अजैविक स्ट्रैस प्रबंधन समाचार
Abiotic Stress Management News

भाकृअनुप-राष्ट्रीय अजैविक स्ट्रैस प्रबंधन संस्थान
(समतुल्य विश्वविद्यालय)
मालेगाँव खुर्द, बारामती – 413 115, पुणे, महाराष्ट्र, भारत

ICAR- National Institute of Abiotic Stress Management
(Deemed to be University)
Malegaon Kh., Baramati - 413 115, Pune, Maharashtra, India

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From the Director's Desk.....

Greetings from ICAR-NIASM.

The problems of abiotic stresses are exacerbated by global warming and climate change. The looming gap between water availability and demand necessitates the development of strategies for enhancing crop adaptation to drought and salinity stresses through increased water-use efficiency and tolerance to salinity. ICAR-NIASM has taken lead to carry out research on advancement of agricultural research for delivering technologies for benefit of farmer's community through basic and strategic research to address issues of various kinds of abiotic stresses. We are using agronomic, genetic, biochemical, and omics approaches for mitigation and enhancing adaptation to these stresses. Our long term goals are improvement and stability in crop yield under various abiotic stresses.

As Director of this new and unique institute, there are many challenges and responsibilities to create best research facilities in order to utilize potential of young scientific staff in making strategies for management of abiotic stresses. Since this institute came into existence with Deemed to be University status, efforts are being made to start academic activities for development of research driven teaching facilities for PG and Ph.D. programmes. ICAR-NIASM has started research work focused on basic and fundamental studies at cellular and molecular levels to complement applied research.

Institute conducted many important events during last six months such as Swachh Bharat Abhiyan, Constitution Day, Experts Consultation Meeting, Training cum Exhibition Program on Dragon Fruit Cultivation, Maha Agro State Level Exhibition, World Soil Health Day, Vigilance Week, Agriculture Education Day, Krushik Exhibition, Republic Day, International Women's Day and Training on ICAR-ERP. Under Mera Gaon Mera Gaurav programme, our scientists provided requisite advice and information to the farmers of the adopted villages so that income of farming community can be increased.

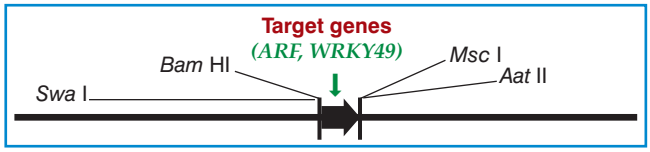
I thank the Editorial team lead by Dr. D.P. Patel who has made tremendous efforts to include key highlights of the institute in this issue of the newsletter. I also place on record my thanks to all the staff members who have contributed for this issue of Newsletter. I extend my sincere thanks to Dr. Trilochan Mohapatra, Secretary (DARE) & Director General (ICAR); Shri Sunil Kumar Singh, Additional Secretary & Financial Advisor (DARE/ICAR); Shri Chhabilendra Roul, Additional Secretary (DARE) & Secretary (ICAR); DDG (NRM, ICAR); ADG (Soil & Water Management), and ADG (AAF & CC) for their continued support to ICAR-NIASM. I am very much confident that this issue of the Newsletter would provide useful information for advancement of research on abiotic stress management to readers across different domains.

(Narendra Pratap Singh)

Research Highlights

Virus induced gene silencing in soybean

Virus induced gene silencing (VIGS) vectors were developed to knockdown the ADP Riboxylation Factor (*ARF*) and *WRKY-49* genes. These genes were successfully down regulated using VIGS technology. Soybean genotypes including locally adapted cultivars JS-335 and NRC-37 were used in the experiment to silence these genes and to validate their role in water stress tolerance.

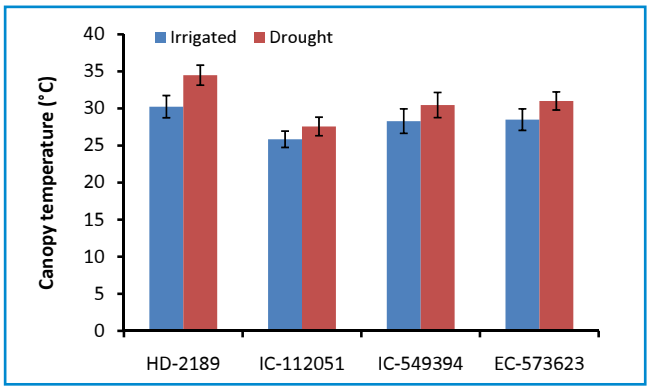


VIGS construct for silencing *ARF* and *WRKY-49* genes

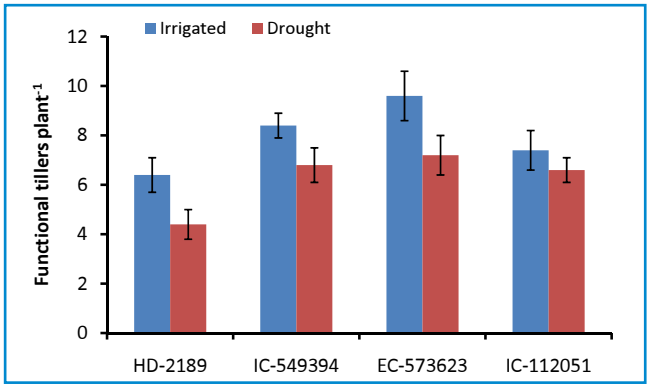
Phenotype of vector alone, *WRKY-49* and *ARF*-silenced soybean plants

Traits associated with adaptation of wheat genotypes to water stress

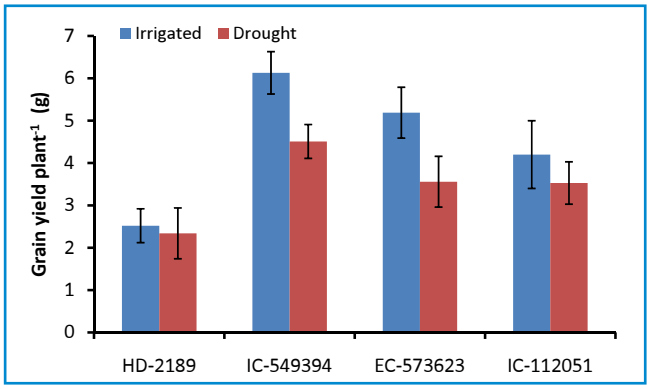
Water stress tolerance capability among diverse bread wheat genotypes was determined using traits associated with water stress tolerance to select promising wheat genotypes for use in breeding programme. 120 wheat genotypes were evaluated for traits associated with adaptation to limited soil moisture. Physiological and yield related attributes were recorded. Wheat genotypes, IC-112051, IC-549394 and EC-573623 showed higher functional tillers and photosynthetic efficiency compared to local check HD-2189. Wheat genotypes viz. IC-549394, EC-573623 and IC-112051 were found suitable for cultivation under limited soil moisture conditions.



