



अजैविक स्ट्रेस प्रबंधन समाचार

Abiotic Stress Management News

October 2020 to March 2021



ICAR-National Institute of Abiotic Stress Management
Baramati, Pune, Maharashtra 413115



Abiotic Stress Management News

भाकृअनुप- राष्ट्रीय अजैविक स्ट्रेस प्रबंधन संस्थान

ICAR-National Institute of Abiotic Stress Management

बारामती, पुणे, महाराष्ट्र 413115, भारत

Baramati, Pune, Maharashtra 413115, India



Vol. 02 No. 06

An ISO 9001:2015 Certified Institute

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LIST OF ONGOING PROJECTS

WEBINARS ORGANIZED

- Translating Physiology into Techniques for Abiotic Stress Tolerance in Crop
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- Genomics Strategies for Improvement of Abiotic Stress Tolerance in Crop Plant

TRAININGS ATTENDED

PUBLICATIONS

VIDEOS

PERSONALIA

EDITORIAL COMMITTEE

- Dr Dhananjay D Nangare
- Dr Sachinkumar S Pawar
- Dr Bhaskar B Gaikwad
- Dr Vijaysinha Kakade
- Mr Mukesh P Bhendarkar
- Dr Basavaraj PS

TECHNICAL ASSISTANCE

- Mr Pravin More

From the Director's Desk....

Greetings from ICAR-NIASM.

The pursuit of managing abiotic stresses through explorative research leading to knowledge creation and practical solutions has been inspiring ICAR-NIASM to continue with its mission amid the pandemic challenges faced worldwide. Though agriculture has emerged as the only sector of Indian economy having in-built resilience during the COVID pandemic, it still has to eternally face the natures uncertainties and therefore will continue to remain vulnerable. The much-needed effort in imparting resilience to Indian agriculture is being carried out through planned scientific explorations that lead to implementable solutions and also through extension of proven climate smart agriculture solutions. ICAR-NIASM foresees to do its part in management of abiotic stresses in agriculture and allied sectors through its tailored research programmes and outreach activities.



The research work carried under the new umbrella and flagship research projects and other research activities at ICAR-NIASM have led to several research findings and also suggestions for policy reforms. The research findings of evaluation of soybean germplasm for root traits associated with adaptation to drought stress; role of EPA & DHA in growth performance in fish against multiple stress; responses of chickpea genotypes to soil moisture deficit; bioprospecting xerophytes for novel bio-inoculants and bio-regulators; investigations of halophytic plants and associated microbiome for amelioration of saline agricultural land of arid & semi-arid regions; evaluation of halotolerant Rhizobium and PGPB based biomolecules for alleviation of drought and salt stress and prioritization of strategies and policy reforms to support fisheries sector during and post-Covid-lockdowns, using the Multi-Attribute Decision Making (MADM) techniques are detailed in the Newsletter.

The COVID 19 has led to quick adoption of online tools for scientific discussions and its wide reach that attracted more than 1000 participants through webinars conducted by ICAR-NIASM. The complete implementation and adoption of e-office by office staff and launch of QR-NIASM app to impart self-guided exploration of the facilities and activities of NIASM campus by the visitors has helped immensely under prevailing COVID scenario. Also the importance of cleanliness and covid safety measures across NIASM and its residential premises were reinforced in spirit through the celebration of 'Swachhata Pakhwada' and 'COVID-19 appropriate behavior campaign'. The inauguration of the administrative building of ICAR-NIASM, celebration of Agricultural Technology week, ICAR-NIASM Foundation day, International Women's day were conducted with active participation. Outreach activities including establishment of ATIC and fish museum; distribution of inputs to farmers of Pune and Ahmednagar districts under SCSP and farmers of Nandurbar district under TSP programmes; conduct of several farmer trainings were also carried out.

I thank the editorial board members for their sincere efforts in bringing out the Newsletter. I place on record my thanks to all the staff members for their contributions for this issue of the Newsletter.

Date: March 31, 2021

(Himanshu Pathak)

RESEARCH HIGHLIGHTS

Evaluation of soybean germplasm for root traits associated with adaptation to drought stress

Ajay Kumar Singh

Seventy-five soybean genotypes along with check varieties i.e., JS-9752 and JS-7105 (drought tolerant), were evaluated for root traits such as root angle, root length at different time intervals, root hairs, root thickness and root biomass under *in vitro* conditions. Genotypes, NRC-86, AGS-142, NRC-2, JS-9305 and NRC-7 showed longer roots and higher biomass as compared to check varieties (Fig. 1 and 2).

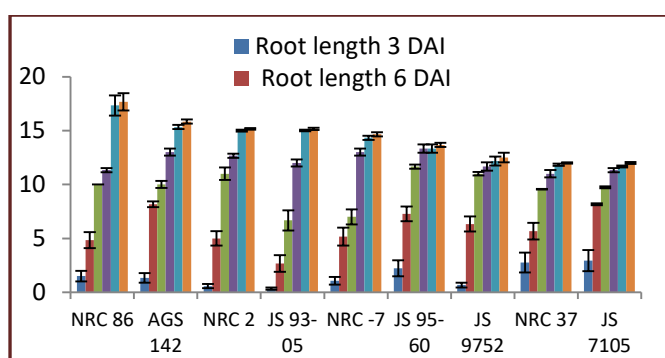


Fig. 1. Genetic variability in root length in soybean genotypes.

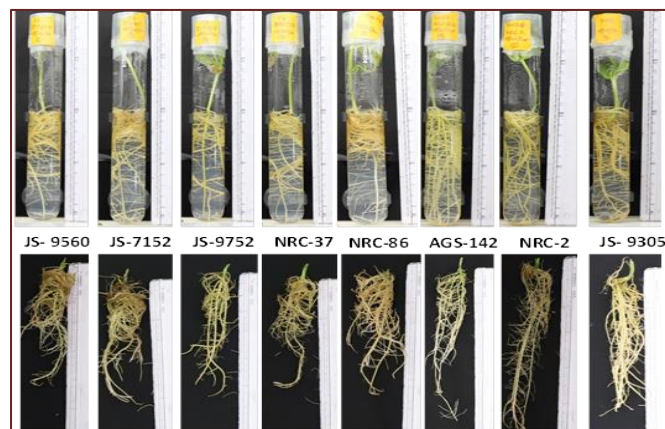


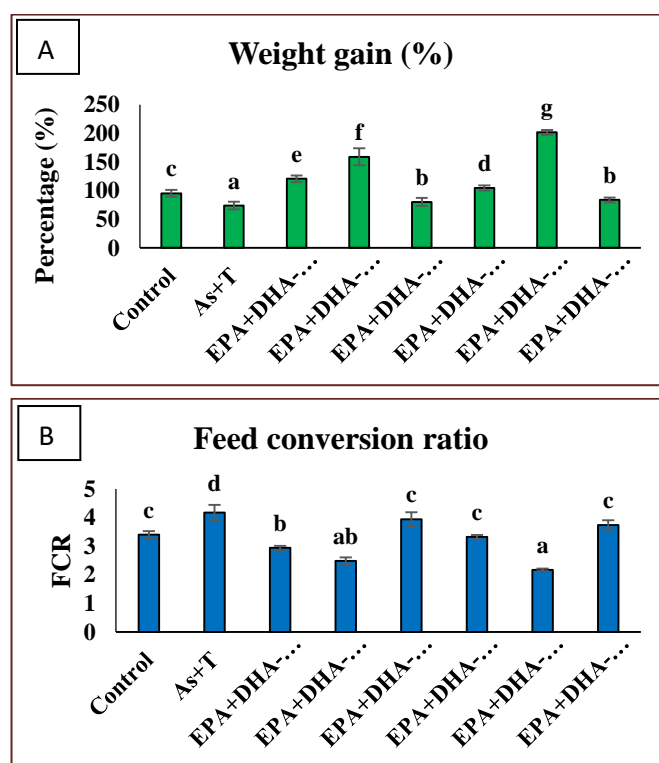
Fig. 2. Genetic variability in Root System Architecture in soybean genotypes.

