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ICAR-NRCP Newsletter

An ISO 9001:2015 Certified Institute

Contents

FROM THE DIRECTOR'S DESK

Dr. Jyotsana Sharma,
Director *(Acting)*, ICAR-NRCP

It gives me immense pleasure to release the first issue of ICAR-NRCP Newsletter. It is a matter of great privilege to serve the institute - with which I am associated since it came into existence- as Acting Director. During the journey of 12 years the Centre has made its presence felt not only in India but also abroad. The ICAR-NRCP has also come up with several technologies for the benefit of end users.

Bacterial blight of pomegranate was the major cause of distress to the growers in 2005 when the Centre was established. The Centre was instrumental in developing confidence among the growers to manage bacterial blight successfully using the Integrated Disease and Pest Management (IDIPM) schedule which was demonstrated in farmers' fields covering 41 ha/year in a network mode. In a short span, technology for mass production of tissue culture raised plants along with bio-hardening, processing and value addition technologies for pomegranate juice, ready-to-serve (RTS) beverage, minimal processing of pomegranate arils, sparkling pomegranate wine & pomegranate seed oil have been developed. During 2017-18, promising processable varieties 'Solapur Lal' and 'Solapur Anardana' were released. Apart from these some technologies are in the pipeline that will reduce cost of production and lead to the total utilization of pomegranate.

ICAR-NRCP effectively disseminated its technologies through demonstrations, on-site and in-house capacity building programmes and supply of extension material all over the India. To disseminate the information on various technologies and to answer queries on pomegranate farming, ICAR-NRCP has developed Mobile App 'Solapur Anar'. The App provides information on all aspects of pomegranate production and value addition, in six languages viz. English, Hindi, Marathi, Kannada, Telugu and Gujarati.

The Centre has strengthened pomegranate cultivation not only in Maharashtra but also in states like Gujarat, Odisha, Rajasthan, Karnataka, Andhra Pradesh, Telangana, Tamil Nadu and Madhya Pradesh. NRCP has also introduced pomegranate cultivation in tribal areas of Gadchiroli district of Vidharbha region of Maharashtra, Bankura and Purulia districts in West Bengal, Raigada in Odisha, Anuppur in Madya Pradesh and Koriya in Chhattisgarh. The research efforts by the scientists and awareness initiatives of ICAR-NRCP in collaboration with SAU's, KVK's, ICAR institutes and other organizations can be witnessed through tremendous increase in pomegranate area, production, productivity and export during last 13 years. Pomegranate cultivation has become a source of livelihood for several rural families in India.

Pomegranate no doubt has become one of the most important crops in arid and semi-arid regions of India.

Achievements of the Year

Release of variety Solapur Lal: A new biofortified pomegranate hybrid 'Solapur Lal' was released in April 2017 by ICAR-NRCP, Solapur. The most important features of 'Solapur Lal' in comparison to Bhagwa are -it is suitable for table and processing purpose, has early maturity (160-165 days) with yield of 23-27 t/ha, higher TSS (17.5-17.7°B), Vitamin-C (19.4-19.8 mg/100g), Anthocyanin (385-395 mg/100g), Iron (0.56-0.61 mg/100g of fresh arils), Zinc (0.64-0.69 mg/100g of fresh arils. In all 3500 No. of planting material has been distributed to various institutions, universities, state agencies KVKs and 100 farmers.

Novel Bio-formulation: Provisional patent has been filed for a novel bio-formulation for potassium fertilizer supplement in March, 2017. It substitutes 70% potassium fertilizer supplement & saves approximately Rs.40,000/- per ha .