Genetic variability in canopy temperature in promising wheat genotypes under irrigated and drought conditions



Genetic variability in functional tillers in promising wheat genotypes under irrigated and drought conditions



Genetic variability in grain yield/plot in promising wheat genotypes under irrigated and drought conditions

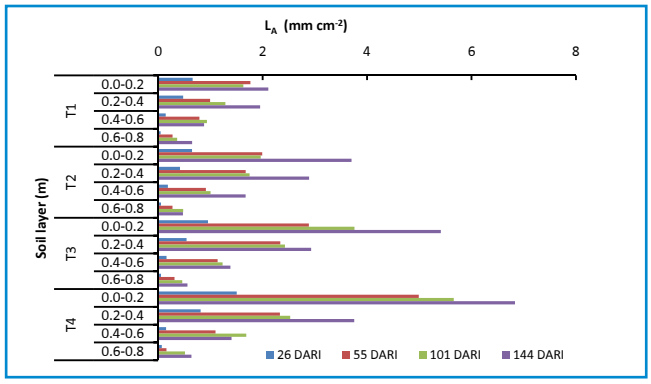
Demonstration of new multifunctional ratoon manager machine for sugarcane farmers

Sugarcane farmers are facing severe problems of trash management, fertilizer placement and other field operations in ratoon crop that results in comparatively lower cane yield. Open trash burning, most popular practice utilized in ratoon sugarcane causes serious environmental pollution and soil health problems. To address these issues a newly developed multifunctional ratoon manager machine was demonstrated to sugarcane farmers of Pandare village on March 23, 2017 by ICAR–NIASM. The machine was demonstrated in association with Pandare Panch Krushi Shetkari Mandal and Shiddeshwar Sahakar Sankul, Pandare and 50-80 farmers participated. This machine is very useful for the sowing of intercrop viz., chickpea and maize in ratoon sugarcane. Few of the farmers raised proposal to fix the hiring charges of machine for the next season to avail the service from ICAR–NIASM. During the demonstration, Prof. Narendra Pratap Singh, Director, ICAR-NIASM, and other scientists (Dr G.C. Wakchaure and Dr Yogeshwar Singh) interacted with farmers and provided their valuable guidance to farmers.

Onsite demonstration of multifunctional ratoon manager machine

Conservation agriculture for improving root growth and mitigation of short term water stress in ratoon sugarcane

A mini-rhizotron technique was used for periodic monitoring of the rooting patterns of ratoon sugarcane. Standard access tubes of 1.8 m length were installed in the field and in-situ root images representing 0.2 m soil depth were captured using a Root Scanner. The images were analyzed for root length (L) with the RootSnap! Software. The maximum root density (L_A) was monitored in surface soil (0.4 m) having 75-85% roots. The growth rate of roots varied during the crop cycle and the maximum was recorded between 26 to 55 days after ratoon initiation (DARI). The L_A in surface soil (0.2 m) was comparatively higher with conservation agriculture (CA) treatments than the other ratoon management treatments. Severe water stress conditions after 55 DARI caused stagnation in L_A or even decline due to root decay in the surface soil until 101 DARI especially in control (no-trash without fertilizer nitrogen) and conventional practices (burning of left over trash and broadcasting of basal fertilizer doses), though root density substantially improved in deeper layers. On the contrary, the roots continued to grow in CA treatments as indicated by substantial improvement in L_A from 55 to 101 DARI.

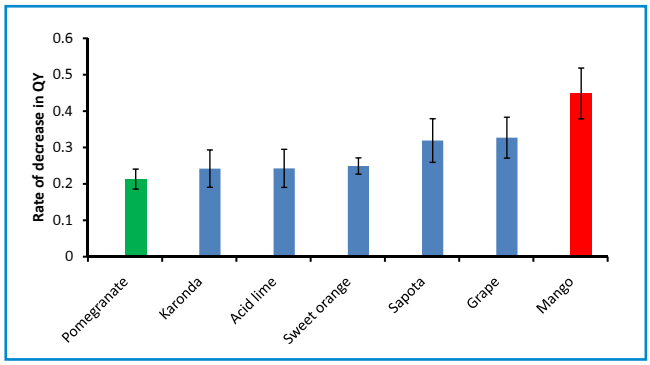


Effect of ratoon management practices on cumulative root density (L_A) of sugarcane

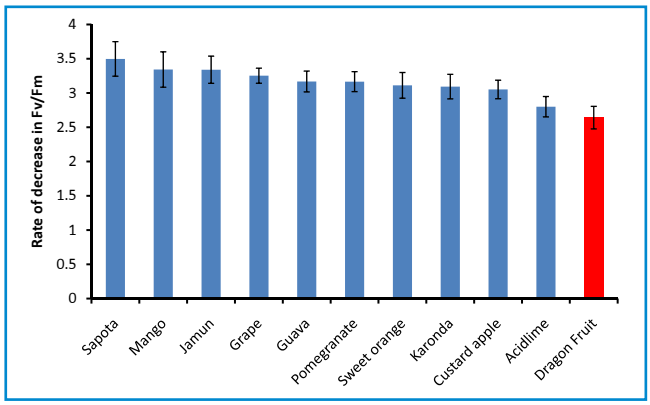
Research Highlights

Abiotic stress tolerance in fruit crops

Chlorophyll fluorescence phenotyping imaging tool was used to assess the photosynthetic efficiency in fruit crops. High sensitivity to desiccation was observed in mango and pomegranate was found to be tolerant to water stress. The rate of decrease in quantum efficiency with moisture stress was in order of pomegranate < karonda < acid lime < sweet orange < grape < sapota < mango. The sensitivity to rise in temperature was lesser in dragon fruit and acid lime than other fruit crops. The rate of decrease in quantum efficiency with rise in temperature was in the order of Dragon fruit > acid lime > custard apple > karonda > sweet orange > pomegranate > guava> grape > jamun > mango > Sapota indicating that dragon fruit is more tolerant to rise in temperature than other fruit crops.



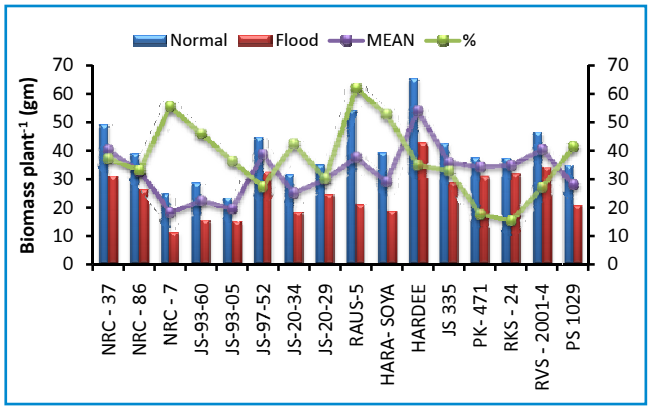
Reduction in QY(Fv/Fm) per unit water loss



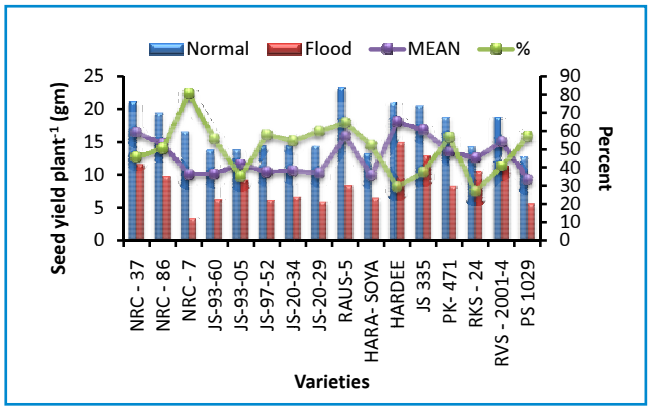
Reduction in Fv/Fm per unit increase in temperature