Dietary eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) modulates growth performance in fish against multiple stresses

Neeraj Kumar

Arsenic contamination and high temperature variations threaten the aquatic animal and led to extinct in the ecosystems. We have performed an experiment to mitigate arsenic and high temperature stress through dietary supplementation of Eicosapentaenoic acid (EPA) and

docosahexaenoic acid (DHA) on *Pangasianodon hypophthalmus* for 105 days. Results of growth performance are shown in the Figure 1 (A-D). Arsenic (As) pollution and high temperature (T) stress in the present investigation reduced the growth performance of the fish (Figure 1A). The group treated with low dose of arsenic and high temperature noticeable ($p < 0.01$) reduced the final body weight gain % in compared to supplemented group of eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) at the rate of 0.2 and 0.4 with or without exposure to stressors group (As+T). Dietary supplementation of EPA+DHA at the rate of 0.4 % with exposure to stressors group (As+T) was significantly higher ($p < 0.01$) final body weight gain (%) and specific growth rate (SGR), followed by EPA+DHA at the rate of 0.4 and 0.2 % with As and temperature as well as 0.2 % of EPA with exposure to As+T in *P. hypophthalmus*. The stressors group (As+T) and fed with control diet showed significantly least growth performance in compared to control and supplemented groups (EPA+DHA). The supplemented group of EPA+DHA at the rate of 0.6 % showed significantly less growth performance compared to control group and EPA+DHA at the rate of 0.2 and 0.4 % (Table 2). Thermal growth coefficient (TGC) was non-significant among the all treatments ($p > 0.05$) (Fig.3D).



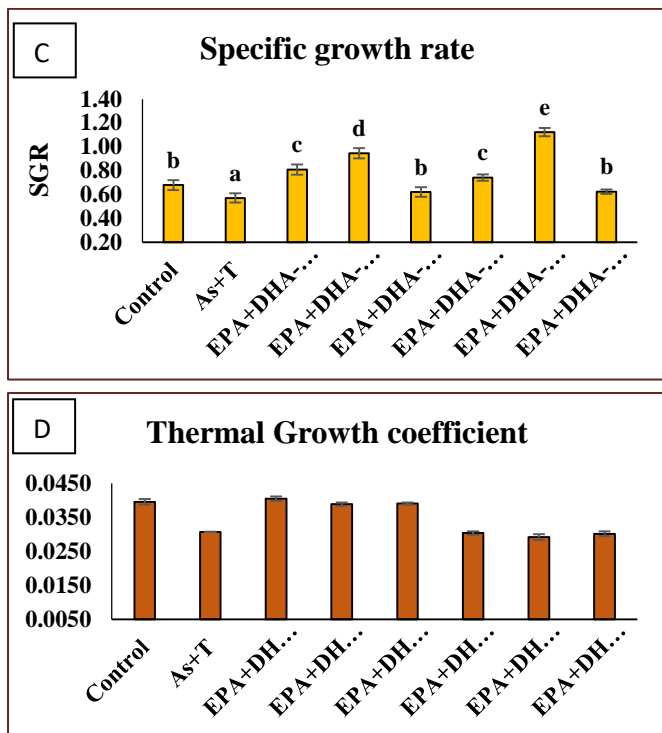


Fig. 3. Effect of dietary eicosapentanoic acid and docosahexanoic acid (EPA+DHA) for mitigation of tertiary stress response (final body weight gain, FCR, SGR, and TGC) on *P. hypophthalmus* reared under arsenic and high temperature for 105 days.

Responses of chickpea genotypes deficit to soil moisture under field conditions

Mahesh Kumar

Experiment was conducted with 78 genotypes including a local check “Digvijay” with two level of soil moisture. Soil moisture stress was imposed at 50% of flowering by withholding water in stressed plot. There were no rains during the experiments. Experiment was conducted with Randomized Block design and with 1.8 m × 1.5 m plots. Genotypes such as, D24, D31, ICE14886 had high seed yield and could maintain their canopy cooler in stress condition induced by soil moisture deficit. Higher Biomass accumulation was observed among D31, D15, D24, and D29 under well water condition while D22, D30, D31 and ICE-14886 under water stress condition (Fig. 4).

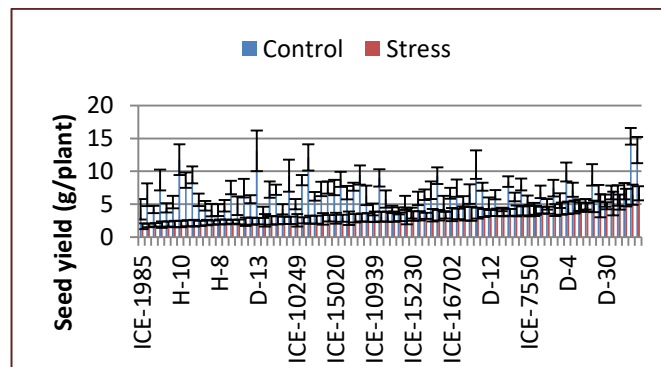
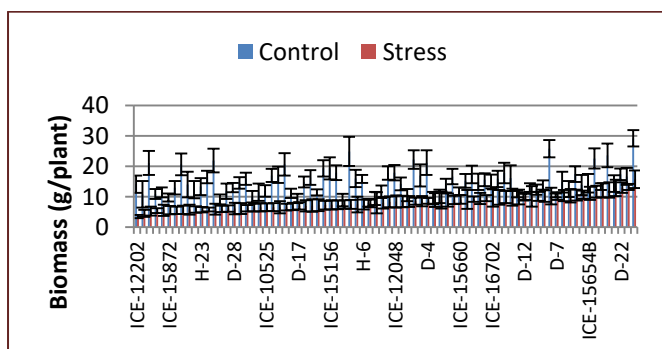
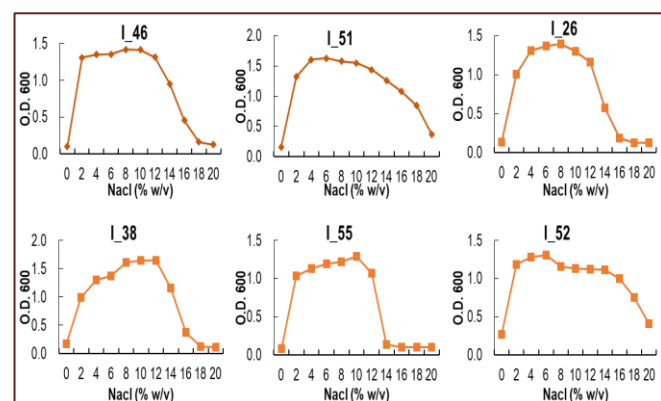


Fig. 4. Genetic variation in biomass (a) and seed yield per plant (b) in chickpea genotypes under normal and moisture stress condition in field conditions.

Bioprospecting xerophytes for novel bio-inoculants and bio-regulators aimed at enhancing drought stress tolerance in field crops

Satish Kumar

Cactacea family which is taxonomically placed under order Caryophyllales is comprised of more than 125 genera distributed across the globe. A literature survey of the prominent genera under Cactacea family was conducted. The publically accessible gene sequences of *rbcL* gene (ribulose-1,5-bisphosphate carboxylase/oxygenase large subunit) were retrieved for phylogenetic analysis. A bootstrap consensus Phylogenetic analysis and evolutionary trends in major genera under Cactacea and Agavaceae family were delineated (Fig. 5). The phylogenetic tree revealed the early evolution of the CAM metabolism in plants of the agavaceae family. Most of the genera of cactacea family formed a separate clade with high bootstrap values but the many stress tolerant genera of halophytic plants seem to be evolved before the evolution of the succulence in cactacea family. Genomic DNA from more than 100 cactus endophytes have been isolated and 16S rRNA gene (1.5 kb) have been amplified for identification of cactus halophytes.