Solapur Lal

Farmer's Corner

Phosphonic acid residues in pomegranate - An export issue: Phosphorus (P) is one of the major elements required by all living species to grow and develop and is commonly found in inorganic phosphate rocks. The most important commercial use of phosphorus is the production of fertilizers based on phosphate derived from phosphoric acid and production of fungicides based on phosphite. The phosphorous based fungicidal compounds are also known by terms like-phosphorus acid, phosphite, phosphonite or phosphonate. However, a clear distinction exists between phosphoric acid and phosphorus acid: while the phosphoric acid is a plant nutrient and the phosphorus acid has primarily fungicidal application. The names of the compounds phosphorus/phosphoric acid though are completely misleading. The major differences between the two compounds are briefed below:

Differences between Phosphoric acid and Phosphorous acid

Name	Phosphoric acid	Phosphorous acid
Formula	H_3PO_4	H_3PO_3
Use	Plant nutrient; hence used for production of phosphate based fertilizers.	Primarily fungicide against oomycetes, etc hence used for production of fungicides
Major formulati -ons	Single super phosphate, triple super phosphate, di-ammonium	Aliette, Nutri-Phite, Ele-Max, Prophite,Nutrol, Phostrol, Agrifos, Foli-r-fos 400, Sanchar 40, Acumin, Polyvine, Synergy Plus, Fosphite, Lexx-a-phos, Trafos line,Phytos'K, Phosfik line, Fosfisan, Vigorsan, Geros-K,Kalium

There are regulatory limits to the amounts of phosphite which are permitted in food produce. Very recently European Union announced the permissible limit of phosphite in pomegranate to be less than 2 mg per kg of fresh fruit which led to rejection of many consignments of pomegranate for exporting in the European countries. Hence, we are providing a comprehensive list of products of phosphorus family used in agriculture which include the products of phosphate family that are safe for agriculture use and products of phosphite family to be used with caution to avoid residues.

For registering any chemical product as fungicide, extensive evaluation and documentation are required however, most of such phosphite based products having primarily fungicidal properties than nutritional impact are getting registered as fertilizers - to avoid cost and delay due to fungicidal registration procedure. Uses of such products as plant strengthener or as fertilizers were authorized in organic farming in many European Union countries. Such uses can result in the presence of phosphonic acid residues sometime after its application, especially in the case of perennial crops. The list of phosphite products that are available in the Indian, American and European markets and are sold as fertilizers now includes different brand names.

Products of phosphorus family used in agriculture

Name	Comments
I.The Phosphate Family	
Phosphorus (P)	Does not occur as a free element in nature
Phosphoric acid (H_3PO_4)	Compound found in most phosphate fertilizers. Contains 32% P
Phosphate (PO_4)	Completely dissociated form of H_3PO_4

Finished Phosphate Fertilizers

Single Super Phosphate (SSP)	Dry fertilizer containing about 19% P_2O_5
Di Ammonium Phosphate (DAP)	18-46-0 dry fertilizer
Triple Super Phosphate (TSP)	0-45-0 dry fertilizer
Mono Potassium Phosphate (MPP)	0-52-34 dry fertilizer
Mono Ammonium phosphate (MAP)	12-61-0 dry fertilizer
Ammonium Polyphosphate (APP)	10-34-0 liquid fertilizer

The Phosphite family

Phosphorous acid (H_3PO_3)	Marketed as a fungicide. (39% P)
Phosphonate, Phosphite, Phosphonite (PO_3)	Completely dissociated form of H_3PO_3

Some Phosphite derived products

Aluminium Phosphite	Only marketed as a fungicide
Potassium Phosphite	Marketed as a liquid fertilizer, e.g. 0-58-38, 0-30-20 or 0-24-16
Mg & Ca Phosphite	Marketed as fertilizers
Ammonium Phosphite	Marketed as fertilizer, e.g. 11-35-0
Zn and Mn Phosphites	Marketed as fertilizers

All these products are formulated as alkali salts of phosphorus acid (H_3PO_3) and have been registered under the fertilizer laws. However, the representation and the use of phosphite containing products as sources of plant nutritional P have been subjected to ongoing controversy. This has also created much confusion for distributors and growers. There are numerous publications indicating that phosphite can be well absorbed by leaves and roots but also has no utility for plant as phosphatic fertilizer.

Phosphite is not a fertilizer : Phosphite cannot enter into the same metabolic biochemistry as phosphate owing to differences in charge distribution on the two anions. So, this phosphite does not take part in the plant metabolism and are not able to substitute the role of phosphate in plant metabolism and hence do not contribute in growth in terms of economic yield. However, this phosphite when reacted with ethanol to form ethyl phosphonate, effectively suppress several soil borne plant disease caused by fungi belonging to the order Oomycetes, particularly *Phytophthora sp.* The potassium salt of Phosphite is equally effective agent to control plant infection by *Phytophthora sp.*

The marketing of some products with phosphorous acid &phosphites as active ingredient

Product	Company	Country	Active Ingredent	Marketed as
Aliette	Bayer Cropscience	Germany	Fosetyl- Al*	Fungicide
Nutri-Phite	Biagro Western Sales	USA	Phosphites & Org. Acids	Fertilizer
Ele-Max	Helena Chemicals	USA	Phosphorous acid	Foliar Fertilizer
ProPhyt	Luxembourg-pamol	USA	Mono Potassium Phosphite	Systemic Fungicide
Nutrol	Lidochem	USA	Potassium Phosphite	Fertilizer & Fungicide
Phostrol	NuFarm America	USA	Phosphorous acid	Biochemical Pesticide
Agrifos	Liquid Fert Pty (Agrichem)	USA	Mono Potassium Phosphite	Fungicide
Foli-r-fos 400	UiM Agrochemicals	Australia	Mono Potassium Phosphite	Fungicide
Fosphite	Jh Biotech	USA	Mono Potassium Phosphite	Fungicide
Lexx-a-phos	Foliar Nutrient Inc	USA	Mono Potassium Phosphite	Fungicide
Trafos	Trade Corp.	Spain	Potassium Phosphite	Fertilizer & Defence Stimulator
Phytos'K	Valagro	Italy	Potassium Phosphite	Bio Stimulant (Reg. As EC fert.)
Phosfik Line	Biol Chim	Italy	Phosphorous acid	EC Fertilizer
Fosfisan, Vigrorsan etc	Agrofill	Italy	Potassium Phosphite	Defence Stimulator (Reg. As Fert.)
Geros-K	L-Gobbi	Italy	Potassium Phosphite	EC Fertilizer
Kalium Plus	Lebosol	Germany	Potassium Phosphite	EC Fertilizer
Frutoguard	Spiess Urania	Germany	Potassium Phosphite	EC Fertilizer
Foliaphos**	Plantin	France	Potassium Phosphite	EC Fertilizer

Phosphite - cause of concern for the environment: Phosphite is regarded as being metabolically inert in plant as well as animal system. It can evoke marked perturbations in the P metabolism of plant and that these effects are very detrimental to their growth under low Phosphate conditions. Besides, large amount of hypophosphite are being used to reduce metal ions in chemical plating processes such as those used in compact-disk manufacturing. After metal plating, waste water containing high concentration of phosphite is being released into the environment.

Many of the cleaning products and detergents used in the industries contain phosphonate as ingredient. The waste water from these industries is also released in the environment and sometimes used in the crop production. Many of the farmers are using soaps and detergents (also source of phosphonate/phosphonic acids) in their sprays. Thus phosphite enters into the food cycle.

One of the features which make this phosphite as an effective fungicide is that it is retained in the plant for a long time and gets translocated in the same way as phosphate often ending up in fruit tissues. Thus there is an urgent need to document phosphite levels in food products obtained from phosphite treated plants and to ensure that heavy consumption of these food products pose no threat to the public who consume it.

Ashis Maity, Senior Scientist
ICAR-NRCP, Solapur

Effective Management of Bacterial Blight Disease-Six easy steps: Any bacterial disease in plants can be managed effectively only through developing resistant variety, no chemical gives complete control. In the absence of blight resistant variety in pomegranate and constraints in breeding due to tight linkage of genes for big size and susceptibility to bacterial blight, integrated management is being recommended which includes, planting new orchards with bacterial blight free planting material, balanced plant nutrition with sufficient organics and beneficial organisms, avoiding rainy season crop if disease is observed, orchard sanitation, avoiding too many/unwanted sprays and chemical sprays at 7-10 days interval depending on season. several farmers have benefitted using the IDIPM schedules and ICAR-NRCP advisories.

Though the disease managed effectively with the integrated schedule, yet it faces challenges due to mono-cropping of Bhagwa the most susceptible variety, sale of blight infected planting material, unrestricted sale of spurious chemicals in market and unqualified consultants misleading the innocent farmers.

Those facing bacterial blight can manage bacterial blight in 6 easy steps

1. Put plants on rest soon after harvest in December till February. Take main pruning and provide recommended nutrition for rest period soon after harvest.
2. Put plants on stress from March till there is natural defoliation without chemical defoliants.
3. Allow naked defoliated stems to face sun for another 20-30 days till the tip portion of the branches start drying. Due to high temperature and low moisture, the bacteria residing safely in the nodes (source of infection in next season) of the naked stems will desiccate and die.
4. Go for light pruning removing upper 10-15 cm of stems, put recommended fertilizer doses, irrigate and start the new crop.
5. Take need based sprays of insecticides, fungicides, nutrients, growth hormones and bactericides only at 7-10 days interval.
6. All blight affected orchards in the community should follow the same schedule for promising results.

Jyotsana Sharma, Director (Acting)
& Principal Scientist, ICAR-NRCP, Solapur

Pomegranate cultivation in Tribal regions: The Centre has adopted 12 tribal farmers in Sironcha Taluka of Gadchiroli District, 13 farmers in Bankura and Purulia district of West Bengal. In addition 200 farmers have been adopted in 14 villages of Anuppur, Madya Pradesh and 200 farmers in 2 villages of Koriya, Chhattisgarh in collaboration with Self Reliant Initiatives through Joint Action (SRIJAN), Madhya Pradesh. The farmers were given planting material and other inputs and pomegranate cultivation started in their villages. In addition the Centre imparted, on site and in-house trainings to the farmers

Tribal farmers of Madhya Pradesh, Chhattisgarh & staff of SRIJAN, MP in a training programme at NRCP

Tribal farmers of Bankura, West Bengal

Training on skilled development on pomegranate production &value addition for farmers of Dhule district

Events

Training: The Centre conducted in-house/onsite trainings as well as participated as resource persons for trainings organized by other government or NGOs for farmers and stakeholders from all over India. Till date around 65 trainings were organized by NRCP and scientists participated as resource persons in more than 50 trainings covering the states of Gujarat, Odisha, Telangana, Maharashtra, Rajasthan, Karnataka, Andhra Pradesh, Madhya Pradesh and Chhattisgarh.


Training for farmers from Kullu and Solan, HP at NRCP (left) and on-site training to farmers at Tikkamgarh, MP (right) during 2017-18

National Seminars/Workshops: The Centre jointly organized 2 national seminars one in December 2014 and other in April 2017 at NRCP, Solapur & one stakeholders meet on pomegranate value chain at NASC complex, New Delhi on October 30, 2017 along with SARP. The Centre also organized two National workshops one on fruit cracking and soil health in 2015 and second on major export issues in 2018. Apart from this at least one field day was organized each year.


1st & 2nd National Seminar cum Farmers Fair Pomegranate Organized Jointly by SARP & ICAR-NRCP, Solapur


Workshop on Handling Major Issues in Pomegranate Export at ICAR-NRCP, Solapur on March 17, 2018

Promoting Government initiatives: The Centre, every year organizes programmes like '*Vigilance Awareness Week, Yoga day, Hindi Pakhwada, Swachh Bharat Abhiyan and Constitution Day*' to promote various government initiatives on promoting social integrity, eradicating corruption, Hindi as the national language, Clean India mission.

Vigilance Awareness Week | International Yoga Day


Hindi Pakhwada | Swachh Bharat Abhiyan

The Centre has adopted 6 villages- 4 in Maharashtra and 2 in Karnataka -under the Government initiative Mera Gaon Mera Gaurav. These are Waghdari (Akkalkot), Karkambh (Pandharpur) , Nimgaon (Madha), Nandgaon, Tk. Tuljapur (Osmanabad) in Maharashtra and Jambga B (Kalburgi) and Ambalaga (Kalburgi), Karnataka.The Centre has also tested soil samples and distributed soil Health cards to more than 500 farmers in collabioration with KVK, Solapur during last 2 years.


NRCP Scientists interact with farmers at MGMG adopted villages Karkhamb and Nandgaon


NRCP Scientists interact with farmers at MGMG adopted village Kalburgi | Distribution of Soil Health Card

Technologies developed and transferred

The center has transferred below mentioned 7 technologies to 15 agencies in different states earning a revenue of Rs. **25,51,689/-**

1. *In vitro* propagation of pomegranate cv. Bhagwa including bio-hardening (6.0 Lakhs elite saplings propagated in PPP mode).
2. Two step hardwood cutting protocol of pomegranate including biohardening
3. Development of pomegranate juice and RTS beverage
4. Process of minimal processing
5. Technical consultancy for implementation of total orchard management practice
6. Technical consultancy for "Establishment of minimal processing and packaging unit for pomegranates"
7. *Penicillium pinophilum* based bio-formulation for potassium fertilizer supplement.

Technology transfer agreement with M/s. Ananya Agro Products, Pandharpur for minimal processing of pomegranate arils

Technology transfer agreement with M/s.Natura Crop Care, Bengaluru for *Penicillium pinophilum* based bio-formulation for potassium fertilizer supplement

Academia

ICAR-NRCP, Solapur has signed MOU's with universities to support graduate and post graduate students to carry out research on pomegranate. ICAR-NRCP has signed MoU with MPKV Rahuri, Solapur University, Agarkar Research Institute, Pune, JNKVV, Jabalpur, Madhya Pradesh, Dr. BR Ambedkar NIT Jalandhar, Punjab, College of Biotechnology, Latur, VNMKV, Parbhani, M.S., Lokmangal College of Agricultural Biotechnology, Solapur, Walchand College of Arts and Science, Solapur, College of Agriculture and Biotechnology, Ahmednagar, Sangameshwar College, Solapur , MIT, Aurangabad, SVG Shivdare College of Arts, Commerce & Science, Solapur and M.S., T.C. College, Baramati, M.S., NMU, Jalgaon.

Distinguished Visitors

The Center feels fortunate to be blessed and guided by several distinguished visitors since its establishment in 2005. The distinguished personalities include Dr. Mangla Rai, and Dr. Ayyappan, former DGs- ICAR and Sec. DARE, Dr. Trilochan Mohapatra, DG- ICAR and Sec. DARE, New Delhi, Dr. HP Singh and Dr. NK Krishna Kumar, former DDGs (Hort.), Dr. AK Singh, DDG (Hort.), ICAR, New Delhi, Dr RB Deshmukh, Former VC MPKV, Rahuri and Chairman RAC, Dr. KP Viswanatha, VC, MPKV, Rahuri, Dr. Tapas Bhattacharya, VC, DBSKKV, Dapoli, MS, Dr. CD Mayee, Ex Chairman ASRB, New Delhi, Dr. Umakant Dangat, Former Agriculture Commissioner, Maharashtra, Mr. JS Saharia, State Election Commissioner, Maharashtra state, Padma Shri Genabhai D Patel, Progressive pomegranate grower from Gujarat, ADGs from ICAR and Directors of different ICAR institutes.

Dr. T Mohapatra, DG, ICAR & Dr. NP Singh, Director ICAR-NIASM, Baramati

Dr. RB Deshmukh, Former VC MPKV, Rahuri

Padma Shri Genabhai D Patel, Progressive pomegranate Grower, Gujrat

Mr. JS Saharia, State Election Commissioner, Maharashtra

SARP News

Society for Advancement of Research on Pomegranate (SARP), Solapur, was established in April, 2014. This society identifies and awards researchers working on pomegranate, it conducts farmers' fair and seminars to disseminate the new technologies developed in the field of pomegranate across India. Till date two national seminars cum farmers fair/exhibitions, two workshops, and two meetings have been conducted by the society jointly with ICAR-NRCP, Solapur

Awards 2016-2018

1. **Pal RK:** Fellow of NAAS - 2017, National Academy of Agricultural Sciences, New Delhi and Fellow of SARP -2017, Society for Advancement of Research on Pomegranate (SARP), Solapur.
2. **Sharma Jyotsana:** Dalimb Ratna Award -2016 by Maharashtra Pomegranate Growers Research Association, Pune
3. **Dhinesh Babu, K:** Fellow of HSI-2016, Horticultural Society of India, New Delhi and SARP Associateship- 2017, SARP, Solapur.
4. **Sangle UR:** Eminent Scientist Award-2018, Society for Educational Development and Environmental Research, BHU, Varanasi
5. **Meshram DT:** SARP Associateship-2017, Solapur; Outstanding Scientist Award-2017, 5th IJTA International Conference. Best Researcher Award-2017, 6th Science and Technology-Conference, Mumbai
6. **Maity Ashish:** Dalimb Ratna Award-2017 by Maharashtra Pomegranate Growers Research Association, Pune and SARP Young Scientist Award-2017.
7. **Gaikwad NN:** SARP Young Scientist Award-2017
8. **Singh NV:** Krushi Kranti Award-2016 by RK Foundation, Ahmednagar and SARP Young Scientist Award-2017.
9. **Mallikarjun MH:** Young Scientist Award- 2017, Genesis and Rural Development Society (GARD), Hyderabad.
10. **Prakash G. Patil:** Fellow of ISPRD-2017, Indian Society of Pulses Research and Development, Kanpur.

Publications

The Centre has contributed review articles and research articles in various international and national research journals. The Scientists also authored/ coauthored and were editor/ co-editor in books and book chapters. In addition, technical bulletins, manuals, technical/ popular articles, extension folders were also published for the benefit of stakeholders. The scientists also contributed papers in national or international symposia/ conferences. A short video film of 9 minutes on 'Bacterial Blight and its Management' is available in Hindi, English and Marathi.

Some of the most important research papers published in peer reviewed international / national NAAS rated (>6) journals are listed here. NAAS rating 2018 are given in parenthesis at the end of publication.

1. Babu KD, Singh NV, Gaikwad NN, Maity A, Suryawanshi SK and Pal RK. 2017. Determination of maturity indices for harvesting of pomegranate (*Punica granatum* L.). *Indian Journal of Agricultural Sciences*, 87 (9) :1225-30. **(6.22)**
2. Barman K, Asrey R, Pal RK, Kaur C and Jha, SK. 2014. Influence of putrescine and carnauba wax on functional and sensory quality of pomegranate fruits during storage. *Journal of Food Science and Technology*, 51(1): 111-117. **(7.26)**
3. Chandra R, Lohkare AS, Babu KD, Maity A, Singh NV and Jadhav VT. 2013. Variability studies of physico-chemical properties of pomegranate (*Punica granatum* L.) using a scoring technique. *Fruits*, 68 (2): 135-146.**(6.63)**
4. Gaikwad NN, Pal RK, Suryawanshi S, Babu KD, Maity A and Sarkar S. 2017. Effect of extraction method and thermal processing on retention of bioactive compounds of pomegranate (*Punica granatum* L. Cv. Bhagwa) juice. *Indian Journal of Agricultural Sciences*, 87 (11): 1445-52. **(6.22)**
5. Gosavi AB, Deshpande AN and Maity A. 2017. Diagnosis of nutrient imbalance by Diagnostic and Recommended Integrated System in pomegranate growing soils of south-western Maharashtra. *Indian Journal of Horticulture*, 74(4): 498-504. **(6.15)**
6. Maity A, Sharma J, Sarkar A, More AK and Pal RK. 2016. Nutrient imbalance indices are closely related with susceptibility of pomegranate to bacterial blight disease. *Scientia Horticulturae*, 211, 79-86. **(7.62)**
7. Maity A, Babu KD, Sarkar A and Pal RK. 2016. Seasonality of nutrients vis a-vis fruit quality of pomegranate cv. Bhagwa on Vertisol. *Journal of Plant Nutrition*. 40(9): 1351-1363. **(6.62)**
8. Maity A, Sharma Jyotsana, Sarkar A, More AK, Pal RK and Maity A. 2017. Salicylic acid mediated multi-pronged strategy to combat bacterial blight disease in pomegranate caused by *Xanthomonas axonopodis* pv. punicae. *European Journal of Plant Pathology*. doi: 10.1007/s10658-017-1333-3. **(7.48)**
9. Maity A, Pal RK, Chandra R, and Singh NV. 2014. *Penicillium pinophilum*- a novel microorganism for nutrient in pomegranate (Punica granatum L.) *Scientia Horticulturae*, 169: 111-117. **(7.62)**
10. Mallikarjun MH, Sunil J, and Pal RK. 2018. Pomegranate: a new host for the invasive scale insect *Lopholeucaspis japonica* (Cockerell, 1897) (Hemiptera: Diaspididae) from Gujarat, India. *Oriental Insect* DOI:10.1080/00305316. 2018.1451783. **(6.24)**
11. Marathe RA, Sharma J, Murkute AA and Babu, KD. 2017. Response of nutritional supplementation through organics on growth, yield and quality of pomegranate. *Scientia Horticulturae*, 214 : 114-121. **(7.62)**

12. Meshram DT, Ram Chandra, Singh NV and Pal RK. 2017. Thermal requirement of pomegranate (*Punica granatum* L.) varieties growing in Maharashtra, India. *Indian Journal of Horticulture*. 86 (2) : 192-196 **(6.15)**
13. Pal RK, Singh NV and Maity A. 2017. Pomegranate fruit cracking in dry land farming. *Current Science*, 112 (5):896-897. **(6.84)**
14. Sharma Jyotsana, Sharma KK, Kumar A, Mondal KK, Thalor S, Maity A, Gharate R, Chinchure S and Jadhav VT. 2017. Pomegranate bacterial blight: symptomatology and rapid inoculation technique for *Xanthomonas axonopodis* pv. punicae. *Journal of Plant Pathology*, 99 (1) : 109-119. **(7.27)**
15. Saminathan T, Bodunrin A, Singh NV, Devarajan R, Nimmakayala P, Jeff M, Aradhya M and Reddy UK. 2016. Genome-wide identification of microRNAs in pomegranate (*Punica granatum* L.) by high throughput sequencing. *BMC Plant Biology*, 16:122. **(9.96)**
16. Singh NV, Abburi VL, Ramajayam D, Kumar R, Chandra R, Sharma KK., Sharma Jyotsana, Babu KD, Pal RK, Mundewadikar DM, Saminathan T, Cantrell R, Nimmakayala P. and Reddy UK. 2015. Genetic Diversity and association mapping of bacterial blight and other horticulturally important traits with microsatellite markers in pomegranate from India. *Molecular Genetics and Genomics*. Doi:10.1007/s00438-015-1003-0. **(8.98)**
17. Singh NV, Saminathan T, Chandra R, Awachare Babu KD, Mundewadikar DM and Pal RK. 2015. RNA isolation from high polyphenol containing tissues of pomegranate. *Indian Journal of Horticulture,* 72(2): 273-277 **(6.15)**
18. Singh NV, Sharma J, Chandra R, Babu KD, Shinde YR, Mundewadikar DM and Pal RK. 2016. Bio-hardening of *in-vitro* raised plants of Bhagwa pomegranate (*Punica granatum*). *Indian Journal of Agricultural Sciences*, 86 (1): 132136 **(6.22)**

Personnel

Joining

- Dr. Prakash G Patil, Scientist (Plant Biotechnology) joined ICAR-NRCP, Solapur on 01.07.2017 due to transfer from ICAR-IIPR Kanpur.

Retirement

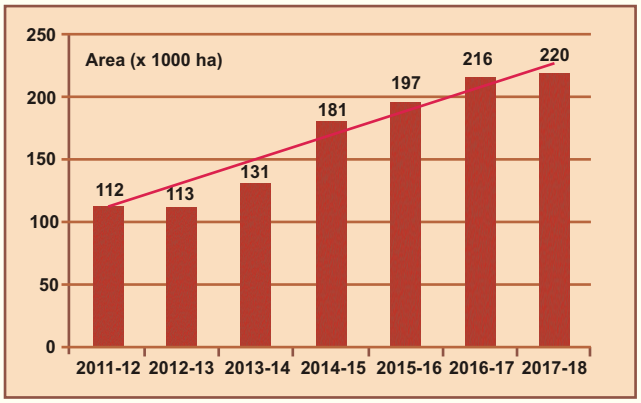
- Dr. RK Pal, Director ICAR-NRC on Pomegranate retired from the ICAR services on 31.12.2017.

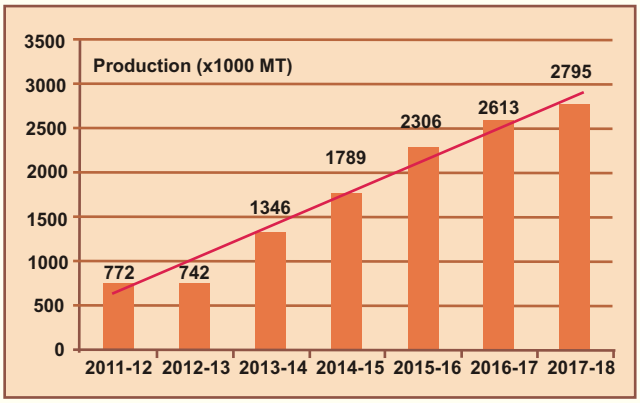
Promotions

- Dr. UR Sangle, Senior Scientist (Plant Pathology) was promoted to Principal Scientist.
- Dr. Prakash G Patil, Scientist (Plant Biotechnology) was promoted from RGP 6000 to RGP 7000.
- Dr. Ashis Maity, Scientist (Soil Science) was promoted to Senior Scientist.
- Dr. Nilesh Gaikwad, Scientist (Agrl. Structures & Process Engg.) was promoted from RGP 6000 to RGP 7000.

New initiatives

- Production of residue free pomegranate for export market.
- Developing a new variety for bigger fruit size along with promising fruit traits.
- Developing bacterial blight resistant / tolerant variety through molecular breeding. Gene responsible for bacterial blight will be identified and regulated at gene level.
- Exploitation of rootstocks for salinity, wilt and bacterial blight in pomegranate
- Amino acid based micronutrient formulation for better fruit size and quality
- Response of pomegranate to deficit irrigation and partial root zone drying
- Hi-fibre cookies from de-oiled seed cake
- Unravelling the mechanism and mitigation strategies for aril browning and fruit cracking in pomegranate (in collaboration with ICAR-NIASM, Baramati)
- Issue of Soil Health Cards (SHC) to the farmers of villages adopted under MGMG





Pomegranate area & production during 2011-12 to 2017-18 (Source: http://nhb.gov.in)

OBITUARY

Dr. Vilas Tejrao Jadhav
(Oct 02, 1950 May 06, 2018)

ICAR-National Research Centre on Pomegranate, Solapur mourns the sad demise of Dr. VT Jadhav, Director (Retd.), ICAR-NRC on Pomegranate, Solapur, who breathed his last on May 6, 2018 at his home Aurangabad. NRCP shall ever remain indebted to Dr. VT Jadhav the founder Director (Dec. 5, 2006- Oct. 31, 2012) of this newly established Centre, for his keen interest and benevolent guidance in establishing the Infrastructure facilities of this centre and handling major pathological issues in pomegranate during this tenure from 2006-2012.

In a short span of 6 years the centre was nationally recognized for its potential in handling farmers' problems. The magnificent NRCP Office-cum-Laboratory-Building which came up during his tenure is being highly appreciated even today by visitors from all over India. Dr. VT Jadhav will always be remembered at NRCP for giving a strong foundation to this centre.

The staff of ICAR-National Research centre on Pomegranate, Solapur, express heartfelt condolences to the grieved family and pray the Almighty to give strength to bear the irreparable loss and vacuum created by his sudden demise.

With Deepest Sympathy
STAFF
ICAR-NRC on Pomegranate
Solapur

Night view of ICAR-NRC on Pomegranate office-cum-laboratory builiding

हर कदम, हर डगर
किसानों का हमसफर
भारतीय कृषि अनुसंधान परिषद

Agrisearch with a human touch

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