



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...

‘कृषि तकनीकी समन्वयक’ हर माह के कृषि प्रबंधन गतिविधियों के लक्ष्यों और उपलब्धियों का लेखा जोखा रखता है। इससे विकास कार्यों में सुधार और स्पष्टता आती है। पिछले महीने का ‘मौसम सारांश’, यदि कोई कमी रही तो उसकी जांच करने में तथा भविष्य की योजना बनाने में मदद करता है।

‘आगे की चुनौतियां’ इस खंड से बहु-फसल प्रबंधन में आने वाली समस्याओं से अवगत करता है तथा ‘कृषि सलाहकार समिति’ की सिफारिशें संक्षिप्त करता है। फसलों की बेहतर प्रबंधन के लिए ‘टेक्निकल बेसिक्स फॉर मंथ’ में कुछ तकनीकी विवरणों की गहन समझ और खेती के तरीकों को लागू करने के लिए चर्चा की गई है। परिसर में प्रयोग हेतु तथा सौंदर्यीकरण के लिए भी कई पौधों की प्रजातियों को लगाया गया है। ‘परिसर की जैव विविधता’ इस शीर्षक के तहत हर महीने एक प्रजाति को गहराई से देखने का प्रयास किया जा रहा है। ‘प्रगति के पथ पर’ में सारांश से ‘मॉडल फार्म डेवलपमेंट’ की प्रक्रिया को समझने का प्रयास किया जाता है। इसमें कुछ खंड हिंदी में भी लिखे जाते हैं।

अक्टूबर मध्य से ही नियासम प्रक्षेत्र में रबी सीजन की गतिविधियाँ जारी हैं। देर तक मानसून रहने के कारण खरीफ फसल की कटाई में देरी हुई। हालांकि, नवंबर के दौरान प्रक्षेत्र प्रबंधन विभाग लक्ष्य तक पहुंचने में सक्षम रहा।

मैं डॉ. प्रविण तावरे और टीम को कृषि गतिविधियों को तथा इस प्रकाशन को नियमित रूप से पूरा करने में उनके समर्पण और ईमानदारी के लिए धन्यवाद देता हूँ।

From Director's Desk...

‘Farm Coordinator’ documents the targets and achievements in farm management activities in a monthly basis. This gives transference and clarity to development works. Weather summary of previous month helps in investigating shortfalls, if any to make future plan.

The ‘Challenges Ahead’ section briefs about the problems in multi-crop management and provide the recommendations of the ‘Farm Advisory Committee’. Some technical details for better management of crops are discussed in ‘Technical Basics for Month’ for in-depth understanding and implementing the cultivation practices. The campus harbors many plant species for experimentation and also for beautification. Efforts are being made to look deep into one species each month under the heading ‘Biodiversity at Campus’. Short-notes on ‘Plan for Progress’ is chalked down to improve understanding the process of ‘Model Farm Development’. Some of the sections are written in Hindi as well.

The rabi season activities in the NIASM farm are in progress since mid-October. The kharif crop harvesting was delayed due to late monsoon. However, farm staff was able to reach the targets during November.

I thank Dr Pravin Taware and the team for their dedication and sincerity for carrying out the farm activities and bringing out this publication regularly.



नवंबर / November 30, 2020

हिमांशु पाठक / Himanshu Pathak

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Harvesting of experimental field crops (C5, C6, C7, C8) was carried out on priority to make the fields ready for *rabi* crops sowing. Due small size of research plots, manual threshing was mandatory. Only border rows and general lines were threshed by using machine. Almost all the plots were made available for *rabi* sowing.

Rabi crops sowing: Wheat (D2, D4) and chickpea (B 5-6, D 5-6, E 7-8) were sown as general crops during first fortnight. Experimental *rabi* crops' sowing was also carried out simultaneously in C2, C4, C5, E 3, E4 and E5. Irrigation to all sown fields was managed at least twice for better germination and crop stand.

