending remaining produce to APMC market.
- Trial commissioning of micro-irrigation system for field crops will be carried out on completing installation and will be put to use for efficient use of irrigation water.
- Back pruning in grape is preferably targeted in the month of April. This being the foundation phase in grape cultivation, strict implementation of viticultural practices is a pre-requisite. The pruning will be carried out by leaving 1-2 buds of cane on vine cordons. Mandatory sprays for eradication of pests and pathogens will be done as per schedule. If the temperature remains high, spraying of water will be carried out at least twice during first week to lower down temperature and increase RH, to enhance sprouting.
- Plant protection: Major issue related to plant health management to take care of during this month will be sucking pests like thrips in citrus crops, pomegranate and grape, leaf eating caterpillar in drumstick, fruit fly in mango and fruit borer in pomegranate. In case preventive sprays for gummosis in citrus, oily spot in pomegranate and secondary infections associated with sunburn in dragon fruit.
- FYM application in fields and orchards: In open fields FYM application will be carried out by broadcasting followed by incorporation with tillage operations. While in orchards the FYM application will be done by band or ring placement under emitters of drip system followed by closing it with soil.
- Finishing work of Malhar Pond: The earth work of Malhar Pond expansion has been completed during last month and the finishing with fine soil and HDPE paper lining work will be completed during April 2021. Water storage in whole big sized pond will be initiated after the plastic lining is completed.
- Other targeted works are fencing and field preparation works at Malad farm, preparation of road map for Agri-Tourism implementation and completing road levelling at medicinal garden.


Chick pea germplasm at maturity


Wheat crop ready for harvest


Drumstick flowering and fruiting


FYM dumped for application in orchard

Road preparation in Medicinal Garden

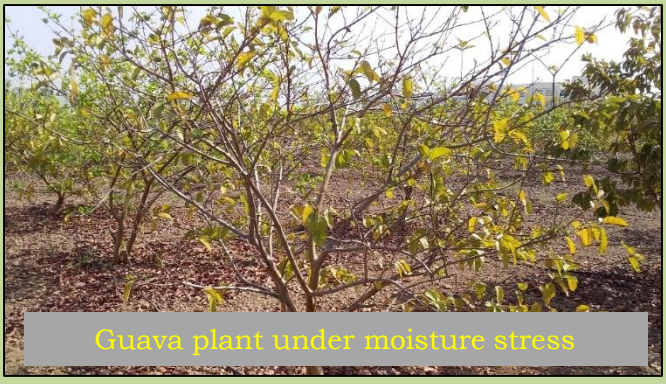
High Temperature Stress Challenge in Orchard Management

As air temperature starts rising from March onwards the orchard and other tree plantations experience severe adversities in growth and production. Following are some observations about these challenges during last 7-years;

- Orchard plantation was carried out by taking pits (1Mx1M wide x1M deep) or trenches (0.75M wide x 0.60M deep) by breaking hard basalt rock with heavy machinery and/or blasting, just like pots.
- The pot like pits or trenches were filled with that much limited quantum of soil + manure mixture, having limited scope for root development. Native soil being very gravelly, low in Organic Matter and poor water holding capacity there were multiple stress challenges always.
- Watering is being carried out through drip irrigation system with 2-4 drippers per plant. However, due to dependence on canal water, pumping and storage limitations earlier, the orchards used to face moisture stress.
- During summer, increase in air temperature and consequent heating of rocky strata exhibits severe stress and its adverse effect on plant growth, reduction in fruit set, pre-mature fruit drop and overall reduction in yield.
- Most of the orchards started bearing in 3-4 years but decreasing trend in yield performance was reported from 5th year onwards.

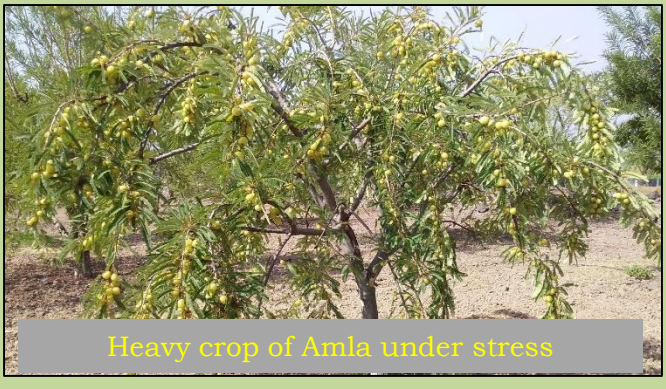
Following strategies out from technical discussions are being implemented for mitigation of these stressors especially on orchards;

- Canopy management to be employed as mitigation tool to mitigate atmospheric, edaphic and water stress by limiting plant size by training and pruning operations. Looking into limitations for root development due to these abiotic stresses, plants' canopy to be reduced accordingly.
- Increasing organic carbon concentration of soil to improve its physical properties for increasing water holding capacity.
- Use of other inert materials e.g. cocopeat, hygroscopic polymers to be used at rhizosphere to improve water holding capacity.
- Use of live or plastic mulch to minimize evaporation losses.
- Use of antistress sprays to minimize transpiration.
- Selection of *bahar* to avoid stress situations coinciding with susceptible crop growth stages.


