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From the Director's Desk

Dear Readers,

Pomegranate is an important crop of arid & semi-arid region of the world. India is the largest producer of pomegranate in the world & Maharashtra is the leading state with respect to production.



The specialty is that, pomegranate is available throughout the year in India. However, country has meagre export & scanty processing & value addition infrastructure. Post-harvest management & value addition plays a crucial role to sustain the profitability of pomegranate production in the scenario of rapid expansion in terms of area, production & productivity. Research on development of need based & cost-effective post-harvest technologies will go a long way in the expansion of market destination for domestic as well as export trade. This crop gained lot of attention within short span of time due to its nutrient content & amazing health benefits. The nutraceutical & therapeutic value of pomegranate fruit attracts the consumers. Its rich source of antioxidant, phenols & flavonoids etc. Carbonated soft drinks are very popular among youth & are known for their thirst quenching & refreshing properties but they lack the nutritional value. The processing of pomegranate juice in to carbonated beverage can be an alternative for synthetic carbonated beverages which are devoid of the nutrition & usually added with artificial colors, flavours & sugar.

ICAR-NRCP has developed the technology of carbonated drink using blend of pomegranate & grape juice which is healthy too. The prepared carbonated drink is nutritionally superior with respect to total phenols, anthocyanin, ascorbic acid & antioxidant capacity in comparison with plain carbonated drink & better in terms of sensory acceptability as compared to pomegranate ready to serve drink.

The major pomegranate growing arid & semi-arid regions have scanty rainfall & water is scarce resource. Therefore, there is urgent need to develop strategies for its conservation & efficient utilization. The Center has also developed mulching technology for efficient & effective water management in pomegranate production. Mulching techniques ensure increased crop yield, high water use efficiency, reduced water & energy consumption and easy management of weeds. It is recommended to use sugarcane bagasse or pervious mulches for better water use efficiency & maximum returns in pomegranate.

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Research Achievements

Development of Pomegranate and grape juice based blended carbonated drink

-Nilesh N. Gaikwad, and Swati K. Suryavanshi

Carbonated Ready to Serve (RTS) beverage from pomegranate (cv. Bhagwa) and grape (cv. Medika) juice blend was developed. Initially pure juice of pomegranate and Grape were studied. The juice based carbonated drink was developed with various blending percentage viz. 50:50, 60:40, and 70:30 for pomegranate: grape. The four levels of carbonation viz. 0, 7, 9, and 11 g/l of CO₂ were maintained with target Brix: Acidity ratio of 30 and TSS of 9 °B & later acidity was adjusted to 0.30 %. The biochemical analysis of pure juices revealed nutritional superiority of pomegranate juice over grape juice. The anthocyanin, ascorbic acid content and total phenols were higher in pomegranate juice as compared to the grape juice. The grape juice had higher TSS and total sugars as compared to the pomegranate juice. All above mentioned parameters contribute to the antioxidant capacity which was thus higher for pomegranate juice as compared to grape. The sensory analysis revealed that the blending of pomegranate: grape juice in 60:40 proportions with carbonation at 9 g/l was found to be most acceptable combination based on overall acceptability. The biochemical analysis revealed that the blending per cent significantly affects the total phenols, anthocyanin, ascorbic acid and antioxidant capacity. This was mainly due to the differential (higher) content of above mentioned bioactive compounds in pomegranate juice. Further, the level of carbonation does not significantly affect the total phenols, anthocyanin, and antioxidant capacity.



Packaged carbonated pomegranate and grape blended RTS beverage



Carbonation process in progress

Farmers Corner

Mulching – It's Role in Water Management of Pomegranate (*Punica granatum L.*)

-D. T. Meshram

Pomegranate is an important fruit crop of arid and semiarid regions of India. Maharashtra, Karnataka and Gujarat are the leading producer states of pomegranate in India. In Maharashtra, pomegranate is predominantly cultivated in Solapur, Ahmednagar, Pune, Nashik, and Sangli districts. As water is a scarce resource in most of the pomegranate growing regions of India, it should be judiciously used for sustainable production. Mulching is an important agro-technique that helps to overcome the water shortage during scarcity months.

Mulches are protective layer of organic material spread up to 7-10 cm depth. These layers are composed of crop residues or inorganic material like 100 micron thick polyethylene pervious/weed covering mat placed on top of exposed soil below the plants. Mulches are useful in regulating microclimatic conditions.