Post pruning operations in grape: After forward pruning of grape crop growth stages were looked after carefully for various growth and time specific viticulture practices. Shoot thinning was carried when 5-leaf stage was achieved and new emerging bunches became visible. Use of GA3 @ 10ppm was carried out at pre-bloom stage (parrot green colour of bunches. GA3 spray was repeated two days after first spray for better rachis elongation.

Drumstick & Karonda pruning: Back pruning drumstick and karonda was carried out to go for canopy management for next season. Drumstick was headed back at 1.5 M height while recut was taken in karonda to make plants bushy.

Plant protection:

- Integrated plant protection activities were carried out in sweet orange, acid lime, pomegranate, and guava by use of insect traps and spraying of biological agents.
- Fallen and infested fruits from sweet orange and guava were collected and disposed of by burying in soil. Spraying of biological agents was carried out at disposal site to get rid of pest.
- Spraying of Azadirachtin 1% @ 1 ml⁻¹ was carried out in guava and grape orchards.
- General spray of Copper oxychloride and Fiproni/ Dimethoate was carried out in pomegranate.
- In grape, 3-leaf and 5-leaf stage was targeted for profilactic spray for downy mildew control by spraying Metalaxyl + Mancozeb. Looking into cloudy climate at the end of month, spraying for both powdery mildew and downy mildew was carried out.



Flat bed preparation



Layout preparation for research crops



Flood irrigation to fields



Weedicide spraying



Floor sanitization in pomegranate

Weather Summary of November 2020 at ICAR-NIASM

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

The long period average (LPA) of November rainfall and average temperature at Baramati is 14.2 mm and 24.3 °C, respectively. The details of weather during the November 2020 has been listed in Table 1 and depicted in following figure.

Table 1. Summary of weather variables recorded during November, 2020.

Weather Parameters	Week				Monthly	Max.	Min.
	1 st	2 nd	3 rd	4 th			
T Max (°C)	31.6	30.2	32.1	30.9	30.9	33.1	25.0
T Min (°C)	16.6	14.7	19.8	17.9	17.4	21.4	10.9
T Avg (°C)	24.1	22.5	26.0	24.4	24.1	27.2	20.1
RH Mean (%)	59	59	67	64	63	73	51
WS (km/h)	4.1	5.2	5.3	6.3	5.2	11.8	3.1
BSS (h)	8.2	9.1	9.1	6.1	7.9	9.5	0.1
Total PE (mm)	32.6	32.5	34.9	34.3	141.3	6.2	3.0
Total Rain (mm)	0.0	0.0	0.0	0.0	0.0	0.0	0.0

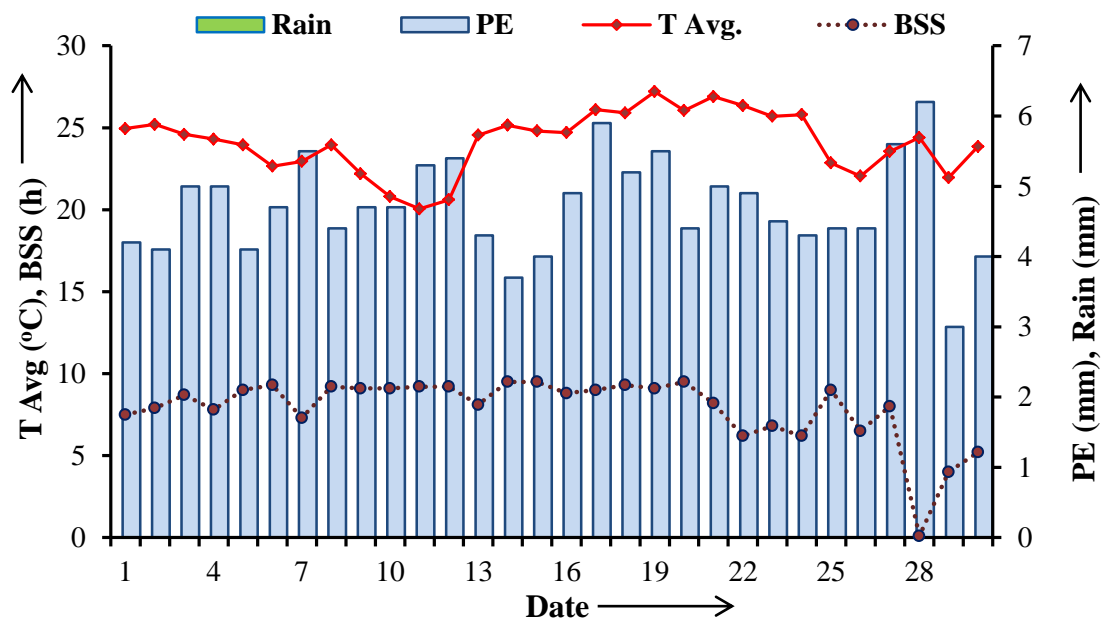


Fig . Variations of daily rainfall (Rain), pan evaporation (PE), mean temperature (T_{Avg}) and bright sunshine hours (BSS) during November, 2020 at ICAR-NIASM Baramati.



Use of insect traps in field



Spraying operation in pomegranate

Rabi crops maintenance: Sowing of experimental rabi crops is still in progress. Maintenance of all the rabi sown crops will be primary target for this month in the form of watering, weeding, fertilizer application and spraying operations.

Irrigation management: New lift irrigation project is supposed to be commissioned during December. More quantity of water could be pumped from canal to fill the tanks at campus. Timely operation of these pumps and distribution as per requirement is a prerequisite for successful irrigation water management.

Canopy Management in Orchard: Pomegranate and grape are in fruiting stage and it requires managing canopies as per standard protocols. Dragon fruit season is over and the pruning has to be taken up to reduce shoot density. Every alternate plant will be headed back to place concrete window at top and manage its canopy to develop some standards. Sweet orange plants also have to be trimmed in view of upcoming fresh season. All the dried branches are to be removed and trees to be trained to maintain balance. Re-cut of karonda have been taken and new shoots to be maintained wisely to avoid very dense inaccessible canopy.

Plant Protection: Integrated pest and disease management activities to be continued while taking care of plant health.

- Powdery mildew will be an issue in grape for which spraying of Hexaconazole and Myclobutanil along with 0:52:34 will be carried out. In case of pests Spodoptera and mealy bug may infest. Sticky traps to be installed in grape orchard to take of small sucking pests.
- General prophylactic spraying for control on oily spot to be continues along with sprays for sucking pests and fruit borer management.
- Infested and fallen fruits of guava and sweet orange have to be collected and disposed of. Spraying of Azadirachtin will be continued to get rid of fruit fly/ borer.

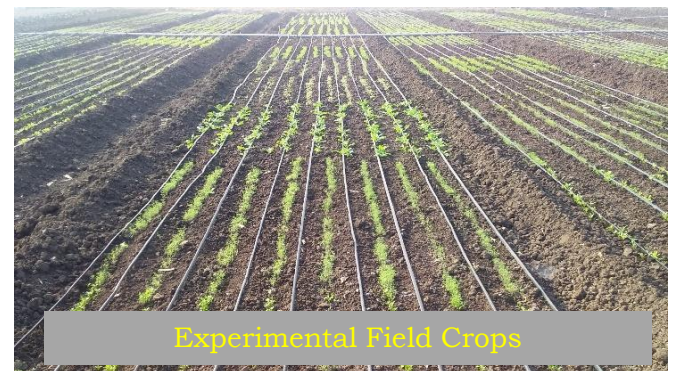
Campus cleaning: Looking profuse weed growth all around, a group of workers has to be employed for weeding in fields, road sides and bunds. Tractor drawn implements to be used to cut or overturn the weeds in open area and dispose by composting/ burning.



Field crops in initial growth stage



Plant protection activities in orchards



Experimental Field Crops



Grape Growth after Forward Pruning



Irrigation management

Research Farm Management under Multi-crop Cultivation

NIASM research farm has its identity due to various field crops being grown along with nineteen types of different orchards and other plantations in the campus. Managing multiple crops at research farm is itself a big challenge and interesting at the same time. Challenge in the sense that understanding and implementation of cultivation practices of each crop is difficult. It is interesting due to the opportunity to interact with variety of plants altogether. However, it becomes more challenging while working on various edaphic stresses due to native soil type. Also there are some limitations in irrigation water availability during prolonged canal closure. NIASM farm is well equipped with farm

machinery but manpower availability is a matter of concern. Step by step these limitations have to be resolved. Efforts are being made to chalk down list of periodic operations and crop-wise cultivation practices so as to reach important stages of crops at any given time.



Field Visit of FAC on Nov 9, 2020

Recommendations of Farm Advisory Committee:

The forth meeting of FAC was held on Nov 6, 2020 to discuss issues for farm improvement.

- Recommendations of 4th FAC were confirmed with follow up of progress.
- Progress of rabi sowing activities was taken up and it was decided to complete rabi sowing on priority by looking into availability of manpower and irrigation water availability.
- Status and utilization of irrigation water was briefed by Farm manager. It was decided to use water judiciously taking into consideration the present limitations arising from issues related to electricity for pumping, storage facility and canal closure.
- Status and distribution of contractual manpower was narrated by Farm manager to carry out daily casual activities. All the participants appreciated the efforts made by Farm In Charge and his team to organize the farm activities with limited manpower. It was decided to plan the activities in advance and communicate the same to farm office for organizing the manpower for farm activities at scheduled time.
- Strategy for management of fruit fly and fruit borer and review of actions from farm management was described by Farm manager. It was advised to continue and scale up the integrated pest management program at campus.
- A field visit was arranged to plan canopy renovation of dragon fruit canopy on Nov 9, 2020. Following decisions were taken in this regard;
 - Alternate plants to be headed back below the pole height and support window to be placed over it to train the canopy further. This is to be done to facilitate the harvesting and maintenance work.
 - Canopy management experiments to be started after this pruning to make plants ready for upcoming season.
 - Experiments for initiating off season fruit development by providing additional lights and colored nets
 - Experiments to control fruit fly incidences
 - Pollination and reproductive biology and postharvest issues
- Pruning operations in grape and pomegranate have been completed and it was decided to critically follow post-pruning operation.
- Committee emphasized on having a field meeting at least twice during month to formulate agenda for farm development.
- It was decided to send a tractor for cleaning work at Staff Quarters, MIDC, Baramati on priority. A blank window in farm operations to be identified to send the tractor without hampering works at farm.

Understanding Flowering and Fruit Set in Grape

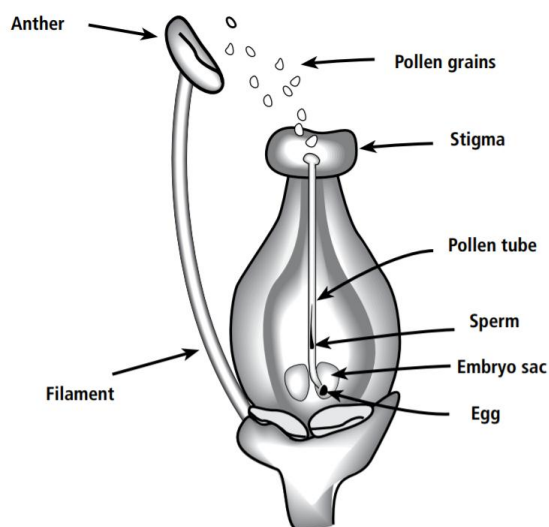
After forward pruning in grape, progressive development of grape bunch happens through pre-bloom, bloom & anthesis, pollination & fertilization, and fruit set.

Pre-bloom: After sprouting, 3-leaf and 5-leaf stages of shoot growth are important from the point of feeling and appearance of inflorescence. This generally happens after 15 to 18 days after pruning (DAP) when shoot thinning is mandatory. Immediately after this about 18-21 DAP the inflorescence turns parrot green in colour which is identified as 'pre-bloom' stage. At this stage in most of the varieties spraying of GA₃ @10ppm is prescribed for bunch elongation.

Bloom & anthesis: Grape flowers are borne on an inflorescence or flower cluster. The main axis of the cluster is the rachis, and the individual flowers are attached to the rachis by the pedicel. Prominent branches arising from the rachis stem are referred to as shoulders. The peduncle attaches the cluster to the vine, extending from the shoot to the first branch of the rachis. At harvest, the rachis framework typically accounts for 2 to 5 percent of cluster fresh weight. Nearly all commercially important *Vitis vinifera* grape varieties have hermaphroditic (perfect) flowers, containing functional male and female organs. Each of the five stamens, the male, pollen-bearing organs of the flower, consists of a pollen-producing anther and a filament or stalk. The female pistil consists of a stigma, a style, and an ovary. The stigma serves as the receiver of pollen. The style is a short, slender column of tissue arising from the ovary to the stigma. The ovary contains four ovules, and each ovule has one embryo sac containing a single egg.

The calyptra (flower cap), which consists of five fused petals, covers and protects the flower organs before the flower opens. Flower opening, commonly referred to as anthesis or bloom, occurs when the calyptra detaches from the flower base and is shed, exposing the stamens and pistil. Anthesis normally occurs 6 to 8 weeks after the commencement of shoot growth, depending upon climatic conditions. Anthesis proceeds rapidly when temperatures range between 29° and 35°C, with a typical 'Thompson Seedless' vineyard taking 6 to 7 days after the start of flower opening to reach full bloom.

Pollination and Fertilization: Immediately after the flowers open, the anthers split open and release their pollen grains. Some of the pollen grains adhere to substances secreted on the stigma, at the tip of the pistil. The stigmatic secretion consists primarily of sugars, proteins, and mineral nutrients essential for the subsequent development of the pollen tube. Grape varieties with hermaphroditic flowers are considered self-pollinating, and the activity of insects or the presence of wind is believed to be unnecessary for pollination. Pollination is complete once the pollen has reached the stigma. If environmental conditions are favourable, the pollen grains germinate and form pollen tubes. The pollen tube is a long, slender structure that grows through the tissues of the stigma and style, ultimately penetrating the ovule. The male gametes (sperm) travel through the pollen tube to the ovary. Fertilization occurs when sperm reaches and impregnates the eggs within the embryo sacs. Under normal field conditions, fertilization typically occurs two to three days after pollination. Temperature is an important factor controlling germination and pollen tube growth. Optimum temperatures for both germination and pollen tube growth range between 26.7° and 32.2°C, and both processes are greatly reduced or even inhibited when temperatures fall below 15.6° or rise above 37.8°C.



An idealised view of pollination and fertilization

Contd. on page 8

बेल फल / The Bael fruit (*Aegle marmelos* L.)



बेल फल जैसे स्वदेशी वनस्पति का उपयोग भारतीय उपमहाद्वीप के निवासियों द्वारा 5000 वर्षों से किया जाता रहा है। पत्तियाँ, छाल, जड़ें, फल और बीज का उपयोग भारतीय पारंपरिक चिकित्सा पद्धति आयुर्वेद और विभिन्न लोक चिकित्सा में असंख्य बीमारियों के इलाज में किया जाता है। बेल फल आहार संबंधी उपयोग में भी लाया जाता है और फल का गूदा मुरब्बा, हलवा और जूस जैसे व्यंजनों को तैयार करने के लिए इस्तेमाल किया जाता है। बेल के फल का उपयोग जीर्ण अतिसार, पेटिश और पेटिक अल्सर के उपचार में भी किया जाता है। कई बार दवाओं में एक रेचक के रूप में और श्वसन क्रियाओं को पुनःसंचालित करने के लिए किया जाता है।

ऐजील मार्मेलोस, जिसे आमतौर पर बेल के रूप में जाना जाता है, तथा बंगाल क्वीन, गोल्डन सेब, जापानी कड़वा ऑरेंज, स्टोन या वूड एप्पल, को हिंदुओं द्वारा पवित्र माना जाता है।

- बेल मोनोटाइपिक जीनस ऐजील का एकमात्र सदस्य है। यह एक पर्णपाती छोटे से मध्यम आकार का वृक्ष है।
- छाल हल्के भूरे या भूरे रंग के, चिकने या बारीक छिद्र वाले और फूलने वाले होते हैं, जो लंबे सीधी रीढ़ से लैस होते हैं, अक्सर कटे हुए हिस्सों से द्राव) गम (बाहर निकलने लगता है। यह गम पहले स्वाद में मीठा होता है और फिर गले में जलन पैदा करता है।
- पत्ती तीन पत्तीवाली होती है, प्रत्येक पत्ती 5-14 x 2-6 सेमी, नुकीले टिप के साथ अंडाकार, गोल या बिना उथले गोल दांतों के साथ होते हैं। नये पत्ते हल्के हरे या गुलाबी, पतले बालों वाले होते हैं जबकि परिपक्व पत्तियाँ गहरे हरे रंग की और पूरी तरह चिकनी होती हैं।
- फूल 1.5 से 2 सेमी, हल्के हरे या पीले, मीठे सुगंधित, उभयलिंगी होते हैं, टहनियों और पत्तों के उंडियों के अंत में शाखा विरहित समूहों में होते हैं।
- बेल फल का व्यास 5 से 12 सेमी के बीच में होता है। यह ग्लोबोज़ या थोड़ा नाशपाती के आकार का होता है, जो लकड़ी जैसा कठोर होता है और पकने पर विभाजित नहीं होता है।
- बेल का उपयोग हिंदुओं के अनुष्ठान संस्कार में पवित्र वृक्षों में से एक माना जाता है। यह माना जाता है कि हिंदू देवता भगवान शिव बेल के पेड़ के शौकीन हैं और इसके पत्ते और फल उनकी पूजा में मुख्य भूमिका निभाते हैं।

Aegle marmelos, a plant indigenous to India has been used by the inhabitants of the Indian subcontinent for over 5000 years. The leaves, bark, roots, fruits and seeds are used extensively in the Indian traditional system of medicine the Ayurveda and in various folk medicine to treat myriad ailments. Bael fruits are of dietary use and the fruit pulp is used to prepare delicacies like murabba, puddings and juice. Bael fruits are also used in the treatment of chronic diarrhea, dysentery, and peptic ulcers, as a laxative and to recuperate from respiratory affections in various folk medicines.

- *Aegle marmelos* L., commonly known as bael, also Bengal quince, golden apple, Japanese bitter orange, stone apple or wood apple, is considered to be sacred by Hindus.
- Bael is the only member of the monotypic genus *Aegle*. It is a deciduous shrub or small to medium-sized tree.
- The bark is pale brown or grayish, smooth or finely fissured and flaking, armed with long straight spines, often with slimy sap oozing out from cut parts. The gum is sweet at first taste and then irritating to the throat.
- The leaf is trifoliate, alternate, each leaflet 5-14 x 2-6 cm, ovate with tapering or pointed tip and rounded base, untoothed or with shallow rounded teeth. Young leaves are pale green or pinkish, finely hairy while mature leaves are dark green and completely smooth.
- The flowers are 1.5 to 2 cm, pale green or yellowish, sweetly scented, bisexual, in short drooping unbranched clusters at the end of twigs and leaf axils.
- The bael fruit typically has a diameter of between 5 and 12 cm. It is globose or slightly pear-shaped with a thick, hard rind and does not split upon ripening.
- Bael is used in the ritual rites of Hindus. Bael is considered as one of the sacred trees of Hindus. It is believed that Hindu deity Lord Shiva is fond of bael trees and its leaves and fruit still play a main role in his worship.

प्रगति के पथ पर

‘रबी’ सीजन की बुवाई पूरी हो रही है और साथ ही अंगूर के मौसम और अनार में ‘हस्त बहार’ की शुरुआत हुयी है। पिछले माह ड्रैगन फ्रूट सीजन समाप्त हो गया और इसी दौरान आम में फूलों की प्रतीक्षा है। मोसंबी के अगले सीज़न की तैयारी पानी के तनाव को लागू करने के साथ शुरू होगी। अनुसंधान प्रक्षेत्र में कई फसलों का प्रबंधन करना एक बड़ी चुनौती और एक ही समय में दिलचस्प है। चुनौती इस अर्थ में कि प्रत्येक फसल की बुवाई पद्धतियों को समझना और उनपर अमल करना कठिन है। परंतु विभिन्न प्रकार के पौधों के साथ बातचीत करने के अवसर के कारण यह दिलचस्प है। ‘कृषि तकनीकी समन्वय पत्र’, सीमित संसाधनों के तहत अनुसंधान फार्म के न्यायिक प्रबंधन में मदद कर रहा है। यह कार्य प्रणाली का विश्लेषण करने के लिए खेत में हर गतिविधि पर ध्यान देने की अनुमति देता है। यह अगले महीने के लिए लक्ष्य तय करने और उपलब्धियों का दस्तावेजीकरण करने की आदत बनाता है। लगातार इस तरह की योजना के माध्यम से बहुत सारे सकारात्मक बदलावों को देखा जा सकता है। खेती के सभी मापदंडों के अनुसार, भूमि, और लेआउट की तैयारी, बुवाई / रोपण, चंदवा प्रबंधन, खरपतवार प्रबंधन, सिंचाई, पोषण और पादप स्वास्थ्य प्रबंधन को बहुत सावधानी से निपटाया जाना चाहिए। इसे प्राप्त करने के लिए जनशक्ति, मशीनरी और अन्य इनपुट के न्यायिक प्रबंधन पर जोर दिया जाना चाहिए। ‘अनुसंधान फार्म प्रबंधन’ में सुधार के लिए कुछ नए और उपयोगी कार्यक्रम के लिए लगातार प्रयास किए जा रहे हैं।

Plan For Progress

Rabi season sowing is at completion and simultaneously fruiting season of grape and ‘*hast bahar*’ in pomegranate are in progress. Dragon fruit season ended while flowering in Mango is awaited. Preparations for next season of Sweet orange will start with imposing stress. Managing multiple crops at research farm is itself a big challenge and interesting at the same time. Challenge in the sense that understanding and implementation of cultivation practices of each crop is difficult. It is interesting due to the opportunity to interact with variety of plants altogether. Farm Coordinator is helping in judicial management of research farm under limited resources. It allows taking note of each and every activity at farm to analyse its impact. It makes the habit of fixing targets for next month and also to document the achievements. Looking behind lot of positive changes can be highlighted through such planning consistently. All the parameters of cultivation practices viz., land and layout preparation, sowing/ planting, canopy management, floor management, irrigation, nutrition and plant health management have to be dealt with very carefully. And to achieve this judicial management of manpower, machinery and other inputs need to be emphasized. Efforts are continuously being made to add new and fruitful to improve ‘Research Farm Management’.

(From page 6-

Fruit Set: In grapes, fruit set is defined as the stage when the berry diameter is between 1.6 and 3.2 mm. In seeded varieties such as ‘Muscat of Alexandria’ fruit set occurs after successful pollination and fertilization and the initiation of seed development. There are two other fruit set mechanisms, however, that allow seedless or seemingly seedless berries to form. The first mechanism,

parthenocarpy, is the only method by which truly seedless berries are produced. The second mechanism, stenospermocarpy, results in the formation of berries that appear to be seedless but are not. In this case, pollination and fertilization occur as normal, but the embryo aborts two to four weeks after fertilization. The result is that partially developed seeds or seed traces can be found within the berry.

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