मई / May 2021

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

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भाकृअनुप ICAR

राअस्ट्रैप्रसं NIASM

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निदेशक के लेखनी से...

मानसून दरवाजे पर दस्तक दे रहा है, इसलिए खरीफ सीजन के लिए खेत की तैयारी चल रही है। इस साल गर्मी बहुत हल्की थी और औसत अधिकतम तापमान रिकॉर्ड कम यानि 38.3°से और दिन का अधिकतम तापमान 39.9 °से मई के महीने में रहा। इस साल औसत मानसून की भविष्यवाणी है इसलिए अच्छी तरह से वितरित बारिश की उम्मीद है। बगीचों में आम की कटाई सफलतापूर्वक पूरी कर ली गई है। बैंक प्रूनिंग के बाद अंगूर की वृद्धि सामान्य है और उत्पादन के लिए अच्छी नींव रखने की उम्मीद है। ड्रैगन फ्रूट में फूलन की शुरुआत इस साल काफी जल्द हुयी हैं जिससे पहली कटाई जल्द होने की संभावना है।

नियासम फार्म के लिए सिंचाई का पानी सबसे कीमती संसाधन है। पिछले कुछ महीनों के दौरान पर्याप्त भंडारण सुविधा विकसित की गई है और नई लिफ्ट परियोजना लगभग पूरी होने वाली है। जल उपयोग दक्षता और उत्पादकता में सुधार के लिए सख्त जल बजट के माध्यम से सिंचाई की योजना बनाई जा रही है। इस अंक में नियासम फार्म पर उपलब्ध फार्म मशीनरी एवं उपकरणों के बारे में संक्षिप्त जानकारी दी गई है। इससे अधिक मशीनीकरण के माध्यम से कार्यों की योजना बनाने में मदद मिलेगी।

'फार्म समन्वयक' गतिविधियों को प्रस्तुत करने, उपलब्धियों का आकलन करने और भविष्य के लक्ष्यों के लिए योजना बनाने में महत्वपूर्ण भूमिका निभा रहा है। मुझे पूरी उम्मीद है कि इस प्रयास से नियासम और अन्य जगहों पर अनुसंधान फार्म प्रबंधन सुधार में सहायता होगी। मैं, डॉ. प्रवीण तावरे और उनकी टीम को इस प्रकाशन को निरंतरता से प्रकाशित करने में उनके समर्पण के प्रति धन्यवाद देता हूं।

मई / May 31, 2021

From Director's Desk...

Monsoon is at the doorstep, therefore field preparations for *Kharif* season are in progress. This year summer was very mild with record lowest av. max. temperature 38.3°C and day's max. 39.9°C during month of May. There are predictions of average monsoon and hope to have well distributed rains this season. In orchards mango harvesting has been completed successfully. Grape growth after back pruning is beat normal and hope to lay good foundation for production. Flowering in dragon fruit has been noticed early this year and first harvest is expected very soon.

The irrigation water is the most precious resource at NIASM farm. Ample storage facility has been developed during last few months and new lift project is almost at completion. To improve water use efficiency and productivity, irrigation is being planned through strict water budgeting. In this issue, brief information about Farm Machinery and Equipment at NIASM farm has been given. This will help in planning works through more mechanization.

'Farm Coordinator' is playing a crucial role in presenting the activities, assesses the achievements and plan for future targets. 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 in bringing out this publication

हिमांशु पाठक / Himanshu Pathak

Contents

Mung bean crop ready for harvest

Maintenance of standing field crops like sugarcane and mung bean in experimental fields, fodder crops in livestock unit and CSIFS (farming system) was the major task during this month on the background of work restrictions due to COVID-19 issues. The work included weeding in standing crops, orchards, peripheral and other plantations.

Irrigation Management was taken up on priority because the demand for water remains at peak during hot sunny days. Fortunately, farm could get ample supply of water from canal through existing as well as new lift systems. The trial run of new lift project was continued this month for making required improvements in flow efficiency. The water received at Malhar pond was directly used for south farm field irrigation and to fill fishery, farming system and manas ponds at campus. North farm irrigation requirements were fulfilled from Manas pond. Operation of drip irrigation system in orchards and cleaning of emitters was looked after to confirm desired discharge. Due care was taken to meet the water requirements of other plantations and medicinal garden. Watering with tanker was facilitated to meet additional requirements of water for southern periphery, avenue plantations and horticulture nursery.

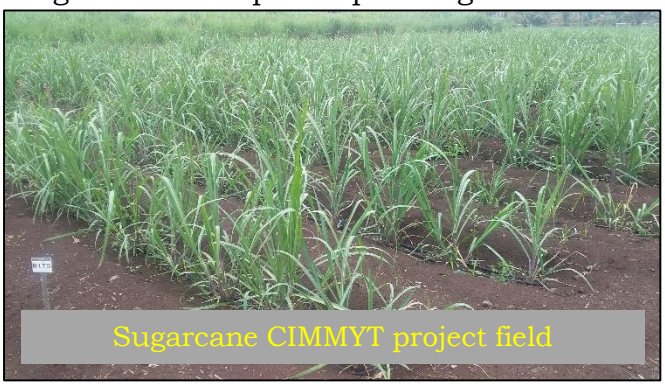
Broadcasting of farmyard manure in fields was followed by cultivator operation to incorporate it into soil. FYM application @ 20 Kg per plant in orchards was carried out manually which was mixed with fertilizers and covered with soil. In grape, soluble fertilizers were applied through drip irrigation. To meet the symptomatic requirements foliar nutrient application was carried out by spraying 19:19:19 or 0:52:34 and micronutrients.

Preparations for *Kharif*: Primary tillage operations were continued in all the fields to prepare for upcoming *Kharif* season. Procedure for allotment of fields for research was initiated by circulating about present status of fields. The requisitions received were compiled and the tentative allotments have been made to go ahead for layout preparation.

Canopy management in orchard: During shoot growth, sub-cane pinching and shoot thinning was carried out in grape. To enhance fruit bud differentiation, spraying of CCC, Uracil and 6- benzyl adenine was done. De-suckering in grape, pomegranate and custard apple was done to avoid nutrient loss.

Harvesting and disposal of various fruits like mango, drumstick, coconut, tamarind, amla, and sapota was done. Due to the prediction of 'Taukte' cyclone, mango harvesting was carried out in one stroke. Some part of it was sold immediately and remaining kept for ripening and sold afterwards. Disposal of this produce was carried through sale's counter at campus. Preparation of gate passes, cash receipts, deposition of received amounts to Institute and timely settlements of receipts was looked after during this course.

Plant protection: The mandatory sprays on grape after back pruning of grape included spraying of insecticides for control of thrips and prophylactic broad-spectrum fungicides. Spraying of Azadirachtin and Flubendiamide in ber was carried out to manage fruit fly pest. The sprays also included foliar nutrients and plant growth regulators manipulate plants' growth.


Sugarcane CIMMYT project field


Grape shoot growth after back pruning


Mango fruits ready for harvest

Weather Summary of May 2021 at ICAR-NIASM

Mr. Sunil V. Potekar

The long period average (LPA) rainfall and average temperature of May at Baramati is 37.0 mm and 31.2 ˚C, respectively. The details of weather during the May 2021 has been listed in Table 1 and depicted in Fig 1.

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

Weather Parameters	Week				Monthly	Max.	Min.
	1st	2nd	3rd	4th			
T Max (˚C)	38.1	38.7	32.1	36.0	36.2	39.9	28.2
T Min (˚C)	22.2	23.5	22.3	22.7	22.7	24.7	20.5
T Avg (˚C)	30.1	31.1	27.2	29.4	29.4	31.6	25.5
RH Mean (%)	41	40	62	54	52	87	38
WS (km/h)	7.3	8.1	12.8	12.9	10.3	20.0	6.2
BSS (h)	6.7	9.5	3.9	8.1	6.9	10.3	0.0
Total PE (mm)	61.7	66.4	47.6	66.5	267.3	12.6	5.1
Total Rain (mm)	0.0	0.0	10.8	0.4	11.4	8.6	0.0

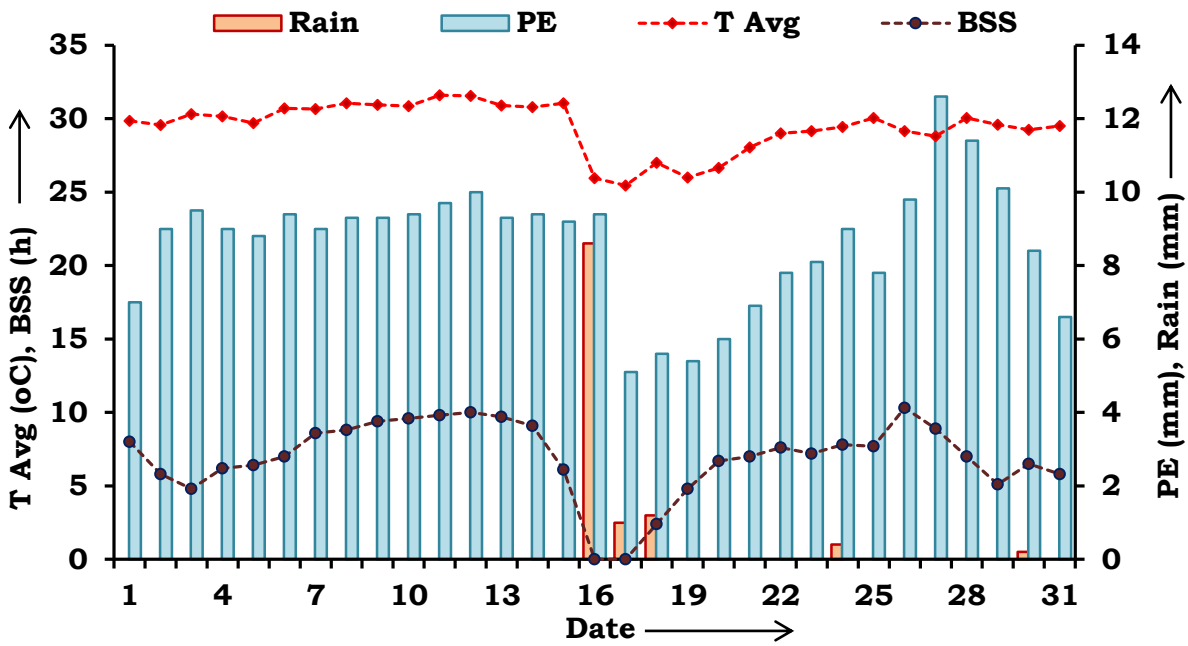


Fig 1. Variations of daily rainfall (Rain), pan evaporation (PE), mean temperature (T_{Avg}) and bright sunshine hours (BSS) during May, 2021 at ICAR-NIASM Baramati.

Drumstick abundant fruiting

Fruiting in Ber

***Kharif* sowing**: NIASM farm is ready for upcoming *Kharif* 2021 season. Field allotment to be finalized very soon. Preparatory tillage has been completed and layout preparation and sowing operations are to be carried out as required by the respective project leaders. Important crops in target are soybean, pigeon pea, sunflower, maize, etc. Fields meant for solely rabi experiments will be brough under short duration crops for soil improvement. It will be tried to complete all the works in scheduled time through facilitation of manpower, machinery and resources.

Orchard maintenance: Canopy management activities in karonda, dragon fruit, mango, grape, pomegranate, guava and fig are on target for June 2021. Flowering in dragon fruit has been initiated and protection of fruits from biotic and abiotic stresses is a priority. Secondly, pruning of mango plants to limit its size and height is mandatory. Proper ventilation is required in mango orchard to enhance early profuse fruiting and management of malformation, fruit fly infestation and disease related to dense canopy. Height will be limited to 2m for ease in plant protection and maintenance. Simultaneously, it's a foundation phase of grape to take care of shoot density, control shoot growth by tipping and removing laterals.

Plant protection: During early monsoon period, the hot and humid climate becomes congenial for Lepidoptera and Diptera pests like lemon butterfly in citrus, leaf eating caterpillars in drumstick and grape, fruit borer and fruit flies. The climate becomes congenial for oily spot in pomegranate, rot in dragon fruit, gummosis in citrus, powdery and downy midew in grape. Recommended pesticides and fungicides along with biological control agents need to be used.

Disposal of farm produce: Harvesting of drumstick, amla and sapota will be continued while dragon fruit, pomegranate and lemon production will start. Disposal of these along with field produces like chickpea, wheat, jowar and soybean, which was pending due to closure of APMC markets, is to be disposed through sale.

Landscape garden maintenance: These are very regular activities, but since long, due to manpower shortage some of the activities need close look. Lawn mowing, training of shrubs, weeding, manure and fertilizer application will be taken up for maintain healthy look of the plants. Potted plants will be placed again indoor to create aesthetic and creative atmosphere. Soil pulverizing and manuring of peripheral plantations will be targeted to harness benefit of monsoon showers. Drip irrigation facility for south side peripheral plantation have to installed.


Field ready for *Kharif* sowing


Maize fodder in field

Drip arrangements for periphery


Irrigation water management

1. Water Management in Field Crops

Irrigation water is the most precious resource at NIASM farm. Water storage facility at campus has been improved during last year. Now it is required to use available water more judiciously. Due to coarse textured soils water holding capacity is less and require frequent irrigation. The losses are more due to flood irrigation. Therefore, it is necessary to bring a greater number of fields under micro irrigation i.e., drip and sprinkler irrigation. Besides improving water use efficiency, this will help in increasing crop performance in terms of quality and quantity of produce. So the challenge ahead is to change the mindset in favour of maximum use of micro irrigation, mulching, subsurface irrigation techniques in research farm.

2. Management of Fruit Fly Infestation in Dragon Fruit

Flowering in dragon fruit has been initiated. The period from flowering to maturity is about 30days. The fruiting occurs in about 6-8 flushes till the month of October. During previous two seasons it has been observed that these fruits get heavily infested with fruit fly. The fruits near maturity are very soft for ease in oviposition. Due synchronized flowering and fruiting, such fruits remain available in orchard for whole season. Therefore, it has become a big challenge to protect fruits from this pest. Integrated pest management practices have to be followed to reduce the menace of fruit fly incidence in dragon fruit. This shall include installation of sticky traps, pheromone traps, poison baits and clean cultivation in orchard. Further, spraying of biological control agents like *Metarhizium anisoplae* and *Beauveria bassiana* may help controlling the pest. Besides this the safe and recommended pesticides like Deltamethrin and Azadirachtin can be used as chemical control measure by looking into intensity of damage.

3. Avoiding waterlogging in crops and orchards

With the experience of last year, it has been observed that any rainy day with more than 40mm rainfall in a day, leads to waterlogging in field crops as well as orchards. This causes losses not only in terms of crops' production but trough experimental errors in valuable research. Therefore, it is necessary to stay prepared to tackle this situation by providing sufficient drains, openings and diversion for runoff water to get collected at low lying area identified for temporary collection. These areas have to develop into permanent runoff storage structures so as to use it for irrigation during dry spells.

Farm Machinery & Implements in Action

Ridger during layout preparation

Earthing up in orchards

Mounted blower spraying in grape

Multi-grain thresher

Machinery and Equipment at NIASM Farm

ICAR-NIASM farm is very well equipped with various type of machinery and implements at service. These includes the tractors of various sizes, power tillers, trailers, water tanker, various tillage and specialized implements. Description and functions of these implements is as follows;

Tillage equipments:

Moldboard plough: A moldboard plough cuts, lifts and turns the soil and in doing so buries the crop residue, aerates the soil, controls weeds, insects and soil borne diseases, incorporates fertilizer into soil, provides good seedbeds and breaks hard pan. The plough should be used only on land where topsoil is sufficiently deep to avoid mixing of the subsoil with the surface soil.

Disc plough: It is used for primary tillage mostly on hard and stony soils where deep ploughing is not desirable. It consists of concave disks mounted on frames. Its working depth is controlled by one or more wheels or hydraulic systems.

Sub-soiler: Sub-soiling is done to break up impervious soil layers below the normal soil tillage depth to improve water infiltration, drainage and root penetration.

Cultivator: It's both primary and secondary tillage implement and very widely used in open fields and orchards. Heavy duty harrows are used for primary tillage and light to medium harrows for secondary tillage, seedbed preparation, summer fallowing, chemical incorporation, weed control, to cover broadcast seed or fertilizer, etc.

Offset disc harrow: It is used to pulverize soil and break clods by cutting and throwing action, cut the chaff and trash, destroy weeds, provide primary tillage when ploughing is difficult and demolish ridges to provide an even surface. The disk's construction varies to meet specific requirement.

Rotavator: It brings top soil layer to fine tilth by breaking small clods with moving blades. It should be used carefully because it works on top 6-9 cm layer only while lower layer gets compacted due to sub-soil moisture.

Ridger: A ridger equipment available is used to prepare single ridge and two furrows in one pass. The width and distance between two ridges can be adjusted from 3' to 6' by moving it on frame. Ridge and furrow layout facilitates furrow irrigation, prevents erosion of top soil, helps in water conservation in soil profile, provides better drainage and prevents water logging, provides un-compacted soil for root growth and partly reducing of fertilizers.

Mechanical seed drill: Sowing by machine is advantageous as it is quick, accurate and uniform. Machine sowing results in to uniform germination as the furrows are opened and closed immediately the seed is placed accurately and the soil can be evenly packed around the seed. There different type of discs available to facilitate sowing of different type of seeds with single machine at different spacing.

Leveler: It is used for moving soil from one place to fill depressions so as to level the field. The equipment can be used in both directions by changing attachment positions.

Earthing-up blade: Earthing up is required in some orchards wherein this equipment moves soil in between rows towards plant rows. Thus it creates a raised bed throughout the row length. It can be used various row width by adjusting the length and angle of equipment on by attaching additional fin if required for wider plantations.

(Continued on next page)

Ploughing operation

Seed drill at sowing

Specialized implements

SORF machine: This machine has been developed at ICAR-NIASM under 'Conservation Agriculture' project, for sugarcane ratoon management. It performs multiple operations in harvested sugarcane field for better ratoon crop by retaining trash. At first the moving disc cuts the sugarcane stubbles at uniform height at soil surface, while root pruning is carried out simultaneously for healthy sprouts and better root development. A small trench parallel to row is opened and closed immediately after fertilizer and/ or seed deposition through mechanical drill. It allows intercrop in ratoon sugarcane. All these activities ensures healthy growth of ratoon crop with extra benefit from trash maintained in field. This machine is helpful in promoting farmers to retain trash in field and eliminate pollution threat due to trash burning.

Mulcher: This is a heavy duty tractor mounted equipment used to run in field after harvesting to cut the plant remains into fine pieces. It has number of cutting bladed on moving as well as stationary shaft to fine cut the agro-waste. It can cut medium thick branches, trash and shrubs. The cut material is then incorporated to soil by ploughing for natural decomposition. It can be used in orchards to use pruned mass as organic mulch.

Shredder: This is a heavy duty trailed type equipment operated through PTO of a tractor. The agro-waste like coconut leaves, medium sized green branches and weed shrubs are put in to shredder for chaff them in small pieces. The shredded material is used for composting or in vermicomposting beds for recycling.

Thresher: Institute is having trailed type, tractor PTO operated, multi-grain thresher for general threshing purpose. It can be easily moved to the field threshing is required. By changing the sieves and stud size it can be used for threshing of various grains. Maize can be threshed without shelling of cobs.

Post-hole digger/ augur: This is PTO operated screw type augur used to drill different sized pits for post installation or tree planting. It works well in soft soil without stones.

Happy seeder: There is tractor-mounted machine that cuts and lifts straw of previous crop, sows wheat into the soil, and deposits the straw over the sown area as mulch. It reduces residue burning that has enormous impacts on human health, soil health, the economy and climate change.

Trailed type sprayer: This is 400L tank capacity sprayer with diaphragm pump to create pressure. The spraying can done with manual booms or with blower. It works on tractor PTO and helps to spray in orchards as well as field crops by standing outside the field or by passing through the rows.

Mounted blower: This sprayer has tractor mounted 200L spray tank created enormous pressure with the help of PTO operated diaphragm pump. The spray solution is passed through the fixed nozzles that can be adjusted to reach the canopy of small trees. It is equipped with high speed blower which further creates air blow to through small water particles inside the canopy. The air blow helps to shake the leaves to get covered by spray from both sides.

Self-propelled implements

Power tillers: The 13.5 hp VST make power tillers are used for precision type works in orchards to pulverize soil, cultivation practices in small fields and sugarcane earthing-up. The small trolley attached to it helps to manage material shifting.

Reaper: Used to harvest crops like wheat and maize. It cuts the crop and throws in line to one side.

Brush cutter: It is petrol engine operated portable cutter for making area weed free or used to harvest some field crops.

Lawn mower: It is electrically operated lawn mower used for timely cutting of lawns.

Hedge cutter: This is petrol engine operated and electrically operated machine used to give shape to the hedges and edges.

Trailed type sprayer

प्रगति के पथ पर

खरीफ 2021 की तैयारी प्रगति पर है और आगे सोयाबीन, अरहर, सूरजमुखी, मक्का और हरी खाद फसलों की समय पर बुवाई का लक्ष्य है। इस वर्ष औसत मानसून का पूर्वानुमान है जो 11 जून, 2021 को महाराष्ट्र पहुंचेगा। इसलिए, लेआउट तैयार करने के लिए सीमित समय उपलब्ध है और इसे एक्शन मोड में लिया जाना है। अंगूर में 'बैक प्रूनिंग' के बाद मौसम की स्थिति बहुत अच्छी थी और पिंचिंग के बाद उप-बेंत की वृद्धि सामान्य है। शूट थिनिंग और CCC, Uracil और 6-BA जैसे ग्रोथ रेगुलेटर्स का छिड़काव निर्धारित समय में किया गया, इसलिए इस सीजन में बेहतर फलदायी लक्ष्य हासिल करने की उम्मीद है। इस बार आम का उत्पादन अच्छा था लेकिन अगले सीजन में कम से कम 20-30 दिनों के लिए फूल और फलने को आगे बढ़ाने हेतु चंदवा प्रबंधन और पीजीपीआर के उपयोग के माध्यम से प्रयासों की आवश्यकता है। मोसम्बी, नींबू, ड्रैगन फ्रूट, सहजन आदि के फलने के मौसम को देखते हुए, उत्पादन की गुणवत्ता बनाए रखने के लिए पौधों की सुरक्षा और पोषण प्रबंधन को बहुत गंभीरता से लेने की आवश्यकता है। बारिश के दिनों में सिंचाई की जल भंडारण क्षमता का पूरा उपयोग सूखे की अवधि और नहर बंद होने की अवधि के दौरान जरूरतों को पूरा करने के लिए किया जाएगा। कुल मिलाकर कृषि प्रबंधन गतिविधियाँ सही रास्ते पर हैं।

Plan For Progress

Preparations for *Kharif* 2021 are in progress and target ahead is timely sowing of soybean, pigeon pea, sunflower, maize and green manure crops. There is a prediction of average monsoon this year which is supposed to reach Maharashtra on June 11, 2021. Therefore, there is limited time available for layout preparation and it has to be taken up in action mode. The weather conditions after back pruning in grape were very good and sub-cane growth after pinching is normal. The shoot thinning and spraying of growth regulators like CCC, Uracil and 6-BA were carried out in scheduled time, so there is hope to achieve better fruitfulness target this season. Though mango production was good this time, efforts are required to advance flowering and fruiting in next season at least by 20-30 days through canopy management and PGPR use. Looking in to fruiting season of sweet orange, acid lime, dragon fruit, drumstick, etc., there is need to take care of plant protection and nutrition management very seriously to maintain quality of production. The irrigation water storage capacity will be fully utilized during rainy days to fulfill needs during dry spells and canal closure period. Overall farm management activities are on right track.

Flowering in Tamarind

Dragon fruit: 1st flower of season

Farm Coordinator (Issue 15) May 2021
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