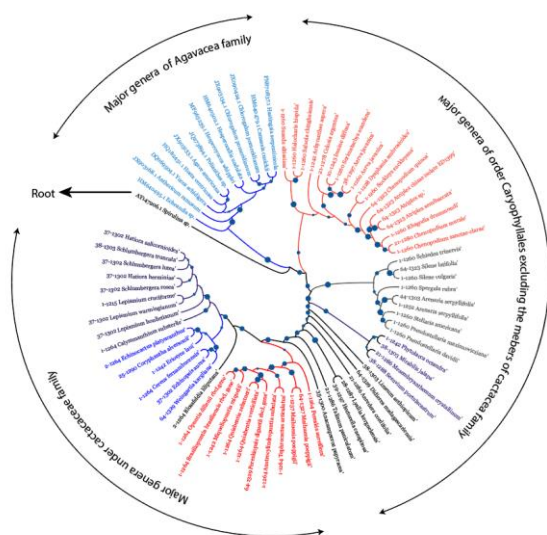


Fig. 5. Phylogenetic tree of the Major genera under cactaceae and Agaveace family of xerophytic plants based on the *rbcL* gene sequences.

Exploitation of halophytic plants and associated microbiome for amelioration of saline agricultural land of arid & semi-arid regions

Satish Kumar

A Preliminary survey of the costal saline habitats from Diveagar area of Raigad district (Konkan Region of Maharashtra) was conducted and the samples of mangroves water, mangroves plants, mangroves marshy soil, sea water were collected for isolation of halotolerant and halophilic microbial isolates. The EC value of the mangroves marshy soil ranged between 10.37 to 23.4 dS/m whereas EC value of the water from mangroves fields and coastal sea ranged between 74.7-123 dS/m. A total of 58 bacterial morphotypes have been isolated from coastal halophytic plant and sediment samples under high salt environment (~3.5% NaCl). Most of the strains exhibited siderophore production ability on iron deficient cultivation medium and around 16% of the isolates were capable to producing exopolysaccharides. We have also isolated the cultured microbial isolates from xero-halophytic plant *Cullen Plicata* collected from western Rajasthan. A total of 66 bacterial morphotypes have been isolated from different plant parts –rhizosphere soil, root, stem, and leaves on different microbiological media. The *Cullen plicata* leaves were found to be largely inhabited by fast growing pink-pigmented facultative methylotrophic (PPFM) bacteria, that occupied 19.95% of the total isolated morphotypes. More than 33% of the isolated strains belonged to endophytic environment in shoot and roots that indicated active plant-

microbial interactions under harsh environmental conditions. The microbial strains isolated from samples of Diveagar coastal region and from *Cullen plicata* have been evaluated for their salinity tolerance by growing the isolates under varied salt concentrations ranging between 0-20% and the microbial isolates from the coastal region samples have displayed higher salt tolerance range indicative of ‘salt-in’ strategy of haloadaptation in such microbes (Fig. 6). The genomic and molecular basis of salt stress tolerance in the microbial isolates is being investigated.

Fig. 6. Growth response of the halotolerant PGPR bacteria in a NaCl gradient ranging from 0-20% (w/v).

Evaluation of halotolerant *Rhizobium* and PGPB based biomolecules for alleviation of drought and salt stress

Satish Kumar

A bio-formulation containing multiple components including carbohydrate (sucrose: 8% w/v); a pool of bacterially secreted plant-beneficial biomolecules (pooled PGPR metabolites: 0.01% w/v); plant growth hormones (IAA : 150 ppm; IBA : 100 ppm, and GA3 : 150 ppm) and methanol (3% v/v) was developed for plant growth enhancement. The plant growth benefits of the formulation were evaluated in spinach plants by applying a very dilute quantities (2.0 ml L⁻¹) through foliar spray at weekly intervals in a pot-based study under greenhouse conditions. When investigated against individual components, the formulation worked far better in terms of plant-beneficial interactions. Length of shoot as well as roots showed a marked increase in length under the influence of formulation. The formulation and IAA exhibited an equivalent performance in lowering the shoot: root ratio. Some of the individual amendments, in addition to the formulation exhibited a substantial beneficial effect on the root volume (Fig.7). The formulation also impacted the canopy temperature and showed marked differences in canopy temperature under various treatment regimes. There was a canopy temperature difference of almost around +1.8, and +1⁰C in case of GA3 and control respectively compared to the formulation indicative the ability of the formulation to lower the canopy temperature (Fig. 7). Compared to the fresh biomass, the extent of dry biomass increase was quite higher under the influence of the formulation. LAI is an important character of plant

canopy that indicates one-sided green leaf area per unit ground surface area. Additional to the formulation, application of GA3 and biomolecules also promoted higher LAI. Spinach being a commercially important-foilage crop, application of the formulation could substantially enhance the farmers' profitability. Given all the constituents within the formulation are used in highly diluted form at the application, we assume the product highly cost effective.

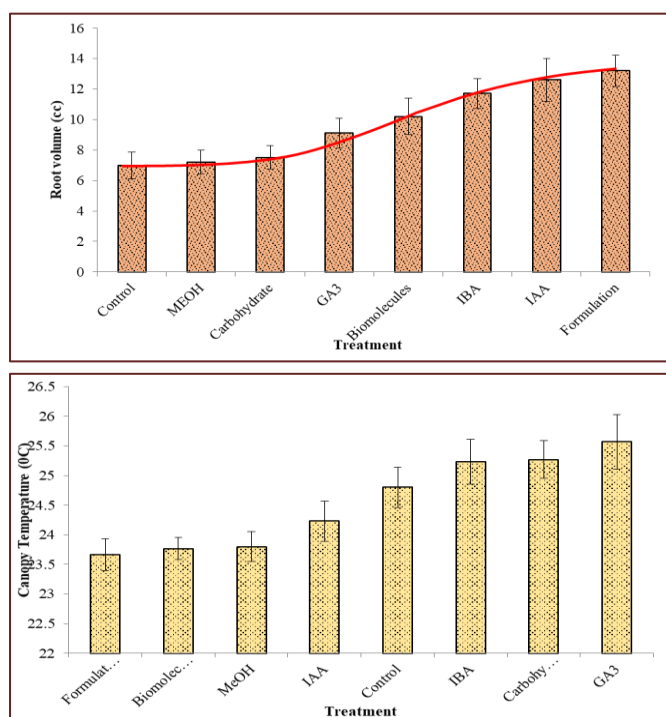


Fig. 7. Effect of the foliar application of the bioformulation on Root volume and Canopy temperature compared to the effect of application of individual components

Prioritization of strategies and policy reforms to support fisheries sector during and post-Covid-lockdowns, using the Multi-Attribute Decision Making (MADM) techniques

BB Gaikwad and MP Bhendarkar

The online snowball sampling done during the Covid-Lockdown period in India, involving 517 respondents revealed the major problems faced by people involved in fisheries as business, viz. lack of transportation facilities, less demand in the market, non-availability of fish seed, non-availability of fish meal & other equipment, unavailability of labour, and technical support. The solutions in form of strategies and reforms, needed to overcome these in the post-covid-lockdown period, were also invited from the respondents/stakeholders, as a bottom-up approach to problem-solving. However, prioritizing these solutions is not easy considering the inability to

judge the gross percentage of stakeholders affected on the ground using the snowball sampling technique alone and the biased outlook of the stakeholders.

To prioritize the reforms/solutions suggested by stakeholders, a group of 30 experts from the fisheries sector were asked to rank these on a seven scale rating across four attributes of A) Priority of implementation, B) Perceived impact on implementation, C) Ease of implementation, and D) Funding requirement for implementation. Similarly, the authors also prepared a list of strategies and policy reforms to support the fisheries sector in future Covid-lockdowns or similar scenario and asked the same fisheries experts to rate these on the similar seven-point scale rating across four attributes listed above. Out of the responses received, the ratings given by 18 experts were selected based on their completeness, rationality and consistency of ratings among the group. These selected 18 experts comprised 9 Academicians & researchers (50%), 5 Government officers of the state fisheries department (~27%) and 4 persons involved in fisheries as a business (~22%). Four weighting methods viz. SWARA (Stepwise Weight Analysis Ratio Assessment), AHP (Analytic Hierarchy Process), MWM (Mean weight method) and EWM (Entropy weight method) were used by authors to assign weight to the attributes (Table 1). The weighing methods also represented four scenarios based on final weights assigned as; Scenario I) Highest weightage to the priority of implementation as in case of Extended covid lockdowns (represented by SWARA weights); Scenario II) Equal and higher weights assigned to Priority of implementation and Perceived impact on implementation as in case of Intermediate covid lockdowns allowing improvements in subsequent lockdowns (represented by AHP weights); Scenario III) Equal mean weights as in case of covid as new normal (represented by Mean weights) and Scenario IV) Higher weights to funding requirement followed by ease of implementation as in case of Government/stakeholders facing constraints of funds and manpower (represented by higher Entropy weights). Seven Multi-Attribute Decision Making (MADM) methods based on weighted-sum models namely, WSM (Weighted Sum Model) and SAW (Simple Additive Weighting); out-ranking method namely ELECTRE III; and distance-based models namely TOPSIS (Technique for Order Preference by Similarity to Ideal Solution),

MABAC (Multi-Attributive Border Approximation Area Comparison), VIKOR (Viekrriterijumsko Kompromisno Rangiranje) and GRA (Grey Relational Analysis) were used using the above listed four weighing methods to judge the suitability of these methods in ranking the solutions that allowed explainable rationale of rankings by the analyst.

The ranking results under Scenario-I are given in Table 2 & 3, while those of four scenarios/weighting methods are shown using the colour map in Fig. 1 & 2 along with the cumulative ratings of all experts and the consistency index which tells about the consistency among expert ratings. The WSM, SAW, TOPSIS, MABAC & ELECTRE3 ranked the strategies and reforms almost similar and were therefore only considered to calculate the final ranking of solutions based on the cumulative ranking scores. However, the VIKOR & GRA ranked only the top & bottom ranks similar to the rest of the methods and deviated a lot for the intermediate rankings.

Table 1. Weights assigned.

Sr. No	Objectives	Types Max/Min	Scenario-I	Scenario-II	Scenario-III	Scenario-IV	
			SWARA	AHP	Mean	Entropy (Pre)	Entropy (Post)
A	Priority of implementation	Max	0.4691	0.3647	0.25	0.1038	0.1316
B	Ease of implementation	Max	0.1737	0.1716	0.25	0.3022	0.1676
C	Perceived impact on implementation	Max	0.2606	0.3648	0.25	0.2157	0.2305
D	Funding requirement for implementation	Min	0.0965	0.0989	0.25	0.3782	0.4703

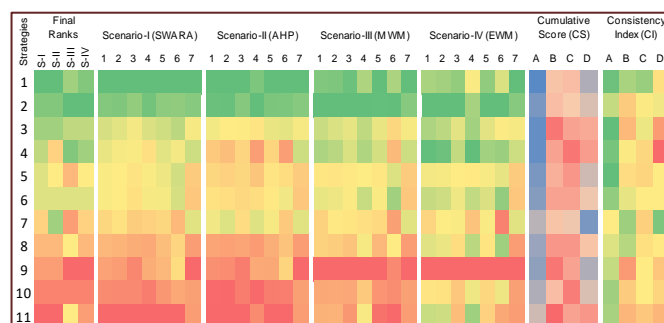
Table 2. Prioritization of strategies under Covid 19/ similar lockdown situation.

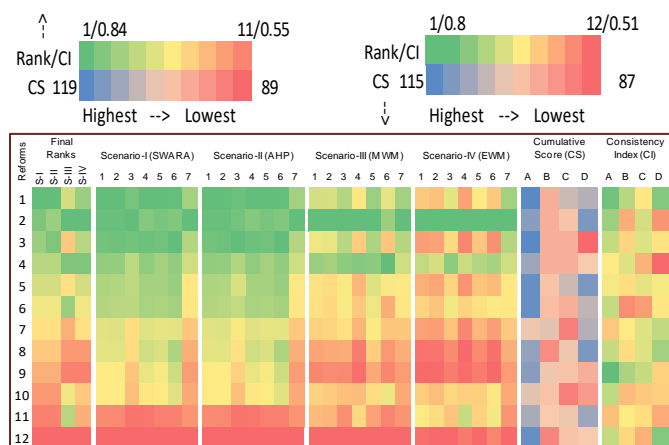
Sl. No.	Strategies
1	Creating modernized hygienic fish marketing hubs in potential zones
2	Policy measures to bring aquaculture industry under essential and priority sector (to support transportation of inputs, marketing, processing, import and export activities)
3	Mechanism for doorstep delivery of fisheries input (seed, feed, medicines etc.)
4	Promotion of domestic market by increasing awareness about safety of consumption of fish products (through ICT awareness campaign/KVK/radio talks/ advt. etc.)
5	Value addition: Promoting techniques to enhance the shelf life of fish and fish

	products
6	Digitized tools for e-governance (licencing of fisheries stakeholders and traceability of produce)
7	Promotion of Biofloc and Recirculatory Aquaculture Systems (RAS) for enhancing resilience
8	Development and promotion of e-commerce platform like eSanta for eliminating middlemen
9	Establishment and strengthening of Fish Farmers Producer Organization (FFPO)
10	Simplified insurance schemes for the fisheries sector
11	Developing fair pricing mechanism for fisheries commodities (similar to MSP in agriculture)

Table 3: Prioritization of reforms suggested by the stakeholders in the post-Covid 19 period

Sl. No.	Reforms
1	Appropriate training for resource utilization, fish processing and consumption
2	Transparency in implementation of government fisheries schemes
3	Promotion and development of fish hatcheries at the local level
4	Export promotion
5	Promotion of farm pond based fish farming
6	Proper timely advisory services
7	Financial assistance to the individual fish farmer, fishermen and small traders
8	Simplified credit and subsidy support
9	Financial support mechanism to cope with the losses
10	Minimum support prices and price regulation for assured profitability
11	Extension of lease contracts for reservoirs
12	Hassle-free banking/credit support





NEW INITIATIVES

Development of ATIC and Museum

The Agricultural Technology Information centre (ATIC) was established at ICAR-NIASM. The farmers, students and Board of Directors of FPOs visited to ATIC.



Establishment of Fish Museum

The Fish Museum has been initiated at ATIC ICAR-NIASM. The glimpse of the biodiversity of the abiotic stress tolerant freshwater fish displaying specimens collected Bhima river stretch and our farm. The collections, arranged systematically for a better understanding of the fish species, attracts the visitors.



MAJOR EVENTS

Distribution of seed under SCSP in Pune and Ahmednagar districts

The detailed survey of Schedule Castes beneficiary farmers from Karhawagaj, Anjangaon and Belwandi was carried out by the SCSP committee. The seed requirement for the *Rabi* season in respect of Wheat, Sorghum and Bengal gram was identified after interacting with the beneficiary farmers. The seed distribution programme was carried out in Karhawagaj and Anjangaon (Baramati tehsil, Pune district) on 25th November, 2020, following all the necessary COVID-19 precautionary measures. Dr Himanshu Pathak, Director, ICAR-NIASM distributed the seeds and addressed the beneficiary farmers. Dr NP Kurade, Chairman, SCSP Committee, coordinated the programme of *Rabi* seed distribution in three villages. Sarpanch, Grampanchayat Members, SC beneficiary farmers and SCSP committee members namely, Dr DD Nangare, Dr AV Nirmale, Dr SS Pawar, Mr Rajkumar and Mr MP Bhendarkar participated in the programme. The seed distribution was extended to Belwandi (Karjat tehsil, Ahmednagar district) on 3rd December, 2020 wherein different agriculture seeds were distributed by Mr. Rajkumar and Mr. Mukesh Bhendarkar, Scientist, ICAR-NIASM, Baramati.



Distribution of Fertilizers under SCSP in Pune and Ahmednagar districts

Schedule Castes beneficiary farmers from Karhawagaj, Anjangaon (Baramati tehsil, Pune district) and Belwandi (Karjat tehsil, Ahmednagar district) were identified based on the survey carried out by SCSP committee. The fertilizer requirement of individual beneficiary for the *Rabi* season in respect to Urea, MOP and SSP was identified after interacting with the beneficiary farmers and

quantity of wheat/jowar/Bengal gram seeds sown. The fertilizers were distributed to the Scheduled Caste beneficiaries following all the necessary COVID-19 precautionary measures. Dr NP Kurade, Chairman, SCSP Committee along with the committee members namely, Dr DD Nangare, Dr AV Nirmale, Dr SS Pawar, Dr. BB Gaikwad, Mr Rajkumar, Mr MP Bhendarkar and Dr Aliza Pradhan participated in the fertilizer distribution programme.



Distribution of seeds of improved varieties to tribal farmers of Nandurbar district under TSP during December 27-28, 2020

The TSP team of ICAR-NIASM (Dr. G.C. Wakchaure, Dr. S.A. Kochewad, Dr. Neeraj Kumar and Mr. K. Ravi Kumar) distributed seeds of improved varieties of wheat, chickpea and groundnut to the tribal farmers of Nandurbar under Tribal Sub-Plan. Total 383 tribal farmers of nine villages of Navapur Tehsil of Nandurbar District were provided the seeds of improved varieties for enhancing yield and sustainability. The TSP committee also organised two Kisan Gostis at Motekadwan and Nangipada villages for creating awareness of TSP scheme and improved technologies for enhancing livelihood of tribal farmers. TSP team visited to tribal farmers fields and KVK Nandurbar for assessing the present farming situation and identifying the interventions to be adopted in future.



Inauguration of Administrative Building of ICAR-NIASM, Baramati

Shri Parshottam Khodabhai Rupala, Hon'ble Minister of State, Agriculture and Farmers' Welfare inaugurated the administrative building of ICAR-National Institute of Abiotic Stress Management (NIASM), Baramati through virtual platform. In his inaugural address he lauded the efforts involved in timely completion of the iconic administrative building of ICAR-NIASM. He also applauded the challenge taken up by scientists of ICAR to study the impacts of abiotic stress on agriculture and finding the management solutions, which will benefit the farmers. He stressed that climate change has posed severe challenges to agriculture and NIASM should have the mission of managing abiotic stresses in multi-stressed agro-ecosystems for sustainable agriculture.

Dr. Trilochan Mohapatra, Secretary, DARE and DG, ICAR welcomed all the dignitaries, and briefed about the background of ICAR-NIASM formation and the various facilities housed in the administrative building of ICAR-NIASM. He observed that abiotic stresses like drought, floods, extreme temperature, salinity, acidity, mineral toxicity and nutrient deficiency have emerged as major challenges for Indian agriculture. The anticipated increase in frequency of extreme weather events due to changing climate poses serious threats to sustainable production of crops, livestock, fish and poultry. He suggested that NIASM, as one of the national institutes under

ICAR, to carryout basic and strategic research for management of various abiotic stresses affecting sustainability of national food production systems. Smt. Supriya Sule, Hon'ble Member of Parliament, Lok Sabha, mentioned the details about the innovative work being carried out at Baramati and invited the dignitaries to visit the Institute to observe the work being carried out at NIASM.

Shri Sanjay Singh, Additional Secretary, DARE and Secretary, ICAR; Deputy Directors General; Directors of ICAR institutes; and other senior officials of the ICAR, Central and State Governments graced the occasion.

Dr. S.K. Chaudhari, Deputy Director General (NRM), ICAR steered the inaugural ceremony and brought out the work being carried out for abiotic stress management aspects. A Committee Chaired by Dr. S Bhaskar, ADG (AAF&CC), ICAR made arrangements for the event.

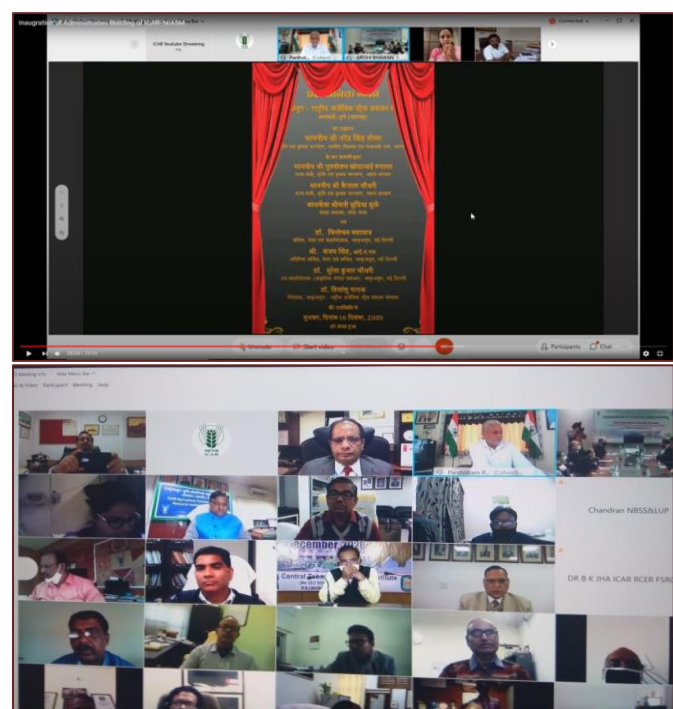
Dr. Himanshu Pathak, Director of ICAR-National Institute of Abiotic Stress Management proposed vote of thanks and expressed heartfelt gratitude to all the dignitaries and participants for attending the inaugural ceremony.

SBC reviewed the progress of digitalization/e-office, weeding out old records, disposing of old and obsolete furniture's junk materials etc, also status of white washing/painting. Further, cleanliness and sanitation drive within campuses was observed daily by cleaning/sanitizing the premises of office buildings- main/admin building corridors, central lab, canteen and other common areas. On 22nd Dec, 2020, Dr. H. Pathak, Director, ICAR-NIASM reviewed the progress of an umbrella project "Climate Resilient Integrated Farming System" and suggested to make it climate smart and model Integrated Farming System by developing/adopting different models and computations. Further, on the same day all the staff participated in plantation of trees and planted more than 50 plants of teak, banana and other trees as a part of agro-forestry component at IFS unit. ICAR NIASM observed National Farmers Day (Kisan Diwas) on December 23 and on this occasion, Dr. H Pathak, Director of the Institute interacts with scientist and technical staff at their respective experiment fields and suggested to try to address the farmers problems at field level through basic and strategic research in abiotic stress management. Dr. Anjali Khade (Institute's Authorised Medical Attendant) delivered lecture on COVID 19 awareness on 26th December, 2020 through zoom meeting.



Launching of QR-NIASM, first App to explore the Institute

On January 1, 2021 ICAR-NIASM launched 'QR-NIASM', an android app developed to help the visitors explore the facilities and activities carried at the NIASM campus. The app is designed as a self-help tool to get on the spot information about the facility/site visited. The user has to scan the QR code displayed at the visited facility/site to get the information in audio format in user selected language option of Marathi, Hindi and English.



Celebration of 'Swachhata Pakhwada' and 'COVID-19 Appropriate Behavior Campaign' during 16-31 December, 2020

As a part of 'Swachhata Pakhwada' and 'COVID-19 Appropriate Behavior Campaign', all the staff taken Swachhata Pledge through online/zoom meeting on inauguration day i.e 16th Dec, 2020.



Krushik Technology week held jointly with KVK, Baramati from 18th -24th January 2021

Shri Sharad Pawar, Member of Parliament (Rajya Sabha) & Former Union Minister of Agriculture & Farmers' Welfare inaugurated the "KRUSHIK - Technology Week - 2021 - Live Demonstrations" on 18/01/2021. The Technology Week was jointly organized by the Krishi Vigyan Kendra, Baramati, Maharashtra and ICAR-National Institute of Abiotic Stress Management, Baramati, Maharashtra. In his inaugural address, Shri Pawar urged to focus on millets and it's processing as wheat and paddy is challenged by marketing issues despite high yields. He also stressed the need for processing of grains.

Dr. Trilochan Mohapatra, Secretary (DARE) and Director General (ICAR) participated the inauguration through online mode and outlined the implementation of the Drought Action Network Programme in each District of India to manage any drought situation and natural calamities. The Director General emphasized on re-casting and modification of the District Contingency Plan. He stressed that the Drought Forecasting System is developed by the ICAR-CRIDA, but further data should be created.

Celebration of New Year Get Together-2021

The staff welfare committee of ICAR-NIASM organized the New Year Get Together programme on 01/01/2021 at Amphitheatre. Dr Himanshu Pathak, Director, ICAR-NIASM and the chief Guest emphasized the importance of research and encouraged the young achievers.



Drought Action Network (DAN) held on 18th January 2021 at NIASM, Baramati

The DAN meeting was organized at NIASM, Malegaon, Baramati on 18th January 2021 at 3:30 pm. Dr S.K. Choudhary, Deputy Director General (NRM), ICAR, New Delhi chaired the meeting attended by Scientists from ICAR and DAN core group members. He suggested that the aim of the DAN should be to develop a robust system for action to reduce losses caused by drought in Maharashtra, which can set the example for other states of India to follow. Ideas for implementation in three areas for interventions chosen by DAN core team were presented in the meeting by ICAR, SAU and DAN members.



Agriculture Technology Week 18th-24th January, 2021

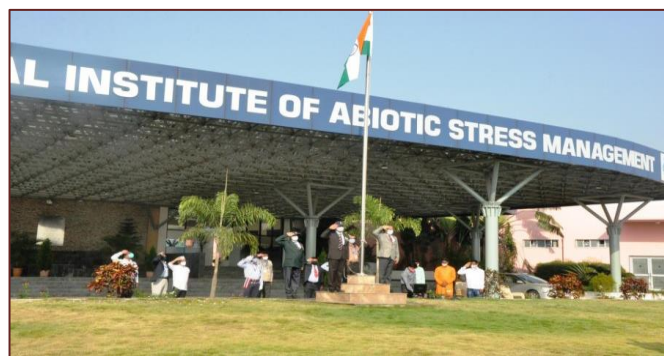
The KRUSHIK - Technology Week had focus on live demonstrations of agricultural technologies and machineries for farm mechanization, bullock-operated machineries, demonstration of millets, value-addition in pulses and oil seeds, use of hydro gel technology for maize, hydroponic and vertical farming, innovations hub, etc. at KVK and live demonstration of dragon fruit technology, technology for establishing orchards of all fruit crops on shallow basaltic terrain, Climate smart integrated farming system, Conservation

agriculture and SORF machine for sugarcane, Livestock and fishery experimental ponds and fish museum, Medicinal and herbal garden, Genetic stock garden etc at NIASM. More than 3000 farmers visited ICAR-NIASM to witness the live demonstrations and the experimental plots during the technology week.



Celebration of 72nd Republic Day

ICAR-NIASM celebrated 72nd Republic Day on the 26th January, 2021 by hoisting of the National Flag by Dr. Himanshu Pathak, the Director of ICAR-NIASM. All the Scientists, Technical, Administrative, Senior Research Fellows, Young Professionals and supporting staff filled with a feeling of patriotism and dedication gathered in front of the Administrative building. The director in his speech, highlighted the importance of the day and expressed his gratitude to all those who contributed to the national development.



Motivational talk on "How to achieve success?" delivered by Dr. Himanshu Pathak, Director, ICAR-NIASM on 4th February, 2021

A motivational talk on the topic "How to achieve success?" was delivered by Dr. Himanshu Pathak, Director ICAR, NIASM. The talk was well received by the audience which included around 100 NIASM office staff, students, research scholars. In his talk Dr. Himanshu Pathak narrated 10 basic attributes needed to achieve success. He used several short stories, pictures and pertinent examples of relevance from day-to-day life to build the understanding of 10 basic attributes to the audience.



ICAR-NIASM provides livelihood support to Bamboo artisans and Agricultural labourers under Schedules Caste Sub-Plan (SCSP) 2020-2021

ICAR-NIASM, Baramati with the aim to provide livelihood support to these families, surveyed the area and identified the beneficiaries. The distribution of inputs in the form of bamboos was carried out under which thirty bamboo artisans' families were benefitted. On the same occasion, bicycles were distributed to the agricultural labourers belonging to scheduled caste community. Sixty beneficiary families' benefitted through this programme. Dr Himanshu Pathak, Director, ICAR-NIASM chaired the programme and addressed the beneficiaries regarding the activities of the

institute. SCSP Committee lead by Dr NP Kurade and the members namely, Dr DD Nangare, Dr AV Nirmale, Dr SS Pawar, Dr BB Gaikwad, Mr Rajkumar, Mr MP Bhendarkar, Dr Aliza Pradhan, Mr K Ravi Kumar coordinated and conducted the activities. Mr Babul Kumar Sinha (CAO) and Mr Anil Kumar Sidharth (F&AO) participated in the programme.



2nd Foundation Day lecture and Panel discussion of NIASM-NAAS Pune Chapter on 'Abiotic Stress Management in Maharashtra Agriculture' held at ICAR-NIASM on 20th February, 2021

The 2nd foundation day lecture by Dr. PS Naik, Former Director of IIVR, Varanasi, and the maiden Panel discussion by the recently formed Pune chapter of NAAS, held jointly with ICAR-NIASM and SARAS on 20th February, 2021 marked the beginning of two-day celebrations of the 13th Foundation Day of ICAR-NIASM. The Panel discussion on the topic 'Abiotic Stress Management in Maharashtra Agriculture' was held in the Sardar Vallabhbhai Patel Auditorium of the institute and was also attended online by the participants and panellist. Dr Himanshu Pathak, the convener of the Pune chapter, NAAS steered the panel discussion with several rounds of discussion focused on the impact of abiotic stress on Agriculture, Livestock, Horticulture, Fisheries and Floriculture in Maharashtra State, their mitigation strategies and policy recommendation for abiotic stress research.



13th Foundation Day Celebrated by ICAR-National Institute of Abiotic Stress Management

NIASM celebrated its 13th Foundation Day today in the Sardar Vallabhai Patel Auditorium of the institute. Dr YS Nerkar, Ex Vice Chancellor, MPKV Rahuri was the Chief Guest and Dr SK Chaudhary, DDG, NRM, ICAR graced the occasion through online mode as the Guest of Honour. The special guest for the function was Mr. Pandurang Taware, known as Father of Agro-Tourism in India. The function was attended by the NIASM staff, guests, invited farmers and dignitaries physically following the COVID guidelines and also through online virtual mode. On the occasion, two Memorandum of Understanding (MoU's) were signed and exchanged between ICAR-NIASM and Agriculture Tourism Development Trust (ATDC), Pune and Shivnagar Vidya Prasarak Mandal, Malegaon, Baramati for collaboration in area of Agro-Tourism and academics & research, respectively. Ten progressive farmers from crop, livestock and fisheries sector were felicitated for their outstanding contribution and excellence in their area of work. Also, several of the office scientific, technical and contract staff were felicitated by institute awards for their outstanding performance in year 2020. Three institute publications and video on QR-NIASM android app use were released by the dignitaries on the occasion.



Celebration of International Women's Day on 8th March, 2021

ICAR-NIASM celebrated the International Women's Day on March 8, 2021. Mrs. Sunita Desai, Dragon fruit farmer, Baramati graced the occasion as the Chief Guest. The special guests for the function were Doctor Vanita Kokare, Mrs. Sumita Pathak and Mrs. Vijaya Yadav, a successful entrepreneur in value addition & processing. The function was attended by NIASM staff, guests, farm women, students and young professionals. Mrs Sunita Desai, Chief Guest of the programme highlighted that the societies with greater gender equality and diversity are more productive and efficient. Accepting the challenges in your daily life to create opportunities, said by Mrs. Vijaya Yadav. Importance of caring women's own health was emphasized by Dr Vanita Kokare. Mrs Sumita Pathak stressed the need of changing overall attitude of society towards women and their self-respect. Dr Himanshu Pathak, Director, ICAR-NIASM, highlighted about women's respect and well-being as well as performing on one's own field with dedication and determination. All the women working in the institute viz., farm, office, students and young professionals were felicitated on the occasion.



Fisheries Training programme on "Farm pond based Aquaculture: A Business Opportunity" 'under Scheduled Caste Sub-Plan (SCSP) conducted at ICAR-NIASM, Baramati on 24th March, 2021

ICAR-National Institute of Inorganic Stress Management, Baramati organized a one-day training program on "Farm Pond based Aquaculture: A Business Opportunity" on March 24, 2021 under the Scheduled Castes Sub-Plan 2020-21. On this occasion, Dr. Himanshu Pathak, Director of ICAR-NIASM and Chief Guest of the program briefed the farmers about institute activities and emphasized the importance of fish

farming business and need to learn newer technologies in fish farming. He assured the farmers that all the required technical assistance would be provided by the institute for fish farming. Dr. Sharad Surnar, Aquaculture Expert, Pune provided guidance on artificial feed management and Pradhan Mantri Matsya-Sampada Yojana. Mr. Mukesh Bhendarkar, Training Coordinator, guided the farmers on various topics such as commercially important fish species, freshwater aquaculture, management methods for modern aquaculture, GIFT tilapia. Dr. Nitin Kurade, Principal Scientist and Chairman, Scheduled Castes Sub-Plan 2020-21, introduced the farmers in detail about the SCSP program and appealed to as many people as possible to take advantage of the scheme. On this occasion, technical bulletin was released entitled "मत्स्य संवर्धन मार्गदर्शिका". The fish seeds and fish feed were distributed to all the beneficiary trainees under SCSP scheme. All the members of the Scheduled Caste Sub-Plan 2020-21 Committee participated in the event. Vote of thanks was given by D.D. Nangare, I/C Head, SPSR.



Organized Training on "Farm Pond based Aquaculture: A Business Opportunity" under the Scheduled Castes Sub-Plan 2020-21 held at Jamkhed on dated 27th March, 2021.

Dr Mukesh Bhendarkar Scientist (FRM) organized the training programme for fish farmers at Jamkhed on 27th March, 2021.



LIST OF ONGOING PROJECTS

Umbrella Projects

1. Abiotic Stress Information System (ASIS): Geo-spatial digital maps of multiple abiotic stresses, management options and future scenarios.
2. Germplasm Conservation and Management (GCM): Genetic garden and gene bank for abiotic stress tolerant plants, animals and fisheries for food security and sustainability.
3. Model Green Farm (MGF): Environment-friendly, economically viable, state-of-the-art model farm for abiotic stressed regions.
4. Climate-smart IFS (CIFS): Climate resilient integrated farming system in semi-arid region.

Flagship Projects

1. Atmospheric Stress Management: Adaptation and mitigation of atmospheric stress in crops, livestock, poultry and fishes for sustainable productivity and profitability
2. New Crops: Augmenting farm income in water scarce regions with alternative crops
3. Bio-saline Agriculture: Exploitation of halophytic plant and associated microbiome for amelioration of saline agricultural land of arid & semiarid regions
4. Technology Targeting and Policy: Targeting prospective technologies for abiotic stress resilience in rainfed and dryland regions

Externally Aided Projects

1. Genomics strategies for improvement of yield and seed composition traits under drought stress conditions in soybean (Funded by: ICAR-NASF)
2. Phenotyping of pulses for enhanced tolerance to drought and heat (Funded by ICAR-NICRA)
3. Climate Smart Management Practices (Funded by: IRRI)
4. Evaluation of halotolerant rhizobium and PGPB based biomolecules for alleviation of drought and salt stress (Funded by: AMAAS, NBAIM, Mau)
5. Conservation Agriculture for Enhancing Resource-Use Efficiency, Environmental Quality and

Productivity of Sugarcane Cropping System (Funded by: CA Platform ICAR)

6. Abiotic stress detection from field to landscape scale in different crops using remote sensing tools (Funded by ISRO-SAC)
7. Establishment of model herbal garden for medicinal and aromatic plants (Funded by NMPB)

8. WEBINARS ORGANIZED

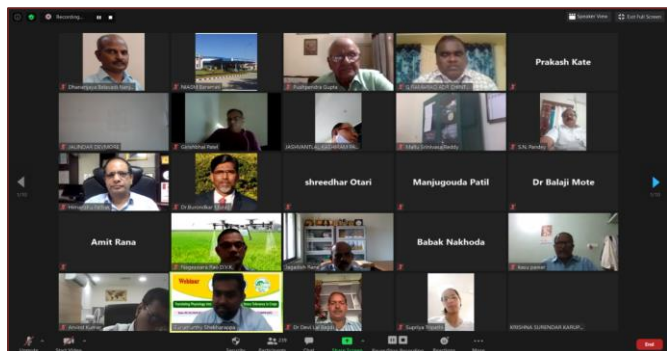
National Webinar on 'Translating Physiology into Techniques for Abiotic Stress Tolerance in Crop' held on 9th October, 2020

The ICAR–National Institute of Abiotic Stress Management (NIASM), Baramati in collaboration with the Indian Society for Plant Physiology and Society for Agricultural Research on Abiotic Stresses, organized a webinar on “Translating Physiology into Techniques for Abiotic Stress Tolerance in Crop” on October 9, 2020. The aim of the webinar was to explore status, constraints and opportunities in this area of research for young research scholars and scientists.

Dr. Himanshu Pathak, Director, ICAR-NIASM, highlighted the importance of plant physiology research and opined that a lot of information had been generated on the mechanism of abiotic stress tolerance. He suggested that present knowledge can be translated into screening techniques and other tools for managing the stress in crop plant.

The introductory remark by Director was followed by a brief overview about the webinars and the invited speakers by Dr. Jagadish Rane, I/C Head SDSM, ICAR-NIASM and Secretary, Society for Agricultural Research on Abiotic Stresses, India. The webinar included expert's lectures, views and discussions on various aspects of Plant Physiology and breeding traits. Dr. Bettina Berger, Scientific Director, The Plant Accelerator, Australia, outlined the High-throughput 3D analysis of barley shoots for revealing the novel QTL involved in leaf growth under salt. Dr P. K Gupta, Emeritus Professor, CCS University, Meerut, outlined the genetics of some physiological traits for tolerance against drought and heat in wheat. Dr Arvind Kumar, Director, IRRI-India, presented the integration of physiological, breeding and genomics aspects to tackle abiotic stresses in important crops like rice. Dr M Sheshshayee, Professor, UAS Bangalore, explained perspectives and opportunities for translating physiology for crop improvement.

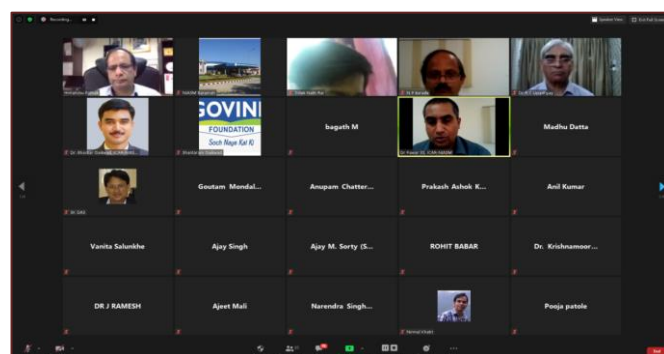
The webinar provided an opportunity to almost 500 participants to listen to the experts from different disciplines from India and abroad which included scientists, entrepreneurs and students. Dr. Gurumurthy S as Organizing Secretary and Dr Mahesh Kumar as the Convenor, played a key role in organizing this event.



National Webinar on Climate Resilient Livestock Production: Opportunities and Threats held on 3rd November, 2020

The ICAR-National Institute of Abiotic Stress Management, Baramati, Maharashtra organized a National Webinar on “Climate Resilient Livestock Production: Opportunities and Threats” on November 03, 2020. Dr. Himanshu Pathak, Director, ICAR-NIASM in his introductory remarks gave a brief overview about the climate change and its relationship with livestock sector. Dr. N.P. Kurade, I/C Head SASM, ICAR-NIASM and Convener of the webinar gave a brief overview of webinar and introduction of the invited speakers. The Chief Guest, Dr. B.N. Tripathi, Deputy Director General (Animal Science), ICAR graced the webinar as chief guest. He emphasized on characterization of indigenous animals breeds and their registration. He reiterated need for considering multiple traits in selection process of the animals breeds. Dr. S.S. Honnappagol, Former: Animal Husbandry Commissioner (GOI) & Vice Chancellor, KVAFSU, Bidar delivered lecture on Status, Scope and challenges for livestock production in India wherein he summarized the current status, Scope and challenges faced in livestock production and emphasized the way forward to overcome the challenges. Dr. R.C. Upadhyay, Former Head, Animal Physiology, ICAR-NDRI, Karnal in his address highlighted impact of climate change on livestock production and health. He highlighted the need of more investment in livestock sector. Dr. A. Sahoo, Head, Animal Nutrition, ICAR-CSWRI,

Awikanagar presented the detailed nutritional strategies for climate resilient livestock production. Dr. Bagath M., Senior Scientist, ICAR- NIANP, Bengaluru presented the cutting edge biotechnology tools useful in climate resilient livestock production including next generation sequencing, microarray, transcriptomics studies, metagenomics, CRISPER/CAS and biosensors. Dr. S. Gaikwad General Manager, Govind Milk & Milk Products Pvt. Ltd., Phaltan discussed the dairy industry and his experiences in imparting the climate resilience in dairy production through various practical and ground initiatives. The Webinar was aimed to understand status, scope, research gaps in adaptation/mitigation strategies and possible collaborations with reference to climate resilient livestock production in the country. Dr. Sachinkumar S. Pawar and Dr. Bhaskar B. Gaikwad, (Co-Convenors), contributed in organizing and smooth conduct of the webinar. A total of 220 participants including researchers, academicians, Research fellows, Young Professionals and Students registered for the webinar and about 135 delegates and participants virtually participated in the Webinar.



Webinar on ‘Genomics Strategies for Improvement of Abiotic Stress Tolerance in Crop Plants’ held on 27th November, 2020

The ICAR–National Institute of Abiotic Stress Management (ICAR-NIASM), Baramati, Pune in collaboration with the Alliance of Bioversity International & International Centre for Tropical Agriculture (CIAT), Asia-India Office, India organized a webinar on “Genomics Strategies for Improvement of Abiotic Stress Tolerance in Crop Plants” on November 27, 2020. The aim of the webinar was to explore the opportunities of genomics for improvement of abiotic stress tolerance in crop plants, understanding the mechanisms underlying various environmental

stress tolerance and also collaborations for abiotic stress research.

Dr. Himanshu Pathak, Director, ICAR-NIASM, highlighted the challenges in enhancing abiotic stress tolerance in crop plants and talked about the opportunities of genomics for developing resilience to environmental stress in crop plants. He suggested that recent advances in various aspects of genomics can be crucial to develop climate resilient crops.

The introductory remark by Director was followed by a brief overview about the webinar by Prof. KC Bansal, Former Director, ICAR-NBPGR and Senior Advisor, Alliance of Bioversity International & International Centre for Tropical Agriculture (CGIAR), Asia-India Office, New Delhi. Prof. Bansal emphasized the need to combine genomics and phenomics approaches with a view to identify novel genes/alleles, QTLs and genomic regions associated with multiple abiotic stress tolerance in crops.

The webinar included experts' lectures, views and discussions on various aspects of genomics for understanding mechanisms of abiotic stress tolerance, and techniques like CRISPR-Cas for generating climate resilient crops. Prof. Mark Tester from the King Abdullah University of Science & Technology (KAUST), Saudi Arabia, emphasized to discover the novel genes and tolerance mechanisms especially in salt tolerant crops like wild tomatoes, *Chenopodium* and *Salicornia*. Dr. Himabindu K, ICRISAT, Hyderabad outlined the integrative omics approach to understand drought tolerance mechanism in chickpea. Dr. Matthew Reynolds, International Maize and Wheat Improvement Centre (CIMMYT), Mexico, highlighted opportunities to improve wheat adaptation to environmental stresses through advances in genomics and phenomics, exploring untapped genetic resources and physiological and molecular breeding. Dr. Girdhar Pandey, University of Delhi, South Campus, New Delhi presented a model to improve K^+ deficiency tolerance in rice using CRISPR/Cas9-based genetic engineering. Dr. Viswanathan Chinnusamy, Division of Plant Physiology, IARI, New Delhi explained genetic engineering of rice with ABA receptors. He emphasized that the ABA receptors engineering employing CRISPR/Cas9 mutagenesis can be useful to enhance water use efficiency, tolerance to drought, cold and salinity.

About 500 participants registered for the webinar. The webinar provided an opportunity to almost 150 participants to listen to the experts from India and abroad which included scientists, researchers and students. Prof. KC Bansal as Moderator and Dr. Ajay Kumar Singh as the Convenor played a key role in organizing this event.



TRAININGS ATTENDED

Dr Sangram Chavan

- National Workshop on Intellectual Property Management in Agriculture held at ICAR-IIAB, Ranchi on November 28, