ICAR-NRCP

Newsletter - संवादपत्र

July - December 2023

From the Director's Desk - निदेशक की कलम से

Dear Readers

I feel happy to share that NRCP scientists have identified one early maturing variety of pomegranate. This variety will reduce the cost of cultivation and hence will help to enhance pomegranate farmers' remuneration. Along with this, soon pomegranate farmers will get one table purpose and one processing purpose pomegranate variety.

During this period, NRCP celebrated its 19th foundation day and organized a **'Pomegranate stakeholder meet'** and **'Stakeholder-industry interface meet',** which was attended by pomegranate exporters, processors, nursery representative and pesticide industry. Pomegranate export to USA was banned in 2018, with efforts of NRCP along with APEDA, NPPO, MSAMB, INI Farms Pvt. Ltd. consignment of irradiated pomegranate was successfully air routed to USA. In this line NRCP is working on storability enhancement of fruits to make its' export more economic through sea route. ICAR has certified four NRCP technologies developed for bacterial blight management, Pomegranate seed oil encapsulation, SSR marker development and mass production protocol for pomegranate fruit-piercing moth. These technologies have shown huge potential and have benefitted pomegranate stakeholders. Key biochemical markers affected by soil moisture fluctuation were identified in pomegranate rind that is responsible for fruit cracking. Pomegranate peels were used as natural preservative to enhance the shelf life of muffins. This product has potential to reduce the use of synthetic preservatives in the muffins and will be a boon to bakery industries.

Contents

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Air Route Trial Shipment of Indian Pomegranate to United States of America

ICAR-NRC on Pomegranate, Solapur; APEDA, New Delhi, National Plant Protection Organization (NPPO), New Delhi; Maharashtra State Agriculture Marketing Board (MSAMB), Government of Maharashtra and INI Farms Pvt. Ltd. joined hands for the successful trial shipment of irradiated pomegranate fruits by Air from India to USA. The virtual flag off ceremony was conducted on 27.07.2023 by the Sh. Abhishek Dev, Chairman APEDA, Dr. Rajiv A. Marathe, Director, ICAR-NRC on Pomegranate, Dr. J. P. Singh National Plant Protection Advisor, and other dignitaries were also present.

After the ban of pomegranate fruit export to the USA in 2018 the pomegranate fruit export from India to the USA was halted. The USDA-APHIS has prescribed a new operational work plan for the pomegranate export to the USA including surfactant wash, surface disinfection, irradiation and packaging, etc. The operational work plan has been meticulously followed in the presence of the USDA-APHIS observer and a trial shipment of 150 Kg fruits in 45 boxes was shipped by air to New York, USA. The static storage trials for the irradiated fruits will be conducted at ICAR-NRCP, Solapur, and INI Farms Pvt. Ltd. The air shipment costs are prohibitive to the exporters. The sea shipment of pomegranate fruits to the far distant markets in Europe and North America needs higher storability to compensate for the time lost during transportation. However, the successful static trials will pave the way for the sea shipment of the irradiated fruits to the USA and it will be a commercially viable option for the Indian pomegranate exporters which will also benefit to the pomegranate growers. In this scenario, the static trials to be conducted at ICAR-NRCP are very crucial.

Flag off of trial air shipment of irradiated pomegranate fruits to USA from Vashi, Navi Mumbai

Research achievements/ Highlights/ Technology developed

Pomegranate Var. NRCP H-14: (Pink aril variety for table purpose)

- This hybrid is suitable for table purpose
- Higher TSS content (17.8° Brix)
- Pink arils, yellowish fruit surface
- Registration: PPV&FRA/REG/2016/1748; RC issued.

Date of Grant: 12.12.2023

Pomegranate Var. NRCP H-4: (Pink aril variety for anardana purpose)

- Pink arils, yellowish fruit surface
- This hybrid is suitable for anardana purpose
- Rich in titrable acidity (5.76%)
- Anardana recovery from arils: 20.5%
- Registration: PPV&FRA/REG/2016/1749

Date of Grant: 12.12.2023; RC issued

(K. Dhinesh Babu)

Exploration, collection and conservation of germplasm in pomegranate

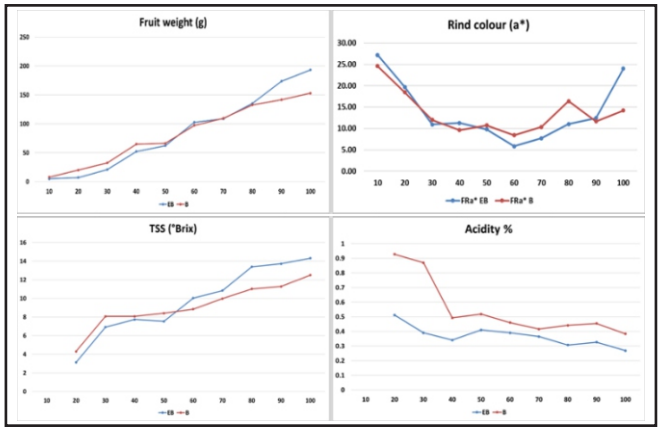
In total 338 pomegranate germplasm accessions consists of 171 Indigenous and 167 Exotic collections have been maintained ICAR-NRCP, Solapur. Additionally, survey cum exploration has been made and collected 50 new pomegranate germplasm accessions from 38 locations of Uttarakhand. Out of which 25 were survived and will be further evaluated for resistance to major biotic and abiotic stresses after proper growth and development.

(Team: Shilpa P., Roopa Sowjanya P., Dhinesh Babu K., P. G. Patil, P. Raigond, C. Awachare, A. R. Girme, T. Daphale & R. A. Marathe)

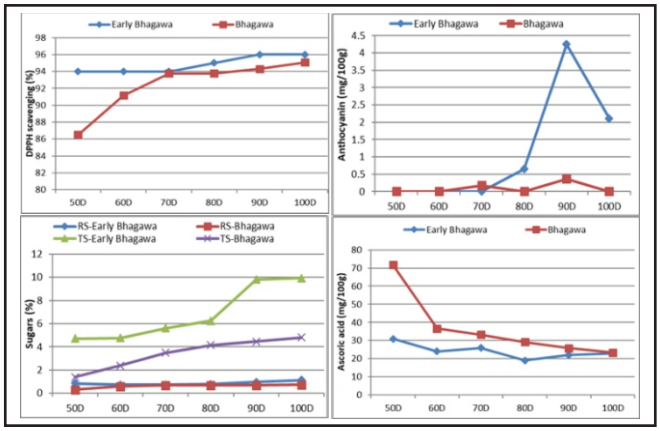
Evaluation of Early Maturing Variety "Solapur Taporatna" for Morhological and Physiological Parameters in Pomegranate

Morphological and biochemical changes in the early maturing variant (Solapur Taporatna) has been studied by comparing with cv. Bhagawa. Early Bhagwa showed significant increase for fruit weight, fruit volume; number of arils/fruit; 100 arils weight; fruit diameter; aril length; aril width; rind thickness; TSS; rind colour (a*) was recorded from 70th to 80th day of maturity. Decreasing trend was observed for acidity %, significant decrease was observed a 70th to 80th day of maturity in case of early maturing variant.

Among the biochemical parameters, total soluble sugars, Anthocyanin development, Beta galactosidase, total phenol have showed significant increase from 80th to 90th day of maturity in Solapur Taporatna. Ascorbic acid showed sharp decrease with maturity in Bhagawa, while in Solapur Taporatna slow increase in ascorbic acid was reported from 80th to 100th day of maturity. Antioxidant potential of Solapur Taporatna was higher than Bhagawa.



Changes in the Fruit weight, Rind Colour, TSS and % Acidity in Solapur Taporatna compared with Bhagawa



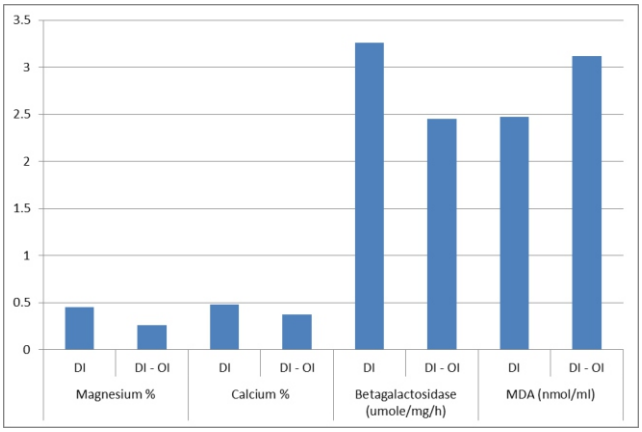
Comparison of Reducing sugars, Total soluble sugars content in Solapur Taporatna and Bhagawa

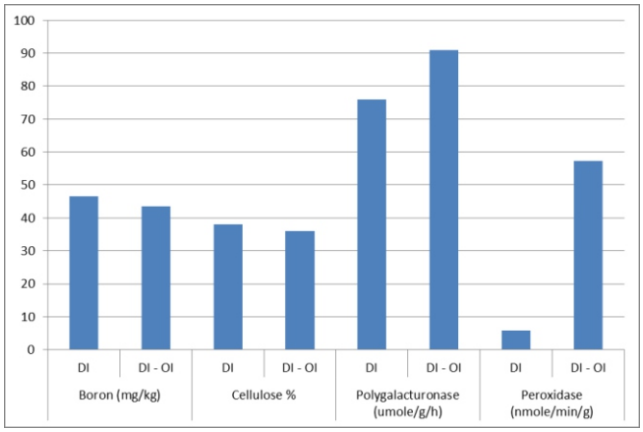
(Team: Shilpa P., Roopa Sowjanya P., P. Raigond, Dhinesh Babu K., Mallikarjun H., Manjunatha N., Girme A. R., T. Daphale and Marathe R. A.)

Effect of Over Irrigation on Pomegranate Rind Composition

Bhagawa variety that was devoid of irrigation for 20 days (DI) at the almost fruit maturity stage was over irrigated for five days. Rind of matured fruits from delayed-irrigated and over-irrigated plants (DI-OI) was analyzed for changes in cell wall composition. The results showed that Magnesium and Boron content in pomegranate peel was significantly affected by irrigation level. Over-irrigation to delayed irrigation plants drastically decreased magnesium content and decrease was 42%. Boron decreased by 7% after over irrigation. Calcium content was decreased by 23% on over irrigation. Over irrigation reduced the cellulose content in pomegranate rind by 5%. Over irrigation to delayed irrigated plants increased the polygalacturonase activity significantly and 20% increase in activity was reported.