Screening of soybean for waterlogging tolerance

Field experiment was conducted for screening of soybean varieties for waterlogging tolerance. Flooding was continued for a period of 15 days at vegetative stage, however, at reproductive stage flooding was continued for 20 days to impose waterlogging in all the varieties. Observations on 50% flowering, 100% flowering, maturity, crop growth parameters, biomass accumulation, recovery of chlorophyll (a, b), changes in root anatomy and yield related attributes were recorded in all the treatments. A significant reduction in biomass accumulation (15-62%), and seed yield (26-80%) was observed in almost all the varieties due to waterlogging treatment at vegetative stage. Similar trend in crop performance was also observed due to waterlogging at reproductive stage. Among the total varieties screened, Hardee, JS-335, NRC-37, RAUS-5, PK-471, RVS-2001-4 and RKS-24 performed better compared to other varieties under normal conditions. However, RVS-2001-4 and RKS-24 showed minimum reduction in most of the parameters under flood treatment compared to normal condition at vegetative stage. Whereas, after flood treatment at reproductive stage, performance of RVS-2001-4 and RAUS-5 was found better compared to other varieties. Performance of RVS-2001-4 was found better under flood treatment at the growth stages, vegetative as well as reproductive stage compared to all other varieties under test. Further, under field condition, vegetative crop growth stage was found more suitable over reproductive stage for screening of waterlogging tolerance due to wide range of variation in yield related traits at vegetative growth stage. Biomass of soybean varieties as influenced by normal and flood water management at vegetative stage. Seed yield of soybean varieties as influenced by normal and flood water management at vegetative stage.



Biomass of soybean varieties as influenced by normal and flood water management at vegetative stage.

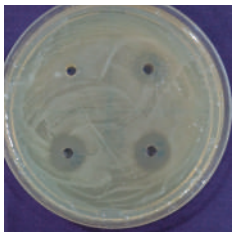


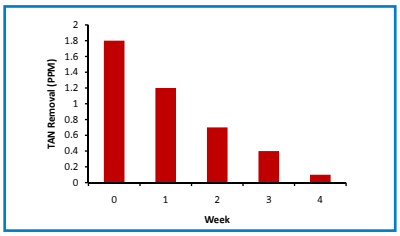
Seed yield of soybean varieties as influenced by normal and flood water management at vegetative stage.

Role of silver nanoparticle on mitigation of multiple stresses in fish

Stilbite is abundantly available in quarries of Maharashtra, hence a method for trapping of nanosilver in stilbite has been standardized by modifying the published protocol (*Bioresource Technology*, 2012, 117C, 86-91). Bactericidal activity of silver nanoparticles and zeolite based nano-composite has been evaluated against *Pseudomonas* sp. using agar well diffusion method. Application of nanosilver stilbite helped in alleviation of multiple stresses in the pond with the result of higher fish production. Bactericidal activity and Ammonia removal in aquaculture pond using zeolite based nanocomposite

Preparation of nanosilver based feed formulations (0-1 mg/kg) has been standardized and were used for alleviation of lead and high temperature in Channa striatus. Results indicated that supplementation of Ag-NPs with concentration of 0.5 mg/kg in the diet has a definitive role in the mitigation of multiple stresses in C. striatus with the result of improved growth performance, immunity, survival and maintained stress biomarker. Feeding with higher concentration of Ag-NPs (1 mg/kg diet) had reduced growth performance.



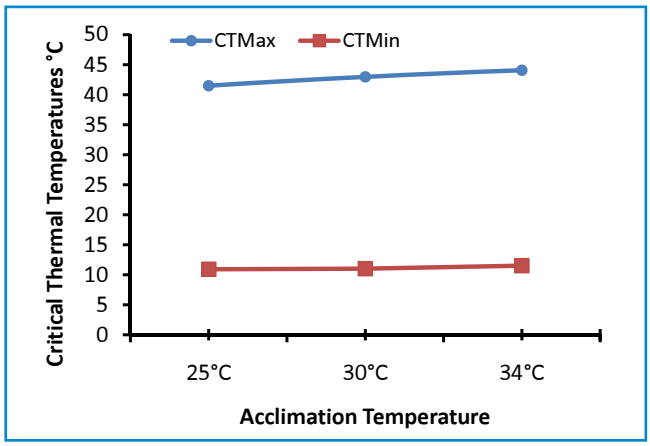


Bactericidal activity and Ammonia removal in aquaculture pond using zeolite based nanocomposite

Identification, cloning and expression of gene against temperature, salinity and hypoxia in fish

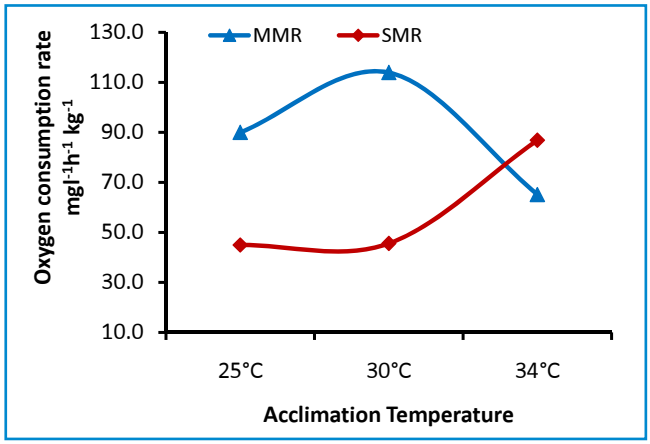
Critical Thermal Tolerance: The critical thermal methodology for thermal tolerance was used to determine CTMax and CTMin for Tilapia, *Oreochromis mossambicus* sampled from Ujani reservoir on Bhima River. Tilapia was acclimated at three constant temperatures, 25, 30 and 34°C for a period of 30 days. Fishes of average size 0.29 g were used of estimating CTMax and CTMin. At the end of 30 days the fishes were exposed to 0.3°C/min increase and decrease in water temperature till the fishes exhibited loss of equilibrium (LOE) by losing its ability to stay upright in water. The fishes acclimated to 25, 30 and 34°C exhibited CTMax at 41.5, 43.5 and 44.1°C, respectively. The CTMin values for 25, 30 and 34°C acclimation was 11.8, 12.4, 11.5°C. The lethal

thermal maximum and lethal thermal minimum for tilapia acclimated at 25, 30 and 34°C was 43, 43.7, 44.3 and 8.8, 9.45, 9.8°C, respectively.



CTMax and CTMin of *Oreochromis mossambicus* acclimated to 25, 30 and 34°C

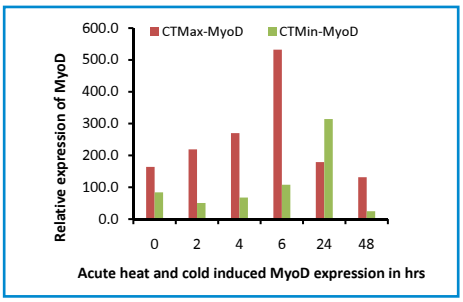
Oxygen Consumption: Oxygen Consumption rate of Tilapia *Oreochromis mossambicus* fry acclimated to 25, 30 and 34°C were measured. Standard metabolic rate, Maximum metabolic rate and aerobic scope was determined with respirometer, oxygen concentration was measured using Winkler's method. The Standard Metabolic Rate (SMR) of acclimated fishes was analyzed without putting the fishes under stress in the respirometery chamber. The Maximum Metabolic Rate (MMR) of acclimated fishes was accomplished in water tub in which fishes were chased for 3 minutes. The SMR for fishes acclimated to 25, 30 and 34°C were 44.99, 45.57 and 86.85 $mgl^{-1}h^{-1}kg^{-1}$ and MMR 89.97, 113.93 and 65.14 $mgl^{-1}h^{-1}kg^{-1}$, respectively.



Standard metabolic rate (SMR) and Maximum Metabolic Rate (MMR) of *Oreochromis mossambicus* fry acclimated to 25, 30 and 34°C

SMR and MMR increased with increase in acclimation temperature but at higher 34°C acclimation the fish exhibits limitation in consuming available dissolved oxygen in MMR. It suggests that the 34°C is the limit of the fish capacity to consume oxygen from water. It results in decrease in the aerobic scope of fish at higher temperature suggesting vulnerability of oxygen consumption capacity to thermal stress.

Acute Heat and Cold Stress: Tilapia was exposed to acute change in temperatures such that the temperatures rise to their CTMax and CTMin values in a very short period at the rate of 0.3°C min^{-1}. The fishes were then samples at 0, 2, 4, 6, 24, 48 hrs and were analyzed for impact of acute thermal stress on the expression of MyoD. The results suggest that MyoD expression is induced and peaks at 6 hours with decreased expression at 24 and 48 hrs sampled fishes. It suggests that the acute heat stress response expression of MyoD takes 6 hours. In Acute cold stress MyoD achieves maximum expression at 24 hours with decrease at 48 hours. Differential response time and quantity of expression of MyoD is observed to the two types of acute thermal stress conditions.



Acute heat and cold exposed *Oreochromis mossambicus* expression of *MyoD* gene

New Initiatives

Development of livestock experimentation facility

A low cost livestock experimentation facility was developed at ICAR-NIASM. The facility consists of cattle, goat and poultry sheds that will be used for housing the animals used for carrying out abiotic stress studies in large and small ruminants and poultry birds.

Low-cost livestock experimentation facility

RNAi in wheat

RNAi constructs have been made for functional characterization of genes associated with adaptation of wheat genotypes to drought stress. Abscisic acid and ethylene biosynthesis and signalling pathways genes will be down-regulated in order to enhance drought stress tolerance.

Major events

Visit of Dr. Trilochan Mohapatra, Secretary, DARE and Director General, ICAR

Dr. Trilochan Mohapatra, Secretary, Department of Agriculture Research and Education, and Director General, Indian Council of Agricultural Research, visited ICAR-IASM, Malegaon, Baramati on 23rd October 2016. The Plant Phenomics facility, Meteorological Observatory and the Nira Guest House at ICAR-NIASM were inaugurated by Dr. T. Mohapatra. Technical folders such as "NIASM-Plant Phenomics", "An overview of ICAR-NIASM Agrometeorological Observatory and Present Climatic Trend at Baramati" and "Breeding and Seed Production Technology of Stinging Catfish *Heteropneustes fossilis* (Shingi)" were released on this occasion. In his address, Dr. Mohapatra emphasized the need of basic and strategic research on stress tolerance mechanisms in resilient crop plants, livestock and fisheries, screening abiotic stress tolerant genotypes in crops livestock and fisheries, setting up facility for animal and fishery research, understanding stress responses through transcriptomic studies, gene function studies through Virus Induced Gene Silencing (VIGS), selection of horticulture crop such as drought tolerant Dragon fruit, identification of microbes imparting drought tolerance and use of new science. He cautioned

Inauguration of NIRA Guest house

that not only the publications but also the impact of research be kept in mind while initiating the research projects. Finally, he advised Scientists that duty and sacrifice are the ways to achieve excellence in scientific pursuits.

Inauguration of Agrometeorological observatory

Inauguration of Plant Phenomics facility

Release of publications by Dr. T. Mohapatra, Secretary, DARE and DG, ICAR

Swachh Bharat Abhiyan

"Swachha Bharat Pakhwada" was conducted during October 16-31, 2016. On 15th October, World Food Day and Swachha Bharat Pakhwada was inaugurated by Mr. Nilesh Deshmukh, Chief Officer, Nagar Parishad, Baramati. Dr. K. K. Krishnani, Head, School of Edaphic Stress Management, presented on the theme "Climate is changing, Food and Agriculture must too". Swachhta Abhiyan was conducted at NIASM residential quarters and at the institute main gate. During the Pakhwada, poster competition was held on October 18, 2016 on the topic "Decentralized Solid Waste Management". Students from Tuljaram Chaturchand College, Baramati and Shardabai Pawar Mahila Mahavidyalay, Sharadanagar, Malegaon and Scientists, Technical Assistants, Senior Research Fellows, Young Professionals of NIASM participated. Three posters were awarded under student category. Poster titled "Importance of decentralized solid waste management" by S K Bhujbal and A P Kharat of Tuljaram Chaturchand College was awarded Best Poster award under student category. Elocution competition was held on October 20, 2016 on the topic "Swachha Bharat Abhiyan "Where, Why and How?" Ideas on self-involvement for Swachhata, separation of waste into biodegradable and non-biodegradable, reduction of air pollution, reuse of waste and waste water for agriculture, cleaning of public places to reduce insect prevalence so as to reduce the disease incidences were presented. Swachhata

Mr. Nilesh Deshmukh, Chief Officer, Nagar Parishad, Baramati inaugurating the Swachha Bharat Pakhwada

sensitization and Onsite training cum demonstration was conducted using poster exhibition and portable Vermicomposting unit at NIASM guest house and at Malegaon.

Cleanliness drive near Staff quarter at ICAR- NIASM during Swachh Bharat Abhiyan

The premises around the storage pond was chosen for cleanliness drive during Swachh Bharat Abhiyan. All the weeds, grasses and other debris along the periphery of the storage pond were manually removed and the area was made clean. Swachh Bharat Abhiyan was also conducted on 10th February, 2017 and the area near the NIASM parking lot was chosen for cleanliness drive on that day.

Mera Gaon Mera Gaurav

Kusegaon, Hinganigada, Roti, Diskal, Khor villages were visited during the year 2016-17. A total of 185 farmers were visited and interacted. Animal health camp in collaboration with Department of Animal Husbandry, Baramati was held at Roti in which the farmers participated. Literature on agriculture practices and technologies were distributed namely Pradhan Mantri Fasal Bima Yojna, Information provided on Soil Health card, Literature support on Pomegranate management during drought, also technical folders on Shinghi breeding, Dragon fruit cultivation, Poultry, Cattle management during heat stress was distributed. Prof. Narendra Pratap Singh, Director, ICAR- NIASM, Baramati visited Grape and Pomegranate farmers of Shindewadi village adopted under MGMG and interacted with group of farmers associated with cultivation of Grape and Pomegranate for export purpose. He also discussed about the new fruit crop, Dragon Fruit which requires less water compared to Grape and Pomegranate. Farmers of Nimbodi, Lakadi, Shindewadi, Kajad and Bori were invited to participate in the Farmers Training Cum Exhibition Programme for promotion of Dragon Fruit cultivation as kitchen gardening in semi-arid region of Maharashtra organized on 25th March 2017 at ICAR-NIASM, Baramati.

Exposure visit of dragon fruit for water scarce areas

Institute Technology Management Unit

The novel tools, technologies, products, varieties and practical methods developed by the

ITMC meeting of ICAR-NIASM held on 7th October 2016

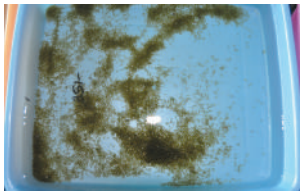
institute were registered at National Agencies and documented at ITMU. The management, transfer of technologies and its dissemination to the farming community is co-ordinated by the ITMU.

Potential technologies developed by the ICAR/ICAR-NIASM suitable for this area were identified for commercialization given as under:

- Dragon fruit: Wonder crop for degraded and water scarce area.


- Multi-purpose "SORF Machine" (Stubble shaving, Off-barring, Root pruning and Placement of basal dose of fertilisers)


- Breeding and seed production of stinging catfish, *Heteropneustes fossilis* (Shinghi)

- Information on these technologies was collected, documented and published for popularization among the farmers through various outreach programmes of institute such as Mera Gaon Mera Gaurav (MGMG) and Tribal Sub- Plan (TSP).

- Application for registration of Trademark of ICAR-NIASM was filed at Trademark Registry Office Mumbai.

Vigilance Week

The Vigilance Week was organized from October 31 to November 5, 2016 at the institute on the theme "Public participation in promoting integrity and eradicating corruption". Prof. Narendra Pratap Singh, Director, ICAR-NIASM, emphasized the need to be vigilant. The various informative talks on eradication of corruption through traditional ways like Yoga and meditation, public participation in promoting integrity and eradication of corruption, observing vigilance, LTC, TA and advance and Do's and Don'ts were delivered by the various participants. The quiz competition on eradicating corruption and related matters elicited enthusiastic response from the participants and served as main mode of communication about the importance of vigilance.

Celebration of Vigilance Week at ICAR-NIASM

Constitution Day

The Constitution Day was observed at ICAR-National Institute of Abiotic Stress Management, Malegaon, Baramati on November 26, 2016 Prof. Narendra Pratap Singh, Director read the Preamble to the Constitution in Hindi and English to the staff of the Institute. After reading the Preamble, the Director explained the meaning and philosophy of the Preamble to the Constitution of India.

Constitution Day celebration at ICAR-NIASM, Malegaon, Baramati

Agricultural Education Day celebration at ICAR-NIASM, Malegaon, Baramati

Agricultural Education Day

"Agricultural Education Day" was celebrated at ICAR-NIASM, Baramati on 3rd December 2016 with the participation of school children along with their teachers, farmers, District Agriculture Officers, Officials from ATMA, Pune and staff of ICAR-NIASM. The drawing competition based on theme of Indian Farming was conducted for the school children wherein, more than 50 school children of the Zilha Parishad Primary School, Malegaon Khurd, Baramati participated. The interactive meeting was organized between the scientists of ICAR-NIASM and farmers, District Agriculture Officers and Officials from ATMA, Pune. They were briefed about the work carried out at the institute and the experiments which are undertaken at the experimental fields.

Agricultural Education Day celebration at ICAR-NIASM, Malegaon, Baramati

Experts Consultation on Management of Abiotic Stress in Agriculture: Roadmap for Future Research and Education

Initial seven years were spent on developing infrastructure and research facilities at NIASM. Now, this unique institute is ready to expand its preliminary research into full-fledged projects on abiotic stress in crops, livestock and fisheries. Consultation meeting was organized at ICAR-NIASM during January 30-31, 2017 to know about on-going research on abiotic stress management and mitigation at other institutes, expectations of other institutes from ICAR-NIASM and possible opportunities for research collaboration and to establish synergy in achieving the common goal of abiotic stress management. The brain storming session included presentation by experts in wide range of discipline with focus on efforts to understand abiotic stress environment, options for mitigation of stress, approaches for improving adaptation to stress and policy support for adoption of technologies. There were five sessions including the inaugural and plenary sessions. The other three sessions were carried out in parallel involving three groups of expertise viz. Natural Resource Management, Crop and Horticultural Sciences and Animal and Fisheries Sciences. Each session had a brief key note address followed by

brief presentation and detailed discussion. About 40 participants including those from institute participated in this meeting.



Maha Agro 2016 State Level Exhibition

ICAR-NIASM exhibited agricultural technologies in the Maha Agro 2016 State Level Exhibition at Aurangabad, Maharashtra. The dragon fruit planting material/cuttings exhibited at the stall generated interest in knowing more about Dragon Fruit. Shri Vijay Anna Borade, Chairman, KVK Jalna took keen interest into the dragon fruit and fisheries so as to utilize the water resource available at Jalna. More than 500 farmers visited the NIASM stall.

World Soil Health Day

World Soil Health Day was organized on December 5, 2016, and more than 75 farmers from various villages near Baramati, were participated. Prof. Narendra Pratap Singh, Director, NIASM, gave an overview of importance of soil health cards in ensuring balanced use of fertilizers, enhancing crop productivity along with reduction in cost of cultivation and advised the gathering to popularize the soil health card based farming among all the farmers to improve the production and quality of the produce, in turn uplift the socio-economic status of the farming community. Dr K. K. Krishnani, Head-School of Edaphic Stress Management addressed the gathering on the need for soil health assessment, soil test based nutrient recommendations, edaphic stresses and their


management through integrated farming and integrated nutrient management.

Exhibition at KVK, Baramati

ICAR-NIASM participated in Krushik exhibition at KVK, Baramati during January 19-22, 2017.

Republic Day

ICAR-NIASM celebrated 68th Republic Day on 26th January 2017 at the Institute.

Tribal Sub-plan

Activities related to improved technology interventions in field crop and horticulture crops, livestock & poultry, fisheries and integrated farming have been undertaken in various villages of Navapur tehsil in Nandurbar district for improving the livelihood of resource poor farmers as part of TSP, which led to higher production/ marketable yield of rice (6-10 tonnes/ha), Sugarcane (40-75 tonnes/acre), onion (25-68 tonnes/ha), banana (15,000-27,000 kg/acre), baby corn (4 tonnes/acre), milk (Av. 108 – 188 Litres/month), and fish (>2000 kg/ha). Improved technology interventions in goat farming as backyard enterprise and dragon fruit cultivation as kitchen gardening are also undertaken for livelihood improvement of tribal farmers. Farmers Field Day were organized to showcase the Farmers Participatory demonstrations on "Water efficient crop production technology in sugarcane" and "four point rice production technology".

Monitoring of four point rice production technology

Field Day on Water efficient crop production technology in sugarcane

Implementation of improved technology intervention in fruit and vegetable crops led to adoption of cultivation of virus free tissue culture banana, *rabi* onion and late *kharif* onion. On the 15th February 2017, exposure visit related to precision farming and micro-irrigation systems, agro-products and cultivation of tissue culture plants were organised at Jain Irrigation Jalgaon.