Types of mulches

Mulches are classified into 2 type's viz., organic mulches or inorganic mulch.



Particulars	Organic mulch	Inorganic mulch
Source material	Biotic in nature	Abiotic in nature
Decomposition	Easily decompose and release humic acid, nutrients, etc. & increase organic matter content of soil. They are environment friendly.	Do not decompose easily, hence may pollute the environment if not properly disposed.
Example	Straw, grass clippings, corn cobs, bark chips, leaves, sawdust, wheat straw, safflower waste, paddy straw, sugarcane bagasse etc.	Pebbles, rocks, gravels, rubber and plastic sheets etc.



Organic mulch

Organic mulch: Sugarcane bagasse is the fibrous dry pulpy residue left after the extraction of juice and is a by-product of sugar industry. It serves as an excellent mulch material for pomegranate.

- Select a circular area with 40-60cm diameter at base of plant.
- Remove all the weeds at the base of plants
- Apply sugarcane bagasse @ 3-4 kg/plants.
- Spread uniformly to 3-4" thick layer to block the sunlight.

Advantages: Mulches are advantageous in several ways and help in

- Conservation of soil moisture through reduction of evaporation
- Smothering of weeds
- Controlling soil erosion
- Improving beneficial soil micro-flora

Inorganic mulch

- Select 1.5x1.0 m area at the base of plants.
- Remove all the weeds from the rectangular area.
- Make raised beds of 1.5x1.0 m size at the base of plants.
- Select pervious / weed covering mat of 1.5 x1.0m (l x b) size.
- Place the pervious / weed covering mat on raised beds and fix the borders with soil
- Locally available crop residue / organic waste material can be used as organic mulch without extra expenditure.
- It should be removed in rainy season



Inorganic Mulches



Water use and water use efficiency

Mulches reduced the rate of water loss through evaporation from soil surface. Organic mulch conserves more water as compared to inorganic mulches. So, the soil water plant relationship is better in low moisture regime than high moisture regime that might help produce higher yield and thereby higher water use efficiency.

Effect of organic and inorganic mulches on water use efficiency

Mulches	Water requirement (liters)	Number of fruits / plant	Average fruit weight(g)	Yield (kg/ plant)	Water conserved (%)	Water Use efficiency (kgm ⁻³)
Sugarcane bagasse	5519	65	290.50	18.88	30-35	2.20
Pervious/weed covering mat	6290	63	285.65	17.99	25-30	2.46
without mulch	7682	45	265.45	11.94	-	1.55

अनार के जल प्रबंधन में मल्लिंग की भूमिका

अनार भारत के शुष्क और अर्धशुष्क क्षेत्रों की एक महत्वपूर्ण फसल है। भारत में महाराष्ट्र, गुजरात और कर्नाटक राज्य अनार के प्रमुख उत्पादक राज्य हैं। महाराष्ट्र राज्य के सोलापुर, अहमदनगर, पुणे, नासिक, और सांगली जिलों में अनार की खेती मुख्य रूप से की जाती है। हालांकि भारत के अधिकांश अनार उगाने वाले क्षेत्रों में पानी एक दुर्लभ संसाधन है, इस कारण शाश्वत उत्पादन के लिए पानी का इस्तेमाल विवेकपूर्ण तरीके से किया जाना चाहिए। पानी जैसे दुर्लभ संसाधन को बचाने के लिए मल्लिंग की तकनीक महत्वपूर्ण है।

मल्ल जैविक सामग्री की ७१०- सेमी मोटाईवाली कार्बनिक अवशेष) फसल अवशेष(की सुरक्षात्मक परत होती है। अकार्बनिक मल्लिंग में १०० माइक्रोन मोटी पॉलीइथिलीन शीट हर पौधों के नीचे मिट्टी के ऊपर बिछाई जाती है। मल्ल सूक्ष्म जलवायु परिस्थितियों को विनियमित करने में उपयोगी होते हैं।

मल्ल के प्रकार :

मल्ल को दो प्रकारों में वर्गीकृत किया जाता है। जो कार्बनिक मल्ल और दूसरा अकार्बनिक मल्ल हैं।

अकार्बनिक मल्ल :

- पौधों के नीचे १.५ X १.० मी क्षेत्र को चुने
- उस आयताकार क्षेत्र से सभी खरपतवार हटा दें
- १.५ X १.० मी आयताकार बेड को सतह से एक से देढ़ फीट ऊंचा बनाएं।

- उस निर्धारित जगह को प्लास्टिक मल्ल शीट से अच्छी तरह से ढक ले और उसके चारों तरफ अच्छी तरह से मिट्टी लगाए।
- इस प्लास्टिक मल्ल शीट को बारीश की मौसम में हटा देना जरूरी है।

विवरण	कार्बनिक मल्ल	अकार्बनिक मल्ल
स्रोत सामग्री	जैविक	अजैविक
विघटनशील	यह जमीन में आसानी से विघटित होते हैं और ह्यूमिक एसिड, पोषक तत्व इ. और मिट्टी के कार्बनिक पदार्थ की मात्रा को बढ़ाते हैं। यह पर्यावरण के अनुकूल होते हैं।	यह आसानी से विघटित नहीं होते हैं इसलिए इनका ठीक से निपटारा करना चाहिए, नहीं तो ये पर्यावरण को प्रदूषित कर सकते हैं।
उदाहरण	तिनका, घास, मकई के खाली भुट्टे, पेड़ के छाल के तुकड़े, पत्तियां, बुरादा, कुसुम के पत्ते, धान की भूसीगन्ने से, निर्मित बगोंस इत्यादि	कंकड़, छोटे पत्थर, बजरी, रबर और प्लास्टिक की शीट आदि



कार्बनिक मल्व:

गन्ने का बगास (गन्ने का)रस निकालने के बाद बचा हुआ रेशेदार सूखा अवशेष(अनार के लिए एक उत्कृष्ट आर्गेनिक मल्व के रूप में कार्य करता है।

1. अनार के तनों के पास ४० से ६० सेंटीमीटर व्यास के गोलाकार क्षेत्र को निर्धारित करें।
2. पौधों के नीचे से सभी खरपतवारों को निकाल कर नष्ट करें।
3. हर पौधे के नीचे गोलाकार सतह पर गन्ने का बगास ३ से ४ किलोग्राम पौधों/की मात्रा में अच्छी तरह से फैलाए।
4. जमीन की ऊपर ३ से ४ इंच मोटी एकसमान परत बनाकर जमीन को ढके, जिस कारण सूर्यप्रकाश को अच्छी तरह से रोका जाए।

फायदे:

इन निचे दिए गए परिणामों के कारण से मल्व फायदेमंद साबित होते हैं।

वाष्पीकरण में कमी और फलस्वरूप मिट्टी की नमी का संरक्षण होता है।

1. खरपतवारों को बार बार निकालने की जरूरत नहीं पड़ती।
2. मृदा अपरदन का नियंत्रण होता है।
3. लाभकारी मृदा सूक्ष्म जीवाणु की संख्या में सुधार आता है।

जल उपयोग और जल उपयोग दक्षता

मल्व के कारण मिट्टी की सतह से वाष्पीकरण के माध्यम से होने वाले पानी के व्यय को कम किया जा सकता है। अकार्बनिक मल्व की तुलना में कार्बनिक मल्व अधिक जल संरक्षण करता है।

यह तकनीकी अधिक पानी वाले क्षेत्र की तुलना में कम पानी वाले क्षेत्र में बेहतर साबित होती है। कम पानी वाले क्षेत्र में मल्विंग के उपयोग से सर्वोत्तम जल उपयोग दक्षता और अधिक उत्पादन संभव है।

कार्बनिक और अकार्बनिक मल्व का जल उपयोग दक्षता पर परिणाम

मल्वेस	पानी की आवश्यकता (लीटर)	प्रति पौधा फलों की संख्या	औसत फल वजन (ग्राम)	उपज किग्रा/पौधा	जल संरक्षण (%)	जल उपयोग दक्षता कि)ग्रामी/३(
गन्ने का बगैस	५५१९	६५	२९०.५०	१८.८८	३०-३५	२.२०
प्रवेशनीय / खरपतवार ढकने वालीशीट	६२९०	६३	२८५.६५	१७.९९	२५-३०	२.४६
बिना मल्व के	७६८२	४५	२६५.४५	११.९४	-	१.५५

Events

Farmers adopted by ICAR-NRCP, Solapur under SCSP and TSP scheme

The center has adopted 26 SC farmers under SCSP programme and provided essential inputs such as fertilizers, good quality planting materials etc. Farmers were also trained for effective cultivation of pomegranate and apprised about need of this intercropping with technical guidance. Field demonstration of intercropping of pomegranate with Rabi Mung has been conducted in farmer's field at Malumbra, Osmanabad. The center has also supplied essential inputs for pomegranate cultivation to farmers under TSP scheme at Sironcha, Gadchiroli.



Pomegranate cultivated with Rabi Mung intercropping at Malumbra, Dist-Osmanabad



Trainings/Workshops/Seminars

ICAR-NRCP has also organized number of training programs for farmers of different districts of Maharashtra and Karnataka to make awareness about the pomegranate cultivation, production and value addition. A four days training on optimum pomegranate productivity using scientific methods was conducted for the farmers of Wardha during 20-23rd May, 2019. The 3 days training programme on Advanced Production and Value Addition Practices in Pomegranate for the farmers of Vijayapur, Karnataka was organized during 24-26th June, 2019. DD Kisan Multitask training programme was also conducted on 8th March, 2019 at center.



Training - cum - distribution of Agri-inputs to beneficiaries under SCSP scheme of ICAR-NRCP



Model Propagation & Pomegranate Production Technologies for Farmers & Coordinating Agencies under SCSP



Pomegranate production inputs supplied to Farmers under TSP scheme at Sironcha, Dist-Gadchiroli

Exhibitions/Melas

This center has also participated in different exhibitions to promote different technologies for the scientific production of pomegranate and its value addition. Center has displayed the different technologies in Global farmers fair organized by KVK Narayangaon during 3-6th Jan, 2019 and Krishidham Expo 2019 at ICAR-CPRI Meerut during 15-17 February, 2019.



Global Farmers Fair at KVK Narayangaon, Dist. Pune on 3-6th January, 2019



Krishidham Expo 2019 at ICAR-CPRI Meerut (UP) on 15-17th February, 2019



Promoting Govt. Initiatives



Training programme on optimum pomegranate productivity using scientific method for the farmers of Wardha District (MS), 20-23rd May 2019



Training programme on Advanced Production and Value Addition Practices in Pomegranate for farmers of Vijayapur, Karnataka 24-26th June 2019



DD Kisan Vichar Vimarsh programme on 08th Mar. 2019



Demonstration orchard under MGMG at Nimgaon



Distribution of Soil Health Card

Mera Gaon Mera Gaurav
Under Mera Gaon Mera Gaurav (MGMG) programme different activities were carried out in 16 adopted villages covering Karnataka and Maharashtra States. Various scientific pomegranate production techniques were demonstrated in adopted village. The demonstration in farmer's field/orchard at Nimgaon was carried out by scientist. The soil health cards were distributed to farmers in order to know soil health and recommendations for nutrient management for quality pomegranate production.

International Yoga Day Celebration
ICAR-NRCP, Solapur celebrated 'Festival of Yoga and Wellbeing' on the occasion of International Yoga Day on 21st June 2019 and also conducted various programmes on Yoga theme on 19th June 2019 viz., Essay competition for NRCP staff and drawing competition for school students. Total 27 participants took part in these competitions. Mrs. Anita Hemade, Yoga teacher, Solapur was Chief Guest and Director (Acting), ICAR-NRCP, Solapur also graced the occasion.



Yoga session by the NRCP Staff



Distribution of prize and certificates to winners by the Yoga Instructor Mrs. Anita Hemade



Transfer of Technologies

ICAR-NRCP signed MoU for technology licensing of minimal processing and packaging of arils to M/S Ramagiri Food and Technology (P) Ltd., Bengaluru on 18th February, 2019 with technology licensing fees of Rs. 1.18 Lakh.



MoU for technology licensing with Ramagiri Food and Technology (P) Ltd., Bengaluru

Academia

- MOU with College of Agricultural Biotechnology, Sangulwadi for UG Training and Project Research on 08th January, 2019.
- MoU with Lokmangal College of Agricultural Biotechnology, Wadala on 01st February, 2019.

Visitors

Dignitaries like Horticulture Commissioner of Madhya Pradesh visited all the divisions of ICAR-NRCP and technologies developed by the institute have been briefed by the concerned Scientists on 23rd April, 2019.



Visit of Horticulture Commissioner of Madhya Pradesh

Different groups of farmers visited the institute from various states of the country to gain the knowledge on Pomegranate cultivation and management practices. The students from different colleges visited NRCP during the period as part of their educational exposure visit.

List of visitors

SN	Date	Organization/ Place	Category	No. of participants
1	20 th Jan. 2019	Lonar, Buldhana, MS	Farmers	24
2	22 th Jan. 2019	Mehakar, Buldhana, MS	Farmers	14
3	22 th Jan. 2019	Vasundhara kala Mahavidyalay, Solapur	Students	34
4	30 th Jan. 2019	Morbi, Gujarat	Farmers	45
5	28 th Feb. 2019	Tuljapur, Osmanabad, MS	Farmers	15

Awards

The Center bagged best display award (second) in exhibition organized by ICAR-CPRI, Meerut during Krushidham Exhibition as part of National Potato day Feb, 2019.



Best Display Award (Second place) at ICAR-CPRI, Meerut during Krushidham Exhibition as part of National Potato day Feb, 2019

Dr. K. Dhinesh Babu

- Fellow of Society for Horticulture Research & Development (FSHRD-2018)
- Fellow of Confederation of Horticulture Associations of India (FCHAI-2019)

Dr. Gaikwad N.N

- **Best poster award:** UAS, Raichur, 28-30th November, 2019.



Publications

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2. Meshram, DT, Gorantiwar, SD., Bake, N. and Wadne, SR. 2019. Forecasting of air temperature of western part of Maharashtra, India. International Journal of Science, Environment and Technology 8(1):201-217.
3. Meshram, DT., Gorantiwar, SD. and Wadne, SR. 2019. Crop coefficient and evapotranspiration pomegranate (*Punica granatum* L.) for western part of Maharashtra, India. ACTA Scientific Agriculture 3(7):218-223.
4. Meshram, DT., Babu, KD., Nair, AK., Panigrahi, P and Wadne, SR. 2019. Response of Pomegranate (*Punica granatum* L.) to deficit irrigation system under field conditions, India. Journal of Agrometeorology (Accepted).
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6. Tele, AA., Banda, MA., Bachake, SS., Jadhav, VB., Deshpande, PP., Adki, VS., Gopika, MK., Shinde, NA., Sharma, J., Parashuram, S., Sangnure, VR., Mundiwadikar, DM. and Singh, NV. 2019. Quality RNA isolation, cDNA synthesis and qPCR validation of differentially expressed gene in *Punica granatum* L. under influence of *Xanthomonas axanopodis* pv. *punicae*. Journal Pharmacognosy and Phytochemistry. 8(3): 2542-2547.

Popular articles

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2. Sharma, J., Maity, A., Shinde, Y., and Gharate, R. 2019. *Dalimb baget baharadarmyan karawayachi mashagatichi kame*, Shetkari, April, 54(1):23-30&34.
3. Sharma, J., Maity, A., Shinde, Y. and Singh, N. V. 2019. *Dalimba: Navya bagechi lagwad va vyavasthapan*, Shetkari, May, 54(2):20-22.
4. Singh, N. V., Sharma, J., Maity, A., Shinde, Y., Gharate, R. and Chaudhari, D. T. 2019. *Dalimbachya navin bageche lagvad tantradnyan va tyavaril telya rogache vyavasthapan*, Baliraja, June, 65-72p.
5. Sharma, J., Shinde, Y., and Chaudhari, D. T. 2019. *Janun ghya dalimb bagetil mar rogachi lakshane*, Agrowon, 13th June, 11p.
6. Sharma, J., Shinde, Y., Chaudhari, D. T. and Gharate, R. 2019. *Dalimb bagetil mar rogache niyantran*, Agrowon, 14th June, 11p.

E-publications

- TV show: Video capsule entitled “Vichaar Vimarsh - Pomegranate Farming” was aired on DD Kisan also been uploaded on youtube channel of DD Kisan.
- URL https://www.youtube.com/watch?v=eg_yxOdYVm4&list=TLPQMTcwMzlwMjB388YRKKcL6w&index=1
- Video in Marathi, Hindi and English on Pomegranate processing for entrepreneurship development were developed and are available at ICAR-NRCP You tube channel.

Personnel

Joining: Nil

Promotion/s

- **Dr. Nilesh Nivrutti Gaikwad**, Scientist (Agril. Structures & Process Engg.) was promoted as Senior Scientist (Agril. Structures and Process Engg.) w.e.f. 23.06.2018.
- **Dr. Prakash G Patil**, Scientist (Plant Biotech.) was promoted to Senior Scientist (Plant Biotech.) w.e.f. 08.01.2018.





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