Betagalactosidase was also significantly affected by irrigation treatments and it decreased by 25%. Over irrigated plants contained higher activity of peroxidase compared to delayed irrigated plants indicating stress level in over irrigated plants. Peroxidase activity increased by 10 folds in over irrigated plants, indicating high stress level. Like peroxidase, malondialdehyde also increased significantly by 26% in overirrigated plants. The results showed that changes in soil moisture levels significantly affected the chemical structure of pomegranate rind particularly after over irrigation.



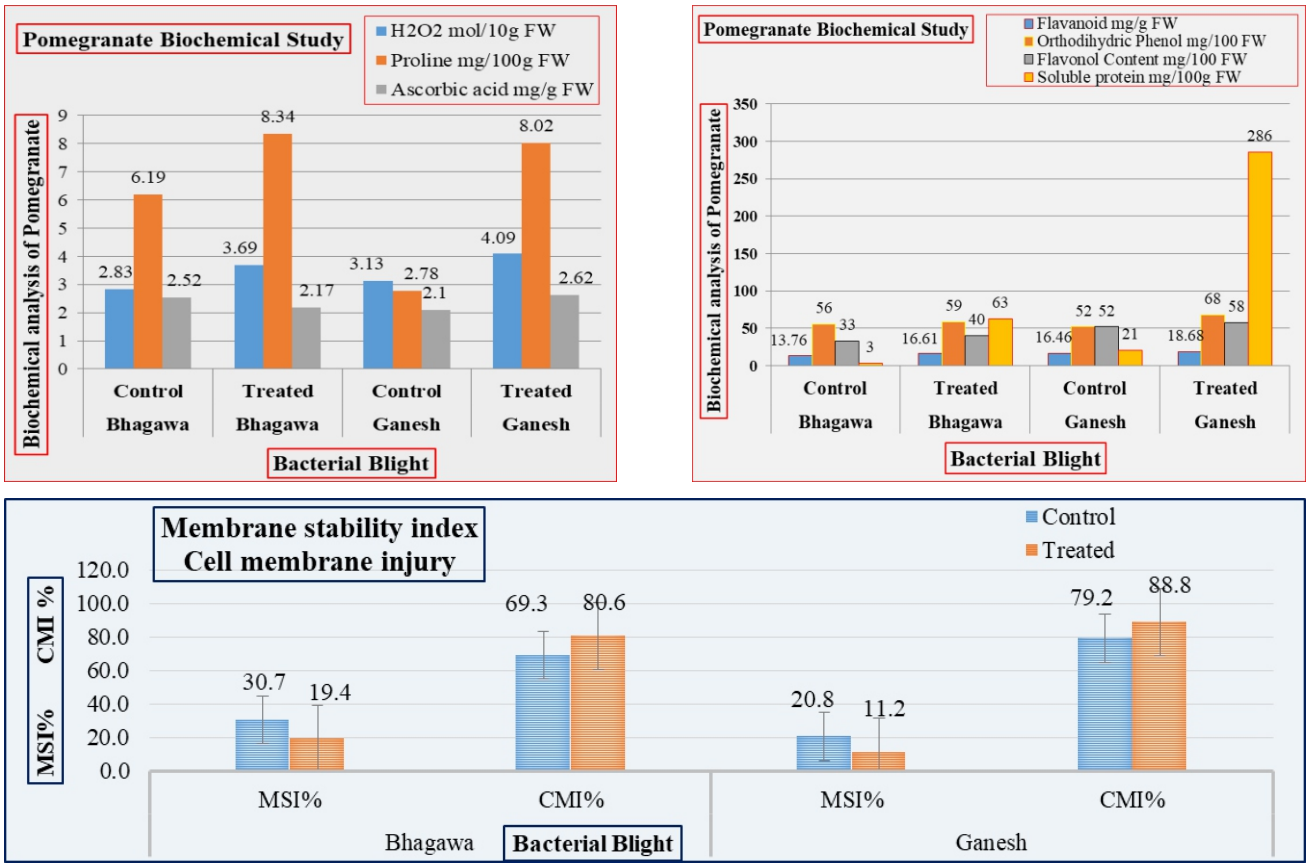


(Team: P. Raigond, A. More, Shilpa P., N.A. Giri, Roopa Sowjanya, R. Damale, R.A. Marathe)

Study of Biochemical and Enzymatic Analysis of Contrasting Pomegranate Varieties under Bacterial Blight Infection

Healthy leaves samples (without bacterial blight infection) and infected leaves samples (with infection of bacterial blight) were analysed for biochemical and enzymatic properties, including hydrogen peroxide, proline content, ascorbic acid, flavonoid content, orthodihydric phenol content, flavonol content, membrane stability index, cell membrane injury and soluble protein. The biochemical and enzymatic analysis study revealed that, significant increased biochemical parameters like Proline content, cell membrane injury and soluble protein in both Bhagawa and Ganesh varieties. The hydrogen peroxide, flavonoid content and flavonol content was found moderately increased in both varieties. The membrane stability index was significantly decreased in Bhagawa as well as Ganesh varieties. The ascorbic acid content was moderately decreased in both varieties after bacterial blight infection. In case of ascorbic acid content was decreased in Bhagawa variety but slightly increased in Ganesh variety.

The study suggests that proline content, protein content, hydrogen peroxide, and flavonoid content may be reported as biochemical markers to detect bacterial blight incidence and prevent further infection.



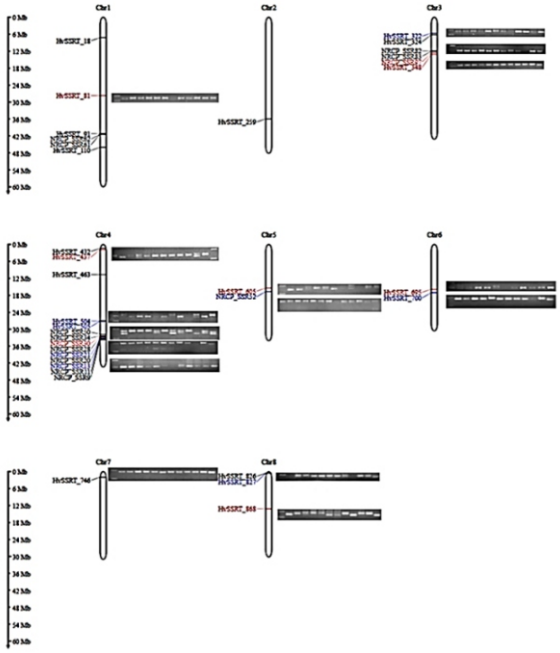
Graphs showing changes in the biochemical parameters after bacterial blight infection

(Team: R.D. Damale, K.D. Babu, P. Raigond, Manjunatha N, Mallikarjun H., N.V. Singh, Shilpa P., R.A. Marathe)

Hyper Variable SSR Marker Based Varietal Fingerprinting and Barcoding of Pomegranate

For varietal fingerprinting twelve pomegranate varieties that are popularly grown in India were selected *viz.,* Ganesh, Mridula, Arakta, Ruby, Super Bhagwa, Dholka, Khandari, Solpaur Lal, Jallore Seedless, Jyoti, Bhagwa and Yercaurd-I. Based on initial SSR screening experiments using 110 SSR primers, 46 SSRs with their clear amplification profiles were selected. Based on physical e-mapping of these SSR primers on Tunisia genome a good distribution of 44 markers was found across eight chromosomes of Tunisia, with the exception of two markers with unknown locations. The amplication profile for few informative hyper variable SSR markers on twelve pomegranate varieties with their physical locations on chromosomes is shown in the figure. The 46 SSR markers generated total of 102 alleles that ranged from 2 to 4 alleles, with an average PIC value of 0.31. For developing varietal-specific marker IDs, 24 SSRs yielded unique alleles that are specific to eight varieties *viz.,* Ganesh, Mridula, Arakta, Ruby, Dholka, Solapur Lal, Bhagawa, and Yercaud-I. In order to develop varietal barcodes, a total sixteen rare alleles producing SSR markers were detected which appeared in two or more cultivars and had allelic frequency of ≤ 20%. These decreased the probability of identity values to 2.6 x10^{-6} for 12 pomegranate varieties. Further, from these 16 SSRs we have chosen eight core SSR markers (NRCP_SSR30, HvSSRT_81, NRCP_SSR97, HvSSRT_695, HvSSRT_348, HvSSRT_605, HvSSRT_868, and HvSSRT_437) that have distinguished all the 12 pomegranate varieties to develop a preliminary barcode. For identification of particular pomegranate cultivars we also proposed the hypothetical multiplex assays *i.e.* Mridula, Ruby, Solapur Lal, Jallore Seedless, and Bhagawa involving two to four SSRs primer combinations for validation experiments.

hypothetical multiplex assays *i.e.* Mridula, Ruby, Solapur Lal, Jallore Seedless, and Bhagawa involving two to four SSRs primer combinations for validation experiments.



Sl.No	Variety	Marker code	Barcode	Fruit morphology
1	Ganesh	11112112	11112112	
2	Mridula	12112121	12112121	
3	Arakta	12112222	12112222	
4	Ruby	12212231	12212231	
5	Super Bhagawa	12122232	12122232	
6	Dholka	12212132	12212132	
7	Kandhari	12112332	12112332	
8	Solapur Lal	22212322	22212322	
9	Jallore Seedless	12121212	12121212	
10	Jyoti	02122232	02122232	
11	Bhagawa	22122231	22122231	
12	Yercaud-I	12111212	12111212	

SSR Locus	Allele (bp)	Ganesh	Mridula	Arakta	Ruby	Super Bhagawa	Dholka	Kandhari	Solapur Lal	Jallore Seedless	Jyoti	Bhagawa	Yercaurd-I
NRCP_SSR30	300								—			—	
HvSSRT_81	250	—											
NRCP_SSR97	240				—		—		—				
HvSSRT_695	210					—				—	—	—	
HvSSRT_348	200									—			—
HvSSRT_605	190							—	—				
HvSSRT_868	180		—	—					—				
HvSSRT_437	130		—		—							—	

SSR markers deployed for barcode development and their feasibility for multiplex assay in pomegranate

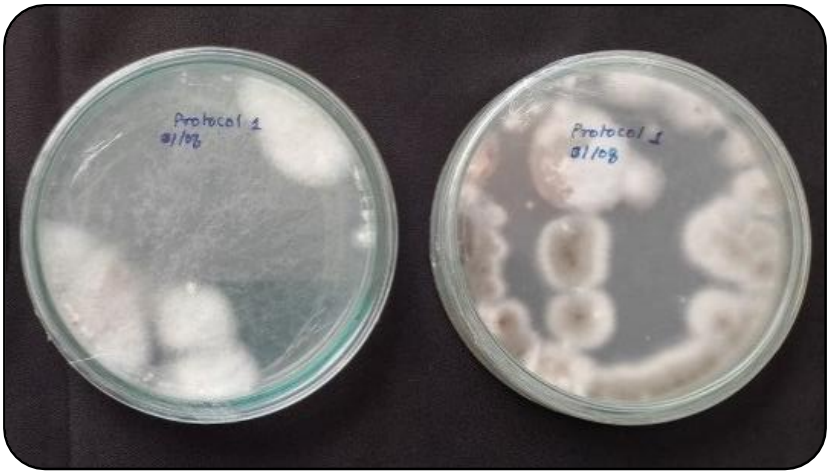
(Team: D. S. Kulkarni, P. G. Patil, Shilpa P., S. M. Jamma, C. Awachare, Dhinesh Babu K, R.A. Marathe)

Molecular Characterization of Symbiotic Fungi Associated with Shot Hole Borer (*Euwallacea fornicatus*)

Two symbiotic fungi isolated from the shot hole borer beetle (SHB) have been verified as *Fusarium oxysporum* and *Pacelomyces maximus*. They were cultured on media plates and identified by sequencing using ITS primers.

Characterization of Fungi associated with SHB:

Organism	Region Amplified	Sequence ID
Fusarium oxysporum	ITS Sequence	>0523-515_002_PCR_I2_ Forward_E07.ab1
Pacelomyces maximus	ITS Sequence	>0723-016_006_PCR_F_ Forward_A04.ab1



Symbiotic fungi associated with shot hole borer F. oxysporum and P. maximus

(Team: Mallikarjun M.H., R. A. Marathe, Manjunatha N., & S. S. Pokhare)

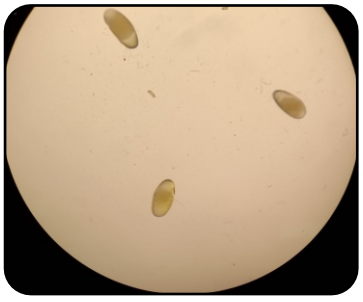
Mass Production of Shot Hole Borer on Semisynthetic Media

The *in-vitro* experiment was conducted to mass produce the pomegranate shot hole borer *Euwallacea fornicatus* on standardized semi-synthetic media.

Treatment details	Total female released/ tube	No. of life cycle completed	Average No. of different stages			
			Eggs	Grubs	Pupae	Adult
Semisynthetic media	1	4	10.25	24.25	6.75	4.25

Ingredients of Semisynthetic media used for rearing of shot hole borer

S.N.	Media ingredient	Quantity (g or ml/300 ml of media)
1	Pomegranate saw-dust	45 g
2	Agar	22 g
3	Sucrose	6 g
4	Casein	3 g
5	Starch	3 g
6	Yeast	3 g
7	Wesson's salt mixture	0.6 g
8	Streptomycin sulphate	0.21 g
9	Ethanol (100%)	3 ml
10	Distilled water	300 ml



Eggs of the shot hole borer in semisynthetic media

Gallery of the shot hole borer in semisynthetic media

(Team: Mallikarjun M.H., R. A. Marathe, Manjunatha N., & S. S. Pokhare)

Pomegranate Peel Powder as a Natural Preservative in Development of Fiber Rich Muffins

Pomegranate peel (50% of fresh fruit weight) is a by-product from pomegranate processing industries and is known as a rich source of bioactive compounds and dietary fibers. It also has good antioxidant and antimicrobial properties. An attempt was made to use pomegranate peel powder in muffins as a natural preservative and fiber rich source. Refined wheat flour was substituted with pomegranate peel powder at the rate of 2 to 10%. The nutritional value of muffins was improved by a significant increase in the fiber content (4.39 to 10.66%), total phenols (0.443 to 48.53 mg GAE/100g), antioxidant activity (75.94 to 99.36%), calcium (200.33 to 294.33 mg/100g), potassium (227.33 to 425.33 mg/100g) and magnesium (96.33 to 288.33 mg/100g).

The free fatty acid content, peroxide value, and microbial count of the muffin with pomegranate peel powder were significantly lower than the control sample. Muffin fortified with pomegranate peel powder had more oxidative and microbial stability than the control sample for a storage period of 21 and 28 days at ambient and refrigerated temperatures respectively. In conclusion, there is an opportunity to use pomegranate peel powder as functional ingredients and natural preservative in the preparation of muffins.

(Team: Namrata A. Giri, Nilesh N. Gaikwad, Manjunatha N., Pinky Raigond & R.A. Marathe)

Special Events

Stakeholders Meet

NRCP, Solapur in collaboration with All Maharashtra Pomegranate Growers & Research Association, Pune; Department of Agriculture, Government of Maharashtra and Mahatma Phule Krishi Vidyapeeth, Rahuri had organised a one-day stakeholders meet on **"Problems, Solutions, Opportunities and Challenges in Pomegranate Production"** on August 25, 2023. The main objective of the event was to bring together all the stakeholders involved in the pomegranate production in order to discuss the problems, solutions and challenges involved.

The Director, National Research Center on Pomegranate, Dr. Rajiv Marathe was the convener of the the meet. The program was presided over by Mr. Ashok Kiranlli, Joint Director of Horticulture, Commissionerate of Agriculture, Pune while Shri. Prataparao Kate & Shri. Shahajirao Jachak of All Maharashtra Pomegranate Growers & Research Association; Dr. Vinayak Joshi from Mahatma Phule Krishi Vidyapeeth, Rahuri; Member of Research Advisory Committee, Shri. Shankar Waghmare and Solapur District Superintendent Agriculture Officer Mr. Dattatraya Gavasane were guests of honour.

On this occasion, detailed guidance was provided by the experts from NRCP on the burning problems of pomegranate crop like Bacterial blight, wilt disease, pin / shot hole borer and other fungal problems. The issue of label claims of very less number of chemicals for pomegranate crop protection was discussed. Farmers highlighted that the Adhoc list of chemicals developed by the NRCP is very helpful and being widely used by the pomegranate producers and exporters. Director NRCP Dr. R.A. Marathe informed the participants about the research work done by the centre and insisted farmers to be in contact with NRCP for solving the problems faced by the farmers. Mr. Ashok Kiranli, Joint Director, Horticulture, in his presidential address, congratulated the Centre and the scientists of the Centre for getting sanction of two projects worth about Rs.6 crores under RKVY Scheme. He also informed the farmers about the various fruit crop schemes being implemented through the Agriculture Department. The detailed discussion was held on the various issues related to pomegranate production, protection and value addition.

Dr. R.A. Marathe, Mr. Ashok Kiranlli, Dr. Vinayak Joshi, Shri Prataparao Kate, Shri Shahajirao Jachak, Mr. Dattatraya Gayasane, Shri Shankar Waghmare & Mr. Ramdas Patil during Stakeholders meet at NRCP, Solapur

Stakeholders meet at ICAR-NRCP, Solapur on 25th August 2023

19th Foundation day of the institute

The 19th Foundation day of the centre was celebrated on 25th September, 2023. Dr. Kailas Mote, Director (Horticulture and Medicinal Plant Board), Govt. of Maharashtra was the chief guest while Dr. K. Sammi Reddy, Director, ICAR-NIASM, Baramati was the guest of honour of the function. The programme was attended by the progressive growers and office bearers of the All India Pomegranate, Growers Association, All Maharashtra Pomegranate Growers Association and Karnataka Pomegranate Growers Association. On this occasion, six publications like NRCP at a glance; NRCP Profile; Mealy bug in pomegranate and its management; NRCP Newsletter (Jan-Jun 2023); Pomegranate processing technologies and value added products & Analytical manual for pomegranate were released by the dignitaries present on this occasion.

Progressive pomegranate entrepreneur such as Shri. Madan Kulkarni, Karvi Agro processing company Ltd., Shri. Prakash Bafna, Bafna Exports; Progressive pomegranate growers such as Shri. Munegowda G. C., Shri. Sham Godase, Pandharpur, Shri. Aaba Jadhav along with NRCP staff such as Shri. Bhausaheb Naikwadi (Best Technical Staff Award 2023), Shri. Aabasaheb Babar (Best Administrative Staff Award 2023), Shri Gagane S. S (Best Supporting Staff Award 2023) were also felicitated during this occasion. Around 160 participants attended the foundation day ceremony.

Dr. R.A. Marathe, Dr. Kailas Mote, Dr. K. Sammi Reddy, Shri Prabhakar Chandane, Shri Bhausaheb Kate and Mr. Nanjundegowda B. during Foundation Day of NRCP

Celebration of 19th Foundation Day of the institute and release of Institute publications & Best worker awards given on this occasion

NRCP-Stakeholders-Industry Interface Meet

The "NRCP-Stakeholders-Industry Interface Meet" was organized on the occasion of 19th Foundation day of the centre on 25th September, 2023 under the chairmanship of Dr. R.A. Marathe, Director, ICAR-NRCP. Around 70 participants representing various stakeholders / industries right from planting material, agri input dealers, pesticides, value addition, marketing and export were present on the occasion. Dr. Jyotsana Sharma, Principal Scientist delivered presentation on Pomegranate cultivation in India: Challenges & opportunities and Dr. Nilesh Gaikwad, Sr. Scientist presented on the opportunities in export and value addition in pomegranate. He has also apprised the audience regarding the technologies developed ICAR-NRCP which are ready for commercialization. Further there were ten presentations from the stakeholder industries on the issues faced by them and their experiences. Programme was coordinated by Dr. Nilesh Gaikwad, Sr. Scientist and Dr. Namrata Giri, Scientist of ICAR-NRCP, Solapur.

The list of stakeholders from different industries as follows:	
Pomegranate Fruit/Aril Exporter	Mr. Indravadan jadhav, ulink agritech pvt. ltd., Pune Mr. K.N. Rao, Direcotr (Tech.) Sam Agri, Hyderabad.
Pomegranate Juice Processor	Mr. R. Giridhar, CEO, Kavya Agro, Chimakurthy, Andhra Pradesh
Bio-formulations	Mr. Vinay Pol, Bharti Green Tech Pvt. Ltd., Dahivadi, Maharashtra Dr. Jaykant Gavaskar, capsber global agro pvt. Ltd. Bengaluru, Karnataka. Mr. Sambhaji Munde, Zonal Manager, Valagro Bioscience Pvt. Ltd.
Planting Material	Mr. Ravindra Kadlag H.U. Gugle Agro, Ahmednagar, Maharashtra Mr. Chetan Gulve, Jain Irrigation Systems Pvt. Ltd.
Pesticide industry	Mr. Praful Malthankar, AO Lead West, Bayer Cropsciences Ltd. Mr. Nitin Thodsare, Regulatory Analyst, UPL India

Felicitation of Representative of Capsberg Biosciences Pvt. Ltd.

Release of P2K2 A Penicillium pinofilum based bio-formulation on the occasion

Mr. K.N Rao, Director (Tech.) Sam Agri, Hyderabad sharing his experience

Mr. Chetan Gulve, Jain Irrigation Systems Pvt. Ltd. Felicitated on the occasion

ICAR-NRCP Technologies certified by the ICAR

The different technologies developed by the Scientists of the NRCP were certified and recognized by the ICAR on the occasion of the Foundation day of ICAR on 16th July, 2023 at New Delhi. These technologies were certified based on the publication in high rated journal and commercialization of the same.

S.N.	Name of the technology	Lead developer	Associate developer
1	Stem solarization to manage bacterial blight in pomegranate	Dr. Jyotsana Sharma	Dr. Somnath S. Pokhare Dr. Manjunatha N. Mr. Vijay Lokhande
2	Microencapsulation of pomegranate seed oil using ionic gelation technique	Dr. Nilesh N. Gaikwad	Dr. Jyotsana Sharma Dr. R. A. Marathe
3	Development of chromosome specific hyper variable SSR markers in pomegranate	Dr. Prakash G. Patil	Dr. N. V. Singh Dr. K. Dhinesh Babu Dr. Jyotsana Sharma
4	Standardizing the mass production protocol for pomegranate fruit-piercing moth (*Eudocima materna*)	Dr. Mallikarjun M. H.	Dr. R. A. Marathe Dr. Manjunatha N. Dr. Somnath S. Pokhare

ICAR-NRCP Technologies certified by the ICAR

Institutional Activities

Research Advisory Committee (RAC) Meeting

The sixteenth Research Advisory Committee (RAC) meeting of ICAR–National Research Centre on Pomegranate (NRCP) was held on August 11, 2023 at ICAR–NRCP, Solapur under the Chairmanship of Dr. CD Mayee, Former ASRB Chairman, New Delhi. Dr. AN Ganeshamurthy, Ex-Head, ICAR-IIHR, Bengaluru and Dr. B.P. Singh, Ex-PS, ICAR-CISH, Lucknow did not attend this meeting due to inevitable reasons.

The technical meeting was started on August 11, 2023 at 9.45 am in the Director's Board Room. Dr. K Dhinesh Babu, Member Secretary extended a warm welcome to the Hon'ble Chairman and esteemed members of RAC. The newly constituted RAC team was welcomed and felicitated by Dr. RA Marathe, Director, ICAR-NRCP with product basket. Dr. V. B. Patel, ADG (HS-II) attended this meeting through online mode. All scientists gave their self-introduction to RAC team with their specialization and area of research work on pomegranate followed by introduction of esteemed members. Dr. R. A. Marathe, Director NRCP briefed about 17 years' journey of NRCP and major milestones related to improvement, production, protection and post-harvest technologies. This was followed by presentation of 'Action Taken Report' on the recommendations of 15th RAC meeting held on Nov 29-30, 2021 by the Member Secretary.

Dr. CD Mayee, Chairman along with Dr. Sunil Pareek, Dr. S. H. Jalikop, Dr. K.K. Pandey, Mr. Ramdas Patil, Mr. Shankar Waghmare, Dr. R. A. Marathe, Dr. K. Dhinesh Babu and NRCP scientist during RAC Meeting

Independence day celebration

ICAR-NRCP celebrated 77th Independence day on August 15, 2023 with religious fervour. Director, ICAR-NRCP, Dr. R. A. Marathe, hoisted the national flag with singing the national anthem along with all the NRCP staff. On this occasion the blood donation camp was organised in the NRCP premises. Director congratulated the staff for their accomplishments and also given the certificates of the institute developed technologies approved by the ICAR.

Celebration of 77th Independence Day on August 15, 2023 at ICAR-NRCP, Solapur

Awarding the certificates of Technologies to the developers

Blood donation and Health check-up camp

Events organized (Seminar/ Webinar/ Symposia/ Conferences etc.)

S.N.	Details of the event	Date & Venue	Course Director/ Co-coordinators/ Team
1	One day stakeholders meet on "Pomegranate production: Problems, Solutions, Challenges and Opportunities	25/08/2023 ICAR-NRCP, Solapur	Convenor: Dr. R. A. Marathe and Dr. J. Sharma Organizing Secretary: Dr. S. S. Pokhare; Co-organizing Secretary: Dr. N. Gaikwad; Dr. Shilpa P. & Dr. C. Awachare
2	NRCP-Stakeholders-Industry Interface Meet on the occasion of 19th foundation day of the institute	25/09/2023 ICAR-NRCP, Solapur	Dr. Jyotsana Sharma, Dr. Nilesh Gaikwad & Dr. Namrata Giri
3	National Pomegranate Buyer Seller Conclave-2023 Jointly organized by the Karnataka Pomegranate Growers Association, Bengaluru, Karnataka State Agricultural Produce Processing & Export Corporation Limited (KAPPEC) and ICAR-NRC on Pomegranate, Solapur, MS.	19/10/2023 Bangaluru	Dr. Sunil Tamgale, G.S. KPGA, Bengaluru Dr. Nilesh Gaikwad, ICAR-NRCP, Solapur Mr. Md. Paravez Banthanal, M.D., KAPPEC, Bengaluru
4	World Soil Day	05/12/2023 Takli village	Dr. Somnath Pokhare and Dr. Pinky Raigond

Celebration of World soil day at Takli village of Solapur district (Left); Director NRCP, handing over Soil health card to farmer participant in the program

Farmers Corner

Two pomegranate hybrids NRCP H-4 & NRCP H-14 got the certificate of registration at PPVFRA, New Delhi.

प्ररूप O-2, FORM O-2
(कृपया नियम 36 और 37 देखें) (See rules 36 and 37)
भारत सरकार / GOVERNMENT OF INDIA
पौधा किस्म रजिस्ट्री PLANT VARIETIES REGISTRY
पौधा किस्म और कृषक अधिकार संरक्षण प्राधिकरण / PROTECTION OF PLANT VARIETIES & FARMERS' RIGHTS AUTHORITY
जी पी एस मार्ग, निकट टोडापुर गाँव, नई दिल्ली – 110012 / D P S Marg, Near Todapur Village, New Delhi - 110012
रजिस्ट्रीकरण प्रमाण-पत्र /Certificate of Registration

पंजीकरण सं./ Registration No.: REG/2016/1749

रजिस्ट्रार के हस्ताक्षर व मुहर/ Seal and Signature of the Registrar,

Pomegranate var. NRCP H-4

प्ररूप O-2, FORM O-2
(कृपया नियम 36 और 37 देखें) (See rules 36 and 37)
भारत सरकार / GOVERNMENT OF INDIA
पौधा किस्म रजिस्ट्री PLANT VARIETIES REGISTRY
पौधा किस्म और कृषक अधिकार संरक्षण प्राधिकरण / PROTECTION OF PLANT VARIETIES & FARMERS' RIGHTS AUTHORITY
जी पी एस मार्ग, निकट टोडापुर गाँव, नई दिल्ली – 110012 / D P S Marg, Near Todapur Village, New Delhi - 110012
रजिस्ट्रीकरण प्रमाण-पत्र /Certificate of Registration

पंजीकरण सं./ Registration No.: REG/2016/1748

रजिस्ट्रार के हस्ताक्षर व मुहर/ Seal and Signature of the Registrar,

Pomegranate var. NRCP H-14

Events attended by the NRCP staff (Seminar/ Webinar/ Symposia/ Conferences)

Title of the event	Date	Organizers	Participants
ICAR foundation Day cum Technology Day and concurrent Industry-Institute Interaction for SMD (Horticultural Sciences).	16-18 July 2023	Indian Council of Agricultural Research	Dr. Rajiv Marathe, Dr. Nilesh Gaikwad & Dr. Somnath S. Pokhare
Brainstorming session on Implementation of Green Credits Programme	24 August 2023	National Academy of Agricultural Sciences	Dr. Pinky Raigond
International Seminar on Exotic and Underutilized Horticultural crops: Priorities & Emerging Trends	17-19 October 2023	ICAR-IIHR, Bengaluru	Dr. K. Dhinesh Babu
National Conference of Plant Physiology – 2023 on 'Physiological and Molecular Approaches For Climate Smart Agriculture'	09-11 December 2023	Indian Society for Plant Physiology & ICAR-Indian Agricultural Research Institute, New Delhi	Dr. Pinky Raigond & Dr. P. Roopa Sowjanya
Global Symposium on Farmers Rights	12-15 September 2023	PPV&FRA, New Delhi	Dr. Shilpa Parashuram
International Conference on Plant Health Management- 2023 - Innovation & Sustainability"	15-18 November 2023	NBPGR Regional station, Hyderabad.	Dr. Somnath S. Pokhare & Dr. Namrata A. Giri

DUS & PVP Data Management (Webinar)	17 November 2023	PPV& FRA, New Delhi	Dr. P. Roopa Sowjanya
One District One Product (ODOP) Webinar on Pomegranate Processing and Value Addition under Prime Minister - Formalization of Micro food processing Enterprises (PMFME) Scheme.	15 December 2023	National Institute of Food Technology, Entrepreneurship and Management (NIFTEM), Thanjavur	Dr. Nilesh Gaikwad

Trainings/FLDs/OFTs organized for the farmers/ students / entrepreneurs etc. by NRCP (on campus / off campus)

Title	Date	Sponsoring / collaborating agency	Course Director/ Co-coordinators/ Team	Participants and Venue
Training cum interaction meet on Pomegranate cultivation in hot arid zone in association with CIAH, Bikaner	20 July 2023	CIAH, Bikaner	Dr. Jyotsana Sharma and Dr. Somnath Pokhare	55 CIAH, Bikaner
Training program on Pest and disease management in Pomegranate with special emphasis on shot hole borer and wilt disease	17 August 2023	ATMA, and DSAO, Sangli	Dr. Jyotsana Sharma, Dr. Somnath Pokhare & Dr. Mallikarjun H	180 Sankh, Jat Dist: Sangli
One-day workshop on Residue free pomegranate production at KVK, Baramati jointly organized by KVK, Baramati; ADT, Baramati; Pomegranate growers association, Mandeshi Foundation and NRCP, Solapur	07 October 2023	KVK, Baramati	Dr. Somnath Pokhare	128 KVK, Baramati
One day field training program for pomegranate pruning labours & Lecture on Pest and disease management in Pomegranate	16 October 2023	Agri. Dept. Govt. of Maharashtra & ATMA, Solapur	Dr. Somnath Pokhare; Dr. Chandrakant Awachare & Shri. M. Gogaon	80 Karandewadi, Sangola
Three days residential Training programme on "Diagnosis of Pomegranate pest and diseases and their integrated management"	19-21 October 2023	Plant Health Clinic project of RKVY.	Program Director: Dr. Rajiv Marathe Training co-ordinators: Dr. Somnath Pokhare & Dr. Manjunatha N.	25 ICAR-NRCP
Farmer scientist meeting on Residue free Export quality pomegranate production in collaboration with Mandeshi foundation, Mhaswad	21 November 2023	Mandeshi Foundation	Dr. S. Pokhare; Dr. Manjunatha N. & Dr. C. Awachare	136 Mhaswad, Dist- Satara

Technical Meet on "Pomegranate cultivation"	13 December 2023	SRPGA-FPO, Banavara, Hassan District and NRCP, Solapur	Dr. Shilpa P., Dr.Manjunatha N., & Dr. S. S. Pokhare	300 Participants Chikkamagalur, Karnataka
Export of pomegranate in the year 2024. (presentation on the sea protocol for the export of the pomegranate to distant markets)	14 December 2023	APEDA, New Delhi	Dr. Nilesh Gaikwad	50 Pomegranate exporters (Virtual)
Three days residential training programme on "Diagnosis of Pomegranate Pest and Disease and their integrated management"	20-22 December, 2023	Plant Health Clinic project of RKVY.	Program Director: Dr. R. A. Marathe Training co-ordinators: Dr. S. S. Pokhare & Dr. Mallikarjun H. Training Co-coordinators: Dr. N. Giri & Dr. C. Awachare	25 ICAR-NRCP

RKVY sponsored training program at ICAR-NRCP

On field training program at Karandewadi, Sangola

Pomegranate technical meet at Chikkamanglur, Karnataka

Training program on Pest and disease management in Pomegranate at Sankh village of Sangli District

Training attended by NRCP staff

Title of the training	Date	Organizers	Participants
NAHEP online training programme on Agriculture in Future & Future in Agriculture	20 November-10 December 2023	RVSKVV, Jabalpur	K. Dhinesh Babu
Pre-season, Pre-cleared Pomegranate Export from India to the meeting with APHIS, APEDA	20 December 2023	APEDA, GOI	Dr. Nilesh Gaikwad

Resource person in training programmes

Program detail	Resource person	Title of the topic
One day training- cum farmer scientist interaction meet on "Diagnosis and management of insect pests and diseases of pomegranate" on 17.08.2023	Dr. Mallikarjun M. H	Insect pests of pomegranate and their integrated management
Online off-campus training programme on "Capacity Building Programme for Pomegranate Growers" organized by APEDA on 24.08.2023	Dr. Roopa Sowjanya P	Conservation and utilization of Pomegranate genetic resources for quality pomegranate production
One day training- cum farmer scientist interaction meet on "Diagnosis and management of insect pests and diseases of pomegranate" on 27.09.2023	Dr. Mallikarjun M. H	Insect pests of pomegranate and their integrated management
Three days RKVY (Plant Health Clinic Project) sponsored Training Programme on "Diagnosis of Pomegranate pest and diseases and their integrated management" conducted from Oct. 19 to 21, 2023 at ICAR-NRCP, Solapur	Dr. K. Dhinesh Babu Dr. Mallikarjun M. H Dr. Pinky Raigond	Establishing new pomegranate orchards and its management at initial stage Insect pests of pomegranate, their diagnosis and management Abiotic stress management in pomegranate
One day training- cum farmer scientist interaction meet on "Diagnosis and management of insect pests and diseases of pomegranate" on 09.11.2023	Dr. Mallikarjun M. H.	Insect pests of pomegranate and their integrated management
Training cum demonstration programme on "Good agricultural practices for quality pomegranate production and farm input distribution programme under STC scheme organized by ICAR-NRCP, Solapur in collaboration with PRTCC, Lakhmapur; KVK, Malegaon and State Department of Agriculture, Satana on 22-24 November, 2023.	Dr. Shilpa P.	Important commercial varieties of pomegranate and their suitability in pomegranate

Pomegranate technical meet organized by South Region Pomegranate Growers Association (SRPGA), FPO, Banavara, Hassan District and NRCP, Solapur at Chikkamagalur, Karnataka on 13.12.2023	Dr. Shilpa P. Dr. Manjunatha N. Dr. Somnath Pokhare	Important commercial varieties and cultivation practices in pomegranate Disease Management in Pomegranate Nematode Management in Pomegranate
Three days RKVY (Plant Health Clinic Project) sponsored Training Programme on "Diagnosis of Pomegranate pest and diseases and their integrated management" conducted from Dec.20-22, 2023 at ICAR-NRCP, Solapur	Dr. Mallikarjun M. H. Dr. Pinky Raigond	Insect pests of pomegranate, their diagnosis and management Abiotic stress management in pomegranate

Agricultural Exhibitions/ Farmers fair attended/ Technology displayed/ Demonstrated

Event	Venue	Date	Particpiants	No. of Visitors
ICAR foundation Day cum Technology Day	NASC Complex, New Delhi	16-18 July 2023	Dr. Nilesh Gaikwad & Dr. Somnath Pokhare	200
"Samruddha Maharashtra-A step towards growth and development"	Sangola, Maharashtra.	23-25 August, 2023	Shri. Mahadev Gogaon & Shri. Govind Salunkhe	1000

ICAR-NRCP exhibition stall at "Samruddha Maharashtra-A step towards growth and development" at Sangola, Maharashtra

Peer recognitions/ Awards/ Honours received by the NRCP staff

Dr. R. A. Marathe, Director ICAR-NRCP awarded with **"Fellowship of Indian Society of Citriculture - 2023"** conferred on 28.10.2023, by Shri. Nitin Gadkari ji, Honorable Union Minister of Transport, Highways & Shipping, Govt. of India.

Dr. Pinky Raigond awarded with '**R.H. Dastur Gold Medal Award**' 2023 by Indian Society for Plant Physiology during National Conference of Plant Physiology held during 9-11 December 2023 at IARI, New Delhi.

* K. Dhinesh Babu et.al. 2023. Awarded **Best oral presentation** award entitled "Development of bio-fortified pomegranate var. Solapur Lal for table purpose & Solapur Anardana" in the International Seminar on Exotic and Underutilized Horticultural crops: Priorities & Emerging Trends held during October 17-19, 2023 at ICAR-Indian Institute of Horticultural Research, Bengaluru.

* K. Dhinesh Babu, N.V. Singh, C. Awachare, R. Damale, J. Rana, Shilpa P, P. R. Sowjanya, P. Raigond, J. Sharma and R.A. Marathe.2023. **Best poster presentation** award entitled "Standardization of crop regulation practices for higher yield & better quality in pomegranate (*Punica granatum*)" in the International Seminar on Exotic and Underutilized Horticultural crops: Priorities & Emerging Trends held during October 17-19, 2023 at ICAR-Indian Institute of Horticultural Research, Bengaluru.

Events organized under SCSP

One-day "Farmer – Scientist Interaction and Input Distribution Program" was organized at KVK, Kalaburagi on 11 December, 2023. During the training lectures were delivered on orchard establishment, commercial pomegranate varieties and management of disease, insects and pests. A group of 150 farmers from Bilgunda, Salagara, Ladmugali, Melakunda and Belamogi village in Kalaburagi, Karnataka were actively participated in the training and 100 SC farmers got benefitted with the farm inputs.

Supply of Farm inputs to about 100 SC farmers though SCSP project

Events organized under STC (TSP)

Training details	Team	Input distributed
One-day training and demonstration program titled "Good Agricultural Practices for Quality Pomegranate Production	Course Director: Dr. R.A. Marathe Coordinator Dr. Mallikarjun M.H. Co-Coordinators Dr. Shilpa Parashuram Mr. Rahul D. Damale	1. Knapsack Sprayer 2. Spade with handle 3. LED Torch 4. Axes with handle 5. Secateurs 6. Insecticides 7. Literature

One-day program for farmers under STC plan of ICAR-NRCP, Solapur

Other Activities Conducted/Celebrated

Rashtriya Kisan Divas Celebration

National Farmers Day also known as Kisan Diwas is celebrated every year on 23 December to mark the birth anniversary of the 5th Prime Minister of India, Shri Choudhary Charan Singh. ICAR-NRCP celebrated this farmer's day with pomegranate trainee farmers. About 87 participants participated on the occasion. Three progressive pomegranate farmers viz. Shri. Appasaheb Magar from Nimgaon (Tehsil-Malshiras, Solapur); Shri. Nilesh Sose from Gogalgaon (Tehsil-Rahata, Ahmednagar) and Shri. Rahul Kasab from Kanadi (Tehsil-Bhoom, Osmanabad) were felicitated for excellent pomegranate production on this occasion.


Farmer felicitation on the occasion of Rashtriya Kisan Divas at NRCP, Solapur

हिंदी पखवाडा

राष्ट्रीय अनार अनुसंधान केंद्र, सोलापुर में १४ से २७ सितंबर २०२३ के दौरान हिंदी पखवाडा मनाया गया। श्री अभिषेक दुबे, उप आंचलिक प्रबंधक बैंक ऑफ महाराष्ट्र, मुख्य अतिथि के रूप में उपस्थित थे। इस पखवाडे के दौरान विभिन प्रतियोगिताएं जैसे कि आशुभाषण, वाद-विवाद, निबंध, हिंदी टिप्पण व् प्रारूप लेखन/पत्र लेखन, प्रशन मंच, हिंदी काव्य पाठ, कंप्युटर पर यूनिकोड में हिंदी टाइपिंग व कहानी लेखन का आयोजन कराया गया। हिंदी पखवाडे में केंद्र के सभी कर्मचारियों ने बढ-चढकर हिस्सा लिया। हिंदी पखवाडे का समापन प्रतियोगिता के विजेताओं को मुख्य अतिथि द्वारा सर्टिफिकेट्स देने से हुआ।

निदेशक महोदय संबोधित करते हुए

मुख्य अतिथि के करकमलों द्वारा सर्टिफिकेट्स लेते हुए कें द्र के कर्मचारी

18th Parthenium Awareness Week

ICAR-NRC on Pomegranate, Solapur has celebrated 18th Parthenium Awareness Week and conducted different activities and programme during 16-22 August, 2023. Various activities have been conducted like Swachhata awareness among the MIT Gurukul School students, Uprooting of parthenium weed by ICAR-NRCP Staff, Cleaning and uprooting of weeds by school students, Students rally by Kegaon school students were organised.


Parthenium cleaning on the bunds and making students aware about the weed

Vigilance Awareness Week

The Vigilance Awareness Campaign was initiated by conducting a guest lecture of Shri. T. N. Godse, Assist Commissioner and Office Head, GST, Solapur on theme "Say No to Corruption, Commit to the Nation" on 8th November, 2023. The Director, NRCP welcomed the guest and delivered welcome address. All staff members participated in the programme. Awareness about Public Interest Disclosure and Protection Informers (PIDPI) was created under Vigilance awareness week by displaying poster in different languages in NRCP campus. The programme was coordinated by Dr. Namrata Giri, Scientist, NRCP.

Shri T. N. Godse, Assist.Commissioner and Office Head, GST, Solapur addressing the gathering on the occasion of Vigilance awareness week

Swachhata Pakhwada

ICAR-NRC on Pomegranate, Solapur has celebrated Swachhata Pakhwada and conducted different activities and programme during 16-31st December, 2023 as per the schedule provided by the ICAR. On the occasion of Swachhata Pakhawada various activities have been conducted at NRCP. The pakhwada started by taking Swachhata Pledge. Later activities like 154th Mahatma Gandhi Jayanti celebration, tree plantation, cleaning of ICAR-NRCP premises were carried out. For creating awareness among masses, programmes such as converting waste to wealth, essay and drawing competition for students of Shree Sharadchandra School Solapur were organized. During this period, Kisan day was also celebrated by felicitating progressive pomegranate farmers by NRCP on 23rd December 2023.

154th Mahatma Gandhi Jayanti celebration

Plantation of Mango trees at ICAR-NRCP Field

Cleaning of NRCP Premises

Drawing competition for School Students

Publications

Research papers

1. Nripendra Vikram Singh, Jyotsana Sharma, Manjushri Dinkar Dongare, Ramakant Gharate, Shivkumar Chinchure, Manjunatha Nanjundappa, Shilpa Parashuram, Prakash Goudappa Patil, Karuppannan Dhinesh Babu, Dhananjay MorteppaMundewadikar, Unnati Saltugi, Muskan Tatiya, Aundy Kumar and Rajiv Arvind Marathe. (2023). *"In Vitro* and *In Planta* Antagonistic Effect of Endophytic Bacteria on Blight Causing *Xanthomonas axonopodis pv.punicae:* A Destructive Pathogen of Pomegranate" *Microorganism*, 11, 5. https://doi.org/103390/microorganisms11010005. **(NAAS score : 10.5)**

2. Giri, N. A., Gaikwad, P., Gaikwad, N. N., N, M., Krishnakumar, T., Kad, V., Manjunatha N., Raigond P.& Marathe, R. A. (2023). Development of fiber enriched muffins using pomegranate peel powder and its effect on physicochemical properties and shelf life of the muffins. *Journal of the Science of Food and Agriculture*. doi: 10.1002/jsfa.13138. **(NAAS score : 10.1)**

Book Chapters

1. Shilpa P., Roopa Sowjanya P., Babu K. D., Singh N. V., Patil P. G., Sharma J., and Marathe R. A. (2023). Pomegranate Genetic Resources: Conservation and Utilization. In: Rajasekharan, P.E., Rao, V.R. (eds) Fruit and Nut Crops. Handbooks of Crop Diversity: Conservation and Use of Plant Genetic Resources. https://doi.org/10.1007/978-981-99-1586-6_18-1 published in Springer, Singapore.

2. P. Shilpa, P. Roopa Sowjanya, K. D. Babu, N. V. Singh, G. Prakash Patil, S. Jyotsana, and R. A. Marathe. (2023). Pomegranate Genetic Resources: Conservation and Utilization. P. E. Rajasekharn, V. R. Rao (eds.), Fruit and Nut Crops, Handbooks of Crop Diversity: Conservation and Use of Plant Genetic Resources, https://doi.org/10.1007/978-981-99-1586-6_18-1

3. Namrata A. Giri, B. K. Sakhale and N. P. Nirmal. (2023). Functional beverages: an emerging trend in beverage world. In. Recent Frontiers of Phytochemicals (Applications in Food, Pharmacy, Cosmetics, and Biotechnology). (Ed. Pati Siddhartha et al.). Elsevier, 123-138.

Pomegranate Advisories/ E-Publications/ Other publications

1. Jyotsana Sharma, Ashis Maity,N.V. Singh; Mallikarjun H., Dinkar Chaudhari and Somnath S. Pokhare 2023. Bimonthly Pomegranate Advisory for Bearing Orchards June- July 2023. p. 1-12.
2. डॉ. ज्योत्सना शर्मा, डॉ. आशिस माईती, डॉ. एन.व्ही. सिंह, डॉ. मल्लिकार्जुन, श्री. महादेव गोंगाव व डॉ. सोमनाथ पोखरे डाळिंब फळधारक बागांसाठी द्वैमासिक सल्ला (जुन-जुलै २०२३).
3. Jyotsana Sharma; Ashis Maithy, N.V. Singh, Mallikarjun; Manjunatha N, Somanth S. Pokhare and Mahadev Gogaon 2023. Bimonthly Pomegranate Advisory for Bearing Orchards August-September 2023. p. 1-12.
4. डॉ. सोमनाथ पोखरे, डॉ. ज्योत्सना शर्मा, डॉ. आशिस माईति, डॉ. एन व्ही सिंह, डॉ. मल्लिकार्जुन, डॉ.मंजुनाथा एन., व श्री. महादेव गोंगांव. फळधारक डाळिंब बागेसाठी सल्ला (ऑगस्ट-सप्टेबर २०२३).
5. Jyotsana Sharma, Somnath Pokhare, Manjunatha N., Mallikarjun H., K. Dhinesh Babu and R. A. Marathe. Integrated Disease and Insect Pest Management (IDIPM) Schedule for Pomegranate Cultivation (September,2023).
6. Jyotsana Sharma, Mallikarjun H., K. Dhinesh Babu, Somnath S. Pokhare and Manjunatha N., 2023. Adhoc List of Agrochemicals with European Union (EU) Maximum Residue Level (MRL) and Pre Harvest Interval (PHI) for Pomegranate Production. p. 1-6.
7. Mallikarjun M. H. 2023. Advisory management of thrips in pomegranate.
8. मल्लिकार्जुन एम. एच. 2023. डाळिंबातील फूलकिडी (थ्रिप्सचे) व्यवस्थापन.
9. Mallikarjun M. H., R. A. Marathe, Manjunatha, N., Somnath S. Pokhare, Fand D.N. 2023. Sequenced *Fusarium oxysporum* ITS Sequence ID. >0523-515_002_PCR_I2_Forward_E07.ab1 submitted to NCBI database in 2023.
10. Mallikarjun M. H., R. A. Marathe, Manjunatha, N., Somnath S. Pokhare, Fand D.N. 2023. Sequenced *Pacelomyces maximus* ITS Sequence ID.>0723-016_006_PCR_F_Forward_A04. ab1 submitted to NCBI database in 2023.
11. Mallikarjun M. H., R. A. Marathe, Manjunatha, N., Somnath S. Pokhare. 2023. *Verticillium spp*. ITS Sequence ID >0622_708_002_PCR_E2_ITS_PI_B05.ab1. Isolate code E2. submitted to NCBI database (Accession number MF034654.1).
12. Mallikarjun M. H., R. A. Marathe, Manjunatha, N., Somnath S. Pokhare. 2023. 16S rRNA, Sequence ID >0622_708_009_PCR_E6_16S_RNA_PR_F05.ab1. Isolate code E6. submitted to NCBI database (Accession number EU249982.1).

Technical / extension bulletins

1. Pinky Raigond, Namrata A Giri, Nilesh N Gaikwad, Rajiv A Marathe (2023). Analytical Manual for Pomegranate. Technical Bulletin no. NRCP/2023/3. ICAR-National Research Centre on Pomegranate. 38 pages.
2. Mallikarjun M.H., and Fand D.N. (2023). Pomegranate mealybug and its management. Extension Bulletin/NRCP/2023/03. ICAR-National Research Centre on Pomegranate, Solapur, 1-10 pp.
3. Roopa Sowjanya P, Sharma J and RA Marathe. (2023). ICAR – NRCP: A Profile, ICAR –NRCP, Solapur, pp-30. Bulletin No. NRCP/2023/1.
4. Nilesh N Gaikwad, Namrata A Giri, Rajiv A Marathe. (2023). Pomegranate Processing Technologies & Value added products. NRCP/02/2023. ICAR-National Research Centre on Pomegranate. 30 pages.

Extension folders

1. Shilpa Parashuram, Babu K. D., Roopa Sowjanya P, Pinky Raigond, Chandarakant Awachare, Mallikarjun M. H., Mahadev Gogaon, R. A. Marathe. (2023). Important commercial varieties of pomegranate. NRCP/Extension folder/2023/2, pp 4.

2. Pinky Raigond, Singh N. V., Shilpa Parashuram, Chandarakant Awachare, Roopa Sowjanya P, Mallikarjun M. H., Mahadev Gogaon, R. A. Marathe. (2023). Physiological disorders in Pomegranate and their management (Kannada). NRCP/Extension folder/2023/1, pp 6.

3. Roopa Sowjanya P, Sharma J and R. A. Marathe. (2023). ICAR – NRCP at a glance, ICAR –NRCP, Solapur. Extension folder/NRCP/2023/1.

Training manual

- Roopa Sowjanya, P., Manjunatha, N., N.V. Singh, Prakash G Patil, Shilpa, P., Jyotsana Sharma and Marathe R.A. (2023). Compendium of lectures for Workshop on "Igniting young minds for Scientific Innovations", March 27, 2023 at ICAR – NRCP, Solapur, MS, India.pp-45.

New Projects sanctioned

Evaluation of Betacyfluthrin 90 G/L + Imidacloprid 210 G/L OD (Solomon) for bio-efficacy against thrips and Aphids in pomegranate funded by Bayer Crop Science Pvt. Ltd. (PI:Dr Mallikarjun Harsur)

Distinguished Visitors to ICAR-NRCP, Solapur

Interaction of NRCP staff with Dr. V.K Pandey (ADG- Hort.)

Students & Farmers Visit

S.N.	Date	Organization/Place	Category Farmers	No. of Beneficiaries
1	07/07/2023	DAESI (Diploma in Agriculture Extension services for Input Dealers) from SGSVVP, Wadala Solapur	Agri. Input dealers	40
2	07/09/2023	Lokmangal College of Agril. Biotechnology, Wadala	Students	15
3	06/10/2023	College of Agriculture, Osmanabad	Students	60
4	10/10/2023	Collage of Agri. Karekere Hassan Karanataka	Students	65
5	20/10/2023	Shri. Siddeshwar Womens Polytectnic, Solapur	Students	110
6	26/10/2023	South Region Pomegranate Growers Producer Company Limited, Banavara, Haasan, Karnataka	Farmers	40
7	30/11/2023	Aditya Agricultural Biotechnology college, Beed	Students	40
8	11/12/2023	PM Shri Kendriya Vidyalaya, Solapur	Students	224
9	28/12/2023	Rise and Shine School, Solapur	Students	15
		Individual farmers	Farmers	56

Visit of DAESI Participants to ICAR-NRCP

Students from College of Agriculture, Osmanabad at ICAR-NRCP for educational visit

Farmers from Hassan Karnataka visited NRCP on 26th October 2023

Meetings attended by the NRCP staff

1. Dr. Rajiv A. Marathe, Director, ICAR-NRC on Pomegranate and Dr. Nilesh Gaikwad attended virtual flag off ceremony of trial shipment of irradiated pomegranate fruits by Air from India to USA on 27.07.2023.
2. An Interactive Session of Young Scientists with FOCARS Trainees (113th FOCARS) attended by Dr. Pinky Raigond on 29.07.2023 at NAARM, Hyderabad
3. Dr. Pinky Raigond attended meeting as Member Board of Studies, Punyashlok Ahilyadevi Holkar Solapur University, Solapur on 9.8.2023 and 4.10.2023.
4. Scientific Advisory Committee (SAC) meeting of KVK Indi attended on 19.12.2023 at KVK, Vijayapura, Karnataka-Online by Dr Mallikarjun Harsur
5. RKVY-SLPSC meeting attended on 6.11.2023 at Central Building Mumbai, Maharashtra, by Dr Mallikarjun Harsur
6. 2nd Steering Committee meeting of "Crop Pest surveillance and Advisory Project (CROPSAP) 2023-24 attended on 28.11.2023 by Dr Mallikarjun Hirsur
7. 25th SAC meeting of ICAR KVK Vijayapura-II (Indi) attended on 19.12.2023 by Dr Mallikarjun Harsur virtually.

Retirement

Dr. Jyotsana Sharma retired as a Principle Scientist from ICAR-NRCP on 31st October 2023.

Electronic and Print Media coverage

शेतकऱ्याने विकसित 'शरदकिंग' डाळिंब वाणाला स्वामित्व हक्क

जडगावचे शेतकरी विठ्ठल भोसलेंच्या परिश्रमाला यश

सुदर्शन सुतार : ॲग्रोवन वृत्तसेवा

सोलापूर : जडगाव (ता. जि. छत्रपती संभाजीनगर) येथील प्रगतिशील शेतकरी विठ्ठल भोसले यांनी निवड पद्धतीने विकसित केलेल्या 'शरदकिंग' या डाळिंबाच्या वाणाला राष्ट्रीय पीक वाण संरक्षण व शेतकरी हक्क कायदा कलम २००१ अंतर्गत स्वामित्व हक्क मिळाला आहे. केंद्रीय कृषी व शेतकरी कल्याण मंत्रालयांतर्गत राष्ट्रीय पीक वाण संरक्षण व शेतकरी हक्क प्राधिकरणने त्यासंबंधीचे नोंदणी प्रमाणपत्र नुकतेच भोसले यांना दिले आहे. डाळिंबाच्या वाणामध्ये पहिल्यांदाच एका शेतकऱ्याला असा मानकी हक्क मिळाला असावा.

श्री. भोसले गेली २५ वर्षे शेतीत आहेत, जडगावमध्ये त्यांची १८ एकर शेती आहे. त्यात नऊ एकर डाळिंब आहे. त्यात चार एकर भागवा डाळिंब आहे, तर उर्वरित पाच एकरवर त्यांनी स्वतः शोधलेल्या आणि विकसित केलेल्या शरदकिंग वाणाची लागवड आहे. अभ्यासू आणि प्रयोगशील शेतकरी म्हणून त्यांची ओळख आहे. सातत्याने नावीन्याचा ध्यास ते घेतात, त्यांच्या अभ्यास आणि निरीक्षण वृत्तीने २०१० मध्ये पहिल्यांदा त्यांना आपल्या बागेत काहीशी वेगळी वैशिष्टये असलेले डाळिंबाचे झाड पाहण्यास मिळाले. त्यानंतर त्या झाडापासून स्वतंत्र रोपे तयार करत ४०० रोपांपर्यंत वृद्धी व लागवड केली. त्यानंतर पुढे अभ्यास, निरीक्षण आणि अनुभवातून नवा वाण आकाराला आला. 'शरदकिंग' या नावाने त्याचे नामकरण केले.

'शरदकिंग'ची वैशिष्ट्ये

- पूर्णपणे गडद भगवा रंग आणि वजन. आकाराने मोठे फळ. • साधारणपणे प्रति फळाचे वजन ३०० ते कमाल ८०० ग्रॅमपर्यंत मिळते. • झाडांना फळांचे 'सेटिंग' चांगले राहते. • साधारण ८० टक्के फळे एकाच आकाराची मिळतात, साल जाड असल्याने 'सनबर्निंग'चा प्रादुर्भाव कमी राहतो.

सोलापूर : राष्ट्रीय डाळिंब संशोधन केंद्राचे प्रमुख डॉ. राजीव मराठे, डॉ. शिल्पा परशुराम, डॉ. पी. रुपा सौजन्य, डॉ. दिनेश बाबू यांच्याकडून प्रमाणपत्र स्वीकारताना शेतकरी विठ्ठल भोसले.

"विठ्ठल भोसले यांची निरीक्षणशक्ती आणि प्रयत्नांचे कौतुकच आहे. आम्ही त्यांना सर्वतोपरी मदत केली. केळीवेळी शास्त्रज्ञांनी त्यांच्या प्लॉटला भेटी देत मार्गदर्शन केले, संशोधन केंद्राची टीम त्यांच्या संपर्कात होती. त्यांच्या वाणाला नोंदणी प्रमाणपत्र मिळाल्याने आम्हाला आनंद झाला आहे.

-डॉ. राजीव मराठे, केंद्र संचालक, राष्ट्रीय डाळिंब संशोधन केंद्र, सोलापूर

"डाळिंबाच्या फळात वजन आणि आकाराला महत्त्व आहे, बाजारपेठेची ती मागणी आहे. शरदकिंग वाणात ही सर्व गुणवैशिष्ट्ये उपलब्ध आहेत. माझ्यासाठी हा आनंद खूपच अवर्णनीय आहे. आपल्या प्रयत्नांचे, कष्टाचे कुठे तरी चीज झाल्यासारखे वाटते.

-विठ्ठल भोसले, शेतकरी, जडगाव (ता. जि. छत्रपती संभाजीनगर)

प्रभात

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बारामतीत परिसंवादमध्ये ३४२ शेतकरी सहभागी

बारामती, दि. १० (प्रतिनिधी) - अतीकल्पनात देणारमध्ये ट्रस्ट, संचलित, कृषी विज्ञान केंद्र, बारामती, आत्मा पुणे, कृषी विभाग महाराष्ट्र शासन, अटल इन्क्युबेशन सेंटर, राष्ट्रीय डाळिंब संशोधन केंद्र, सोलापूर, महाराष्ट्र राज्य डाळिंब उत्पादक संघ, बारामती तालुका फलोत्पादन संघ आणि माण देशी फौंडेशन यांच्या संयुक्त विद्यमाने विषमुक्त निर्यातक्षम डाळिंब उत्पादन परिसंवादात सातारा, सोलापूर, पुणे, नगर, सांगली जिल्ह्यातील सुमारे ३४२ डाळिंब उत्पादक शेतकरी उपस्थित होते.

यावेळी अतीकल्पनात देणारमध्ये ट्रस्टचे चेअरमन राजेंद्र पवार यांनी कोणतही फळवाण लागवड करत असताना रोपांचे उत्तम वाणाची निवड करून जमिनीच्या आरोग्याचा स्तर देऊन जमिनीमध्ये असणारे सूक्ष्म जीव सेंद्रिय कर्ब आणि त्याच बरोबर संपूर्ण विषमुक्त उत्पादनावर भर दिला, याकरीता शेतकऱ्यांनी झाडांना पिकांना पाणी देताना आपल्या मातीत व देत ते शास्त्रीदृष्ट्या करो देता मेहेत या विषयी सविस्तर मत व्यक्त केले.

खडसे संचालक डॉ. सुब्रती रॉय यांनी शासनाच्या योजनाचा लाभ घेताना केलेकीने आयोजित केलेल्या डाळिंबासारख्या कार्यशाळेमध्ये सर्व भागातील शेतकऱ्यांनी लाभ घेतला पाहिजे. शासनसुक्त तंत्रज्ञानाची माहिती घेतली पाहिजे, भविष्यामध्ये शेती करता असताना मनुष्यबलाचा कमी वापर आणि यांत्रिकीकरण डॉनिसारख्या तंत्रज्ञानाचा वापर व्यक्त केले. यावेळी डॉ. सोमनाथ पोखरे, वरिष्ठ शास्त्रज्ञ, राष्ट्रीय डाळिंब संशोधन केंद्र, सोलापूर यांनी डाळिंब विकासातील प्रभावी सुत्रकृमी (निमॅटोड) व्यवस्थापनविषयी मार्गदर्शन केले.

डॉ. ज्योत्स्ना शर्मा, प्रमुख शास्त्रज्ञ, राष्ट्रीय डाळिंब संशोधन केंद्र, सोलापूर यांनी डाळिंब उत्पादनावर भर दिला, याकरीता शासनसुक्त तंत्रज्ञानाची माहिती घेतली पाहिजे, भविष्यामध्ये शेती करता असताना मनुष्यबलाचा कमी वापर आणि यांत्रिकीकरण डॉनिसारख्या तंत्रज्ञानाचा वापर व्यक्त केले. यावेळी डॉ. सोमनाथ पोखरे, वरिष्ठ शास्त्रज्ञ, राष्ट्रीय डाळिंब संशोधन केंद्र, सोलापूर यांनी डाळिंब विकासातील प्रभावी सुत्रकृमी (निमॅटोड) व्यवस्थापनविषयी मार्गदर्शन केले.

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गोडवाडी येथे कृषि विभागामार्फत हार्टसप अंतर्गत डाळिंब पिकावरील रोतीशाळा संपन्न

सांगोला/वृत्तवेध :

१ डिसेंबर रोजी गोडवाडी ता. सांगोला येथे कषि विभागामार्फत फलोत्पादन पिकावरील किड रोग सर्वेक्षण सल्ला व व्यवस्थापन प्रकल्प (हार्टसप) अंतर्गत डाळिंब फळपिकावरील शेतीशाळा संपन्न झाली. सदरील शेतीशाळा रिसोर्स शेतकरी नाना माळी यांचे डाळिंब प्रक्षेत्रावर घेण्यात आली. यावेळी तालुका कृषि अधिकारी शिवाजी शिंदे यांनी डाळिंबाची सद्यस्थिती, डाळिंब लागवड तंत्रज्ञान, ठिबकचा वापर, डाळिंब भौगोलिक मानांकन, अनारनेट नोंदणी, मनरेगा व भाऊसाहेब फुंडकर फळबाग योजनेअंतर्गत फळबाग लागवडीविषयी सविस्तर मार्गदर्शन केले. गोडवाडी परिसरातील तरुण शेतकऱ्यांचे डाळिंबामधील उत्कृष्ट नियोजनाबद्दल अभिनंदन केले. राष्ट्रीय डाळिंब संशोधन केंद्र सोलापूर चे शास्त्रज्ञ डा. मल्लीकार्जुन हरसुर यांनी डाळिंबावरील एकात्मिक किड व रोग व्यवस्थापन याविषयी सविस्तर मार्गदर्शन केले. राष्ट्रीय डाळिंब संशोधन केंद्र सोलापूर चे शास्त्रज्ञ डा. सोमनाथ पोखरे यांनी कलमांची निवड, सुत्रकृमी व्यवस्थापन आदी विषयावर सविस्तर मार्गदर्शन केले. डाळींब निर्यातदार मयुर सपकाळ यांनी विविध देशांमध्ये डाळिंब निर्यातीसाठी आवश्यक मापदंड याविषयी मार्गदर्शन केले. त्यानंतर प्रश्नउत्तराचे माध्यमातुन डाळिंबावरील विविध बाबीवर शेतकरी, शास्त्रज्ञ व आधिकारी यांचेमध्ये सविस्तर चर्चा झाली. त्यानंतर शिवारफेरी करण्यात आली व किड व रोगांची ओळख व व्यवस्थापन याविषयी मार्गदर्शन करण्यात आले. सदरील डाळिंब शेतीशाळेस गोडवाडी परिसरातील डाळिंब उत्पादक शेतकरी मोठ्या संख्येने उपस्थित होते. कार्यक्रमाचे प्रास्ताविक व सुत्रसंचलन कृषि पर्यवेक्षक सतिष देठे यांनी केले व आभारपदर्शन नवनाथ माळी यांनी केले. कार्यक्रम यशस्वी करण्यासाठी कृषि सहाय्यक मयुर माळी व विक्रम वाघमारे यांनी परिश्रम घेतले.

कृषी विभागामार्फत डाळिंब पिकावरील शेतीशाळा

सांगोला / प्रतिनिधी

गोडवाडी (ता.सांगोला) येथे नुकतीच कृषी विभागामार्फत फलोत्पादन पिकावरील किड रोग सर्वेक्षण सल्ला व व्यवस्थापन प्रकल्प (हार्टसॅप) अंतर्गत डाळिंब फळपिकावरील शेतीशाळा संपन्न झाली.

सदरची शेतीशाळा रिसोर्स शेतकरी नाना माळी यांच्या डाळिंब प्रक्षेत्रावर घेण्यात आली. यावेळी तालुका कृषी अधिकारी शिवाजी शिंदे यांनी डाळिंबाची सद्यस्थिती, डाळिंब लागवड तंत्रज्ञान, ठिबकचा वापर, डाळिंब भौगोलिक मानांकन, अनारनेट नोंदणी, मनरेगा व भाऊसाहेब फुंडकर फळबाग योजनेअंतर्गत फळबाग लागवडीविषयी सविस्तर मार्गदर्शन केले.

राष्ट्रीय डाळिंब संशोधन केंद्र सोलापूरचे शास्त्रज्ञ डॉ.मल्लिकार्जुन हरसुर यांनी डाळिंबावरील एकात्मिक किड व रोग व्यवस्थापन, शास्त्रज्ञ डॉ.सोमनाथ पोखरे यांनी कलमांची निवड, सुत्रकृमी व्यवस्थापन तर डाळिंब निर्यातदार मयुर सपकाळ यांनी विविध देशांमध्ये डाळिंब निर्यातीसाठी आवश्यक मापदंड याविषयी मार्गदर्शन केले. प्रास्ताविक कृषी पर्यवेक्षक सतिष देठे यांनी केले व आभार प्रदर्शन नवनाथ माळी यांनी केले. कार्यक्रम यशस्वी करण्यासाठी कृषी सहाय्यक मयुर माळी व विक्रम वाघमारे यांनी परिश्रम घेतले.

ದಾಳಿಂಬೆ ಬೆಳೆಗಾರರಿಗೆ ತಾಂತ್ರಿಕ ಕಾರ್ಯಾಗಾರ

ಸಂಸ್ಥೆಗಳು ರೈತರಿಗೆ ಲಾಭ ತಂದುಕೊಡಬೇಕು

ವಿಜಯಪುರ ಸುದ್ದಿ

ಚಚ್ಚಮಗಳೂರು. ಸಂಸ್ಥೆಗಳು ರೈತರನ್ನು ಬಳಸಿಕೊಂಡು ಲಾಭ ಮಾಡುವುದರ ಜೊತೆಯಲ್ಲಿ ರೈತರಿಗೆ ಲಾಭ ತಂದುಕೊಡುವ ಕೆಲಸ ಮಾಡಬೇಕು. ಆಗ ರೈತ ಉತ್ಪಾದಕರಾಗುವ ಜೊತೆಗೆ ಸಂಸ್ಥೆಗಳೂ ಬೆಳವಣಿಗೆಯಾಗುತ್ತವೆ. ಯಾವುದೇ ಬೆಳೆಯಾಗಲಿ ರೈತರು ಆ ಬೆಳೆಗಳ ಬಗ್ಗೆ ಮೊದಲಿಗೆ ನಿರ್ಧಾರ ಮಾಡುವ ಕಲೆ ತಿಳಿದುಕೊಂಡಿರಬೇಕು. ಆಗ ಮಾತ್ರ ಉತ್ತಮ ಫಲ ಲಾಭ ಗಳಿಸಲು ಸಾಧ್ಯ ಎಂದು ಬೆಂಗಳೂರಿನ ಜಿ.ಕೆ.ವಿ.ಕೆ.ನಾಲ್ಕನೇ ಘಟಿಕೋತ್ಸವ ಸಭಾಂಗಣದಲ್ಲಿ ಏರ್ಪಡಿಸಿದ್ದ ಕೃಷಿ ವಿಜ್ಞಾನ ಕೇಂದ್ರಗಳ ಕಾರ್ಯಾಗಾರದಲ್ಲಿ ಅವರು ಮಾತನಾಡಿದರು.

ರೈತರ ಸಹಕಾರದಿಂದ ಸಂಸ್ಥೆ ಉತ್ತಮವಾಗಿ ಕಾರ್ಯನಿರ್ವಹಿಸುತ್ತದೆ. ಸದಸ್ಯರಿಗೆ ಡಿವಿಡೆಂಡ್ ನೀಡಲು ಸಂಸ್ಥೆಯಲ್ಲಿ ರೈತರ ಬೆಳೆಗಳನ್ನು ಸಂಗ್ರಹಿಸಲು ಮುಂದಿನ ದಿನಗಳಲ್ಲಿ ಆರಂಭಿಸಲಾಗುವುದು.

ಡಾ.ಎಚ್.ಆರ್.ಮೋಗಣ್ಣರ್, ಎಸ್‌ಆರ್‌ಒಪಿ ಅಧ್ಯಕ್ಷ

ಮುಂಚೂರಲ್ಲಿ ಕೆಲವರಲ್ಲಿ ಒಳ್ಳೆಯತನವಿರುತ್ತದೆ. ಇನ್ನು ಕೆಲವರಲ್ಲಿ ಕೆಟ್ಟತನವಿರುತ್ತದೆ. ಹೀಗಿರುವಾಗ ಯಾರಿಗಾದರೂ ಒಳ್ಳೆಯದನ್ನು ಮಾಡಲು ಹೋದಾಗ ಭೀತಿ ಮತ್ತಾವುದೋ ಆಯಾಮದಲ್ಲಿ ಅರ್ಥೈಸಿಕೊಳ್ಳುವ ಸಾಧ್ಯತೆ ಇರುತ್ತದೆ. ಅಂಥವರನ್ನು ನಿರ್ಲಕ್ಷ್ಯ ಮಾಡಬೇಕು. ಸ್ವಚ್ಛತೆಯನ್ನು ಬೆಳೆಸುವ ಅಭಿಯಾನ ಎಲ್ಲರಲ್ಲಿ ಒಂದು ಬಿರುಗಾಳಿಯಂತೆ ಎದ್ದು.

ಕಾರ್ಯಕ್ರಮದ ಉದ್ಘಾಟನೆ ಎಸ್‌ಆರ್‌ಒಪಿ ಅಧ್ಯಕ್ಷ ಡಾ.ಎಚ್.ಆರ್. ಮೋಗಣ್ಣರ್ ಮಾತನಾಡಿ, ನಮ್ಮ ರೈತೋತ್ಪಾದಕ ಸಂಸ್ಥೆಯ ಬಾಗಿಲಿನ ರೈತರಿಗೆ ಲಾಭ ತಂದುಕೊಡಬೇಕು ಎಂಬ ಉದ್ದೇಶದಿಂದ ಸಂಸ್ಥೆಯ ಸದಸ್ಯರಿಗೆ ಡಿವಿಡೆಂಡ್ ನೀಡಲು ಸಂಸ್ಥೆಯಲ್ಲಿ ರೈತರ ಬೆಳೆಗಳನ್ನು ಸಂಗ್ರಹಿಸಲು ಮುಂದಿನ ದಿನಗಳಲ್ಲಿ ಆರಂಭಿಸಲಾಗುವುದು ಎಂದರು.

ಜಿ.ಕೆ.ವಿ.ಕೆ ಆವರಣದಲ್ಲಿ ಏರ್ಪಡಿಸಿದ್ದ ಕೃಷಿ ವಿಜ್ಞಾನ ಕೇಂದ್ರಗಳ ಕಾರ್ಯಾಗಾರದಲ್ಲಿ ಮುಖ್ಯ ಅತಿಥಿಯಾಗಿ ಮಾತನಾಡಿದ ರೈತರನ್ನು ಸದೃಢಗೊಳಿಸುವುದೇ ಕೃಷಿ ಮತ್ತು ತೋಟಗಾರಿಕೆ ಇಲಾಖೆಯ ಕೆಲಸ. ಅದರ ಕೆಲವೊಮ್ಮೆ ಇದು ಇಲಾಖೆಗಿಂದ ಸಾಧ್ಯವಾಗದಿದ್ದಾಗ ರೈತರ ಪರವಾಗಿಯೂ ಬೆಳೆಗಾರರ ಸಂಸ್ಥೆಗಳಿಗೆ ಸಹಕರಿಸುವ ನಿಟ್ಟಿನಲ್ಲಿ, ಬಿಸಿಲಿನ ತೀವ್ರತೆಗೆ ಬಸವ್ವ ಎಂಬ ತೆಳುವಿನಲ್ಲಿ ಮಾತನಾಡಿದರು.

ಬಿ.ಎಸ್.ಪ್ರಸಾದ್, ಜಂಟಿ ತೋಟಗಾರಿಕೆ ನಿರ್ದೇಶಕ, ಬೆಂಗಳೂರು

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