Guava plant under moisture stress


More fruit drop reported in mango


Custard apple flower drop


Heavy crop of Amla under stress

Tillage Implements - 2

Disc Plough

The disc plough is used for primary tillage and to particularly invert soil. Used mostly on hard and stony soils where deep ploughing and not turning is desirable. It consists of a series of concave discs mounted on frame. Its working depth is controllable by wheels or hydraulic systems.

Operating Procedure:

The disc ploughing pattern depends on whether it is one-way or reversible. It must be operated at an optimum and uniform speed for best cutting action and width of cut. The rear furrow wheel should be adjusted for it to be operated at the bottom of the furrow against the furrow wall, with the wheel slightly away from the wall and wheel bottom about ½" or more below the disc bottom.

The disc plough cuts soil and trash and moves with the rolling action. The disc produces a mixing action of the soil rather than an inversion. Disc plough generally have one or more concave discs, each cutting 7 to 12 inches wide. Discs of a large diameter can take a wider cut, permit deeper ploughing and cut trash better. The plough's performance depends on the disc's shape and design, cutting width and angle.

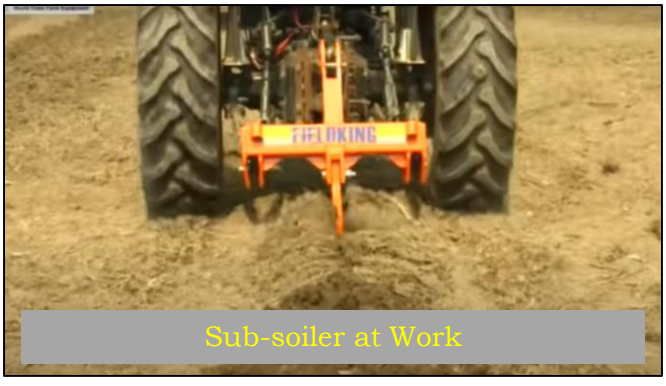
- Disc shape: The outer beveled edge is well adapted for a variety of soil conditions while the inner beveled edge penetrates very hard and dry soil. The notched edge performs in most trash conditions.
- Cutting width: Some disc ploughs are built to reduce cutting width per disc or by reducing the number of discs to obtain deeper ploughing in hard soils. In heavy soils, it may be desirable to reduce the width of cut or number of discs.
- Disc angle: A horizontal disc angle varies from 42° to 47° from the direction of travel. Reducing the angle increases disc rotation, thereby improving penetration. A vertical disc angle varies between 15° and 25°. Increasing the disc angle improves its penetration in heavy soil and decreasing it improves disc performance in loose or brittle soil.

Sub-soiler

Sub-soiling is done to break up impervious soil layers below the normal tillage depth to improve water infiltration, drainage and root penetration. For better crop growth, sub-soiling must meet the following conditions:

- It should be done when the soil is relatively dry to permit shattering of the hard layer
- Soil below the impervious layer should hold additional water for root growth
- Deeper soil layers must not be acidic or alkaline; it discourages root growth
- Tractors and heavy implements must run at least one foot away from the sub-soil slot during subsequent operations to prevent soil sealing by tire compaction
- Sub-soiling should not penetrate too deep in sandy layer; leading to loss of soil moisture.

Disc Plough



Sub-soiler at Work

Fallow agriculture

Fallow is a farming technique in which arable land is left without sowing for one or more vegetative cycles. The goal of fallowing is to allow the land to recover and store organic matter while retaining moisture, disrupting lifecycle of pathogens by temporarily removing their hosts.