Monitoring of improved technology interventions in virus free tissue culture banana plants

Exposure visit at Jalgaon

Major events

For upliftment of livelihood of tribal farmers from Navapur and Dhadgaon tribal areas, 44 goat farming units were established. Four training programme cum exposure visits were also organized for 177 tribal farmers regarding scientific management of goats at KNP college of Veterinary Science, Shivral on 6-8, 9-11, 20-22 and 23-25 March, 2017.

Goat farming training

Distribution of goats

Various inputs were distributed among tribal farmers along with conduct of exposure visits and training programmes. These inputs were distributed in the presence of Dr Heena Gavit, Hon'ble Member of Parliament, Nandurbar, Dr Vijay Kumar Gavit, Hon'ble Member of Legislative Assembly, Maharashtra and Prof. Narendra Pratap Singh, Director ICAR-NIASM and Dr K.K. Krishnani, Chairman-TSP, and Dr NP Kurade, Member, in the various programmes organized at Navapur taluka.

Distribution of inputs

Exposure visit on fish and prawn farming and their management was organized for 38 tribal farmers at KVK-Navasari March 25, 2017. In addition, a training programme on method for Fish feed formulation and preparation was also conducted on March, 26, 2017 for about 100 tribal farmers.

Expsoure visit related to management of fish and prawn farming

Training on nutritional management in livestock and fisheries

International Women's Day

International women's day was celebrated on March 8, 2017 at ICAR-NIASM. Mrs. Prerna Gupta, NGO, Ms. Nilprabha Bhosale, Govt. Advocate, Baramati and Ms. Priyanka Kate, Govt. Advocate, Baramati presided over the function.

Inauguration of Goat Farm

The goat unit was inaugurated on March 24, 2017 by Director, ICAR-NIASM. Low cost, make shift goat shed was constructed for housing and stall-feeding of goats. The goat shed having the covered area along with free area for animal movement. The unit was started with Osmanabadi goats and it is planned for keeping other native Indian goat breeds for carrying out research experiments to study abiotic stress management in goats.

Inauguration of Goat farm at ICAR-NIASM

Training cum exhibition program on dragon fruit cultivation

Training cum exhibition programme on "Promotion of dragon fruit cultivation as kitchen gardening in semi-arid region of Maharashtra" held on March 25, 2017. A group of farmers was invited from the selected villages to ICAR-NIASM for onsite demonstration of various water saving technologies (including dragon fruit cultivation), planting methods for establishment of orchards in shallow rocky land, and other institutional activities.


Training cum exhibition program on dragon fruit cultivation at ICAR-NIASM

Farmers Visits

Farmers from Phaltan, District Satara visited the institute along with faculty members of College of Agriculture, Shreemant Shivajiraje College of Horticulture, Phaltan on January 7, 2017.


Visit of scientists

- Dr. Suzanne Boschma, Research Agronomist and expert in farming systems from NSW, Department of Primary Industries, Australia visited ICAR-NIASM, Malegaon, Baramati on February 14, 2017 and delivered a lecture on "Tropical Pasture Development Northern Inland NSW, Australia".
- Dr. Sumitra Arora, Principal Scientist, ICAR-National Centre of Integrated Pest Management, New Delhi, delivered resource lecture entitled, "Pesticides as abiotic stressors and their management in crop protection" on January 10, 2017.

Training on ICAR-ERP (MIS and FMS)

A training programme was organized at ICAR-NIASM, Baramati during January 19-24, 2017 to know about operational issues regarding ERP. 18 representatives from 5 different ICAR institutes of the western zone participated in the training. The 6 institutes were ICAR-NIASM, NRC-Grapes, DOGR and DFR, Pune, NRC-Pomegranate, Solapur and ICAR-CIRCOT, Mumbai. The programme covered various topics under four major modules namely "Payroll and Finance", "Supply Chain Management (SCM)", "Human Resource Management System (HRMS)" and "Project Management". Among other things the programme dealt with functionalities like employee transfer, employee self-service, leave balance adjustment, payroll posting to general ledger (GL), account receivable (include receipts), asset capitalization, general ledger (including journal entries), budget uploading, purchase requisition, auto create, applying tax on purchase order, receipt creation against a purchase order, item inspection/delivery, RPP creation for scientific projects and project budget entering.


Major events

Visit of Hon. Shri Sharadchandraji Pawar

Padma Vibhushan Shri Sharadchandraji Pawar, Hon'ble MP Rajya Sabha & Ex-Union Cabinet Minister for Agriculture, Govt. of India visited ICAR-NIASM on January 18, 2017.

Workshops/Seminar/Symposia/Conference/ Training attended

- Dr. Mahesh Kumar, Scientist (Plant Physiology) attended training on "Training & awareness workshop on J-gate@CeRA for Western region states (Gujarat, Maharashtra, Goa, Madhya Pradesh) at ICAR-DKMA and NAU, Navsari on October 8, 2016.
- Prof. Narendra Pratap Singh participated in 3rd AAHP Convention and National Symposium on Poultry Health and Welfare: Riding the wave to the future at Goa at ICAR-CCARI, Goa, during October 16-21, 2016.
- Prof. Narendra Pratap Singh participated in Agro-Ecotourism: An emerging enterprise for agriculture Diversification as the Guest of Honour at ICAR-CCARI, Goa during October 30-01 November, 2016.
- Dr K. K. Krishnani Participated in National Seminar on "Soil health assessment with Mridaparikshak" and Brainstorming session on "Efficient utilization of soil test kits for the assessment of soil health" at IISS-Bhopal during November 4-5, 2016 and delivered resource/invited talk on "Agricultural Soil Health Assessment in Navapur Taluka of Nandurbar District of Maharashtra".
- Dr. Jagadish Rane, Head, SDSM, participated in Horticulture crops conference held at Nashik during November 5-6, 2016
- Prof. Narendra Pratap Singh and Dr. G.C. Wakchaure, Scientist (Agricultural Structure & Process Engineering) participated in Edible Alliums: Challenges and Feature Strategies for Sustainable Production held at Jalna during November 7-9, 2016.
- Prof. Narendra Pratap Singh and Dr. Yogeshwar Singh, Senior Scientist (Agronomy) participated in Integrated Land Use Planning for Smart Agriculture - AN Agenda for Sustainable Land Management held at NBSS&LUP, Nagpur during November 10-12, 2016.
- Dr. Jagadish Rane, Head, SDSM; Dr. R. L. Choudhary, Scientist (Agronomy) participated in International Conference & Exhibition on " Sugarcane Value Chain-Vision 2025 Sugar" held at Vasantdada Sugar Institute (VSI), Pune during November 13-16, 2016
- Prof. Narendra Pratap singh; Dr. D. D. Nangare, Scientist (Soil and Water Conservation Engineering) participated in International meet and 7th Indian Horticulture Congress on Doubling Farmers Income through Horticulture, held at IARI, New Delhi during November 15-18, 2016.
- Prof. Narendra Pratap Singh; Dr. D. P. Patel, Principal Scientist; Dr. Yogeshwar Singh, Senior Scientist (Agronomy); Dr. R. L. Choudhary, Scientist (Agronomy); Dr. R. L. Meena, Scientist (Agronomy) participated in in 4th International Agronomy Congress "Agronomy for Sustainable Management of Natural Resources, Environment, Energy and Livelihood Security to Achieve Zero Hunger Challenge" held at ICAR-IARI, New Delhi during November 22-26, 2016.
- Prof. Narendra Pratap Singh; Dr. K. K. Krishnani, Head, SESM; Dr. N.P. Kurade, Principal Scientist (Veterinary Pathology) attended interactive workshop on administrative matters of the ICAR institute located in West zone, held at ICAR- CIFE, Mumbai on November 24, 2016.
- Prof. Narendra Pratap Singh attended VII Research Advisory Committee Meeting at ICAR-CCARI, Goa, on November 27-30, 2016.
- Dr K. K. Krishnani participated in NAAS Get-together meeting/General Discussions on the 2nd January 2017.

- Dr. D. P. Patel, Principal Scientist (Plant Physiology) attended one day training programme for Nodal Officers of the Public Authority under DARE/ICAR related to RTI-MIS Online Portal organized by RTI-PMU, DoP&T at CSOI, New Delhi on November 28, 2016.
- Dr. P.B. Taware attended training on "Recent Advances in Weed Management Strategies" at National Institute of Plant Health Management (NIPHM), Hyderabad during November 29-30, 2016.
- Dr. K. K. Krishnani, Head, SESM, participated in World Soil Day at KVK-Baramati on the 5th Dec 2016 and delivered resource lecture on "Agricultural soil health assessment, edaphic stresses and their management.
- Dr. D. D. Nagare, Scientist (Soil & Water Conservation Engineering) attended training on ICAR winter school on "Real Time Irrigation Management using Sensor Network, Decision Support System (DSS) and Electronic Controls for Precision Agriculture in Vertisols" at Bhopal during December 1-21, 2016.
- Dr. S. K. Bal, Principal Scientist and I/C Head-SASM; Dr. M. P. Brahmane, Senior Scientist, Biotechnology (Animal Science); Dr. Ajay K. Singh, Senior Scientist (Agricultural Biotechnology); Dr. Yogeshwar Singh, Senior Scientist (Agronomy); Dr. R. L. Choudhary, Scientist (Agronomy); Dr. Neeraj Kumar, Scientist (Fish Nutrition); Mr. Rajagopal, Scientist (Soil Chemistry/Fertility) participated in International conference on "Climate Change Adaptation and Biodiversity: Ecological Sustainability and Resource Management for Livelihood Security" held at ICAR-CIARI, Port Blair during December 8-10, 2016.
- Mahesh Kumar, Scientist (Plant Physiology) participated in National Congress on Plant Physiology (NCPP) at the Department of Crop Physiology held at University of agriculture Sciences, GKVK, Bengaluru during December 8-10, 2016.
- Dr. K. K. Meena, Senior Scientist (Agricultural Microbiology) participated in National Symposium of Indian Phytopathology Society New Delhi (West Zone) held at College of Agriculture, Udgir during December 11-12, 2016.
- Mr Rushikesh Gophane, Senior Technical Assistant (Horticulture); Mr. Patwaru Chahande, Senior Technical Assistant (Agriculture) attended training on "Operation and maintenance of improved implements and machinery for technical officers of ICAR Institutes" at ICAR-Central Institute of Agriculture Engineering, Bhopal (M.P.) during December 12-17, 2016.
- Dr. S. K. Bal, Principal Scientist and I/C Head-SASM attended AGMET-2016, National Symposium on Agrometeorology at TNAU, Coimbatore, Tamilnadu on December 20-22, 2016.
- Dr. M. P. Brahmane, Senior Scientist, Biotechnology (Animal Science), Dr. D. D. Nangare, Scientist (Soil & Water Conservation Engineering) participated in Maha-Agro exhibition held at Aurangabad during December 24-26, 2016.
- Dr. Jagadish Rane, Head-SDSM; Dr. M. P. Brahmane, Senior Scientist, Biotechnology (Animal Science) participated in 24th National Children's Science Congress, 2016 at VIIT, Baramati, during December 27-31, 2016.
- Prof. Narendra Pratap Singh attended Stakeholder's Consultation Meeting for doubling the farmers' income by 2022 at Pune on January 16, 2017.
- Dr. Neeraj Kumar, Scientist (Fish Nutrition) attended workshop on Comprehensive Metabolomics and Unknown Characterization Approaches Using Agilent LC-QToF and GC-QToF platforms at Bangalore during January 19-20, 2017.
- Dr. M. P. Brahmane, Senior Scientist, Biotechnology (Animal Science); Dr. D. D. Nangare, Scientist (Soil & Water Conservation Engineering) participated in KRUSHIK 2017 exhibition held at KVK, Baramati during January 19-22, 2017.
- Dr. K. K. Meena, Senior Scientist (Agricultural Microbiology), attended training on "Competency Enhancement Programme for Effective implementation of Training Functions by HRD Nodal Officers at ICAR Institutes" at ICAR-NAARM, Hyderabad during February 13-15, 2017.
- Prof. Narendra Pratap Singh attended ICAR Directors conference at NASC Complex, New Delhi during February 13-16, 2017.

Major events

- Prof. Narendra Pratap Singh; Dr. Ajay K. Singh, Senior Scientist (Agricultural Biotechnology); Dr. R. L. Choudhary, Scientist (Agronomy) participated in National Symposium on ''Advances in Agriculture through Sustainable technologies and Holistic Approaches'' held at Dona Paula, Goa, during February 15-17, 2017.
- Dr. D. D. Nangare, Scientist (Soil & Water Conservation Engineering) participated in presented paper in 51st Annual Convention of Indian Society of Agricultural Engineering (ISAE) and National Symposium on ''Agricultural Engineering for sustainable and climate smart Agriculture'' on at HAU, Hisar during February 16-18, 2017.
- Dr. D. D. Nangare, Scientist (Soil & Water Conservation Engineering); Dr. M. P. Brahmane, Senior Scientist, Biotechnology (Animal Science); Basavaraj Sajjanar, Scientist (Animal Biotechnology); Mr. V. Rajagopal, Scientist (Soil Chemistry/ Fertility); Mr. Rajkumar, Scientist (Agricultural Entomology) participated in Agri-India Expo 2017 at 13th Agriculture Science Congress held at UAS, GKVK, Bengaluru during February 22-24, 2017.
- Dr. K. K. Krishnani, Head, SESM, participated in the Workshop "Microbiovision 2017" on 27th Feb 2017, Department of Microbiology, Shardabai Pawar Mahila Mahavidyalaya Baramati.
- Prof. Narendra Pratap Singh participated in National conference on "Perspective ofchallenges and options in maize production at DRPCAU, Pusa, Samastipur during March 03-05, 2017.
- Dr. Mahesh Kumar, Scientist (Plant Physiology); Dr. R. L. Choudhary, Scientist (Agronomy) participated in Krishi Unnati Mela at IARI, New Delhi during March 15-17, 2017.
- Dr. Jagadish Rane, Head, SDSM; Dr. Yogeshwar Singh, Senior Scientist (Agronomy); Dr. D. D. Nangare, Scientist (Soil & Water Conservation Engineering) participated in National Seminar on Pomegranate at Pune during March 18-19, 2017.

Lectures

- Dr. N. P. Kurade delivered expert lecture on the topic "Nutritional management of livestock in drought prone areas of India," in a training programme organized by ICAR- IVRI Regional station Pune during February 7-10, 2017.
- Prof. Narendra Pratap Singh delivered lecture on "Coastal agriculture in Indian context- an overview" in National symposium on advances in agriculture through sustainable technologies and holistic approaches at Dona Paula, Goa, during February 15-17, 2017.
- Dr K. K. Krishnani delivered invited talk on "Integrated approach for agricultural soil and water health assessment and remediation" and "Nanobioremediation of nitrogenous and bacterial pathogen in aquaculture using zeolite based nanocomposite" in International Conference Clean up India 2016 on Contaminated site remediation 13-15 Dec 2016, TNAU, Coimbatore.
- Dr. D. D. Nangare, Scientist (Soil and Water Conservation Engineering) delivered lecture on ''Dragon fruit cultivation and management'' at KVK Jalna on March 5, 2017.
- Dr K. K. Krishnani Delivered key note address on "Recent advances in agricultural applications of environmental microbiology in Workshop Microbiovision 2017" on 27th February 2017, Department of Microbiology, Shardabai Pawar Mahila Mahavidyalaya Baramati.
- Dr. D. D. Nangare, Scientist (Soil and Water Conservation Engineering) delivered lecture during Water management in Dragon fruit in training cum exhibition programme on "Promotion of dragon fruit cultivation as kitchen gardening in semi-arid region of Maharashtra' at ICAR-NIASM, Baramati on March 25, 2017.
- Dr K. K. Krishnani delivered plenary lecture "Recent advances in Agricultural Applications of Environmental Biotechnology" in a National Conference on "Recent trends and opportunities in Life Sciences" at Waghire College, Saswad (Pune) on January 24, 2017.
- Dr K. K. Krishnani delivered resource lecture on "Environmental and health management of aquaculture using molecular techniques" in Winter school on Current trends in molecular diagnosis for better health management in aquaculture at Central Institute of freshwater aquaculture, Bhubaneshwar on March 4, 2017.

Personalia

Award/ Recognition

- Dr. Yogeshwar Singh, Senior Scientist (Agronomy) was awarded best poster award (Poster entitled: "Impact of Spent wash and Cropping Sequence in Conversion of Barren Basaltic Gravelly Land into Cultivation") in International conference on "Integrated Land Use Planning for Smart Agriculture - An Agenda for Sustainable Land Management" at ICAR- NBSS&LUP, Nagpur, during November 10-13, 2016.
- Dr. Yogeshwar Singh, Senior Scientist (Agronomy) was awarded best research paper award (oral presentation entitled: Dragon Fruit: Wonder crop for degraded and water scares areas) in International conference on "Climate Change Adaptation and Biodiversity: Ecological Sustainability and Resource Management for Livelihood Security" at ICAR-CIARI, Port Blair during December 8-10, 2016.
- Dr. K. K. Meena, Senior Scientist (Agricultural Microbiology) was awarded best research paper award (oral presentation) titled "Isolation and characterization of plant growth promoting halotolerant methylotrophic bacteria from rhizophere and rocks" in 5th National Seminar on " Climate Resilient Saline Agriculture: Sustaining Livelihood Security at S K Rajasthan Agricultural University, Bikaner during January 21-23, 2017.
- Dr. D. D. Nangare, Scientist was awarded best poster award for "Influence of Plant growth regulating chemicals on recovery response to waterlogging in onion" in 7th Indian Horticulture congress 2017 held at IARI, New Delhi during October, 15-18, 2016.
- Dr. R. L. Choudhary, Scientist SS (Agronomy) received best oral presentation award in the "National symposium on Advances in Agriculture through Sustainable Technologies and Holistic Approaches" held at Panjim, Goa during 15–17th February, 2017.

Promotions

The following scientific staffs were promoted to next higher grade pay (Rs 37400-67000+ RGP 9000/-) through Career Advancement Scheme (CAS):

- Dr. Manoj P. Brahmane, Senior Scientist, Biotechnology (Animal Science)
- Dr. Ajay Kumar Singh, Senior Scientist (Agricultural Biotechnology)
- Dr. Ratna Kumar Pasala, Senior Scientist (Plant Physiology)
- Dr. Biplab Sarkar, Senior Scientist (Fisheries Resource Management)
- Dr. Kamlesh Kumar Meena, Senior Scientist (Agricultural Microbiology)
- Dr. Yogeshwar Singh, Senior Scientist (Agronomy)
- Dr. P. Suresh Kumar, Senior Scientist (Fruit Science)

The following scientific staff were promoted to next higher grade pay (Rs 15600-39100+ RGP 7000/- through Career Advancement Scheme (CAS):

- Dr. Mahesh Kumar, Scientist (Plant Physiology)
- Dr. Basavaraj Sajjanar, Scientist, Biotechnology (Animal Science)
- Dr. Ankush L. Kamble, Scientist (Agricultural Economics)
- Dr. Sunayan Saha, Scientist (Agril. Meteorology)
- Dr. Ram Lal Choudhary, Scientist (Agronomy)

The following technical staffs were promoted:

- Mrs. Noshin Shaikh, Sr.Technical Assistant T-4 (Civil)
- Mr. Santosh Manohar Pawar, Sr.Technical Assistant T-4 (Electrical)
- Mr. Pravin Hari More, Sr.Technical Assistant T-4 (Computer)
- Mr. Rushikesh Shivaji Gophane, Sr.Technical Assistant T-4 (Horticulture)
- Mr. Madhukar Gubbala, Sr.Technical Assistant T-4 (IT)
- Mrs. Priya George, Sr.Technical Assistant T-4 (Microbiology)

- Mr. Lalitkumar Bhausaheb Aher, Sr.Technical Assistant T-4 (Biotechnology)
- Mr. Sunil Vishnu Potekar, Sr.Technical Assistant T-4 (Agrometeorology)
- Mr. Patwaru Ranbhid Chahande, Sr.Technical Assistant T-4 (Agriculture)
- Mr. Aniket Tukaram More, Sr.Technician, T-2 (Farm)

Selection

- Mr. Pardeep Kumar, Assistant was selected as Assistant Registrar in Central University Ajmer, Rajasthan.

Transfers

- Mrs. Bandela Sravanthi, Scientist (Spices, Plantation, Medical & Aromatic Plants) was transferred to ICAR–Central Plantation Crops Research Institute, Kudlu P.O., Kasaragod, Kerala (November 19, 2016).
- Dr. Sunayan Saha, Scientist (Agricultural Meteorology) was transferred to ICAR-Central Potato Research Station, PB No.1, Model Town, Jalandhar-144003 Punjab (March 31, 2017).
- Dr. Rang Lal Meena, Scientist (Agronomy) was transferred to ICAR-Central Sheep & Wool Research Institute, Avikanagar, via Jaipur, Rajasthan (March 31, 2017).
- Mr. Balusamy A, Scientist (Environmental Science) was transferred to ICAR Research Complex for NEH Region, Umiam, Meghalaya (March 31, 2017).

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