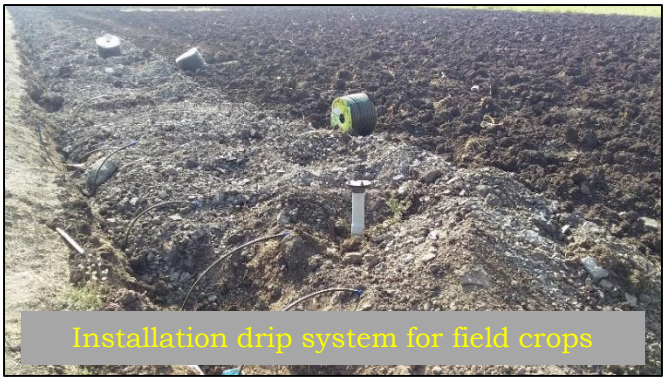

Peripheral coconut tree fruiting


Peripheral Tamarind tree fruiting


Healthy pomegranate plants


Pomegranate plant wilting symptoms


Installation of micro-irrigation system


Installation drip system for field crops


Procurement of Farm Yard Manure


Malhar Pond Part I


Malhar pond expansion work


Malhar pond part I & II connected

प्रगति के पथ पर

नियोजित प्रयासों से नियासम परिसर में जल संग्रहण की सुविधा बढ़ाई गई है। 'मल्हार' तालाब का विस्तार इस महीने के दौरान शुरू किया गया था और इसे पूरा करने के बाद, इसकी क्षमता लगभग 19.5 दशलक्ष लीटर होगी। इससे कैंपस में पानी की कमी के मुद्दों को हल करने की दिशा में बड़ी उपलब्धि माना गया है। अब मिट्टी की जल धारण क्षमता में सुधार के लिए पहल की आवश्यकता है। सभी वृक्षारोपण खड़े हैं, वह स्थानिक मिट्टी बहुत मोटे कनोंवाली, बजरीली और उथले कठोर बेसाल्टिक आधार पर बसी है। इस स्थिति से निपटने के लिए जो उपाय किए जा रहे हैं, उनमें मिट्टी के ऑर्गेनिक कार्बन में वृद्धि हेतु जैविक खाद का प्रयोग, अक्रिय जल अवशोषक का उपयोग, उप-मृदा सिंचाई, मल्चिंग, इत्यादि शामिल हैं। इन पर प्रत्येक बाग के लिए पहचान किए गए नोडल व्यक्तियों के परामर्श से ध्यान रखा जाएगा। प्रक्षेत्र प्रयोग के मामले में मौजूदा परियोजनाओं में नए विकास और सुधार को देखते हुए पीआई के जरिए इस दिशा में हर महीने लक्ष्य तय किए जा रहे हैं। वैज्ञानिकों और तकनीकी कर्मचारियों के बीच बेहतर समन्वय इन प्रयासों को आसान और फलदायी बनाता है और यह फार्म समन्वयक 'का मुख्य उद्देश्य है। यह कुशल खेत प्रबंधन के लिए तय लक्ष्यों और नए आयामों के संबंध में उपलब्धियों की समीक्षा और ऑडिट भी करता है। अप्रैल 2021 के महीने से, जब नोडल व्यक्ति संबंधित बागों को नियंत्रित करना शुरू करेंगे, तो लक्ष्यों में अधिक गहराई होगी और अंतिम परिणाम एक बेहतर प्रबंधन होगा।

Plan For Progress

Water storage facility at NIASM campus has been increased with planned efforts. Expansion of 'Malhar' pond was initiated during this month and after completion, its capacity will be about 19.5-million-liter. This has been considered as big achievement towards resolving water scarcity issues at campus. Now the initiatives are required for improving water holding capacity of soil. The native soil on which all the plantations stand are very coarse, gravelly and shallow having hard basaltic base. The measures planned to tackle this situation are increasing soil organic carbon by addition of organic manure, use of inert water absorbents, sub-soil irrigation, mulching, etc. These will be taken care of in consultation with the nodal persons identified for each orchard and the PI's in case of field experimentation. Every month targets are being fixed in this direction considering new developments and improvements in existing projects. Better coordination among scientists and technical staffs makes these efforts easy and fruitful and it is main objective of 'Farm Coordinator'. It also performs the review and audit of achievements in relation to targets fixed and opening new dimensions for efficient farm management. From the month of April 2021, when the nodal persons will start controlling respective orchards there will be more depth in targets. And ultimate result will be the better management.

Date palm orchard at H1

Drumstick after recut at H2

Contributors:
Dr Pravin Bhimdeo Taware, Senior Technical Officer (Farm) & Farm Manager
Mr Rushikesh Shivaji Gophane, Senior Technical Assistant (Hort)
Mr Patwaru Ranbhid Chahande, Senior Technical Assistant (Agril)
Mr Sunil Vishnu Potekar, Senior Technical Assistant (Agro.Met.)
Mr Aniket Tukaram More, Senior Technician (Farm)
Mr Pravin Hari More, Senior Technical Assistant (Computer)
Compiled and edited by:
Dr Pravin Bhimdeo Taware, Senior Technical Officer (Farm) & Farm Manager
Published by:
Dr Himanshu Pathak, Director
ICAR-National Institute of Abiotic Stress Management, Baramati, Pune, Maharashtra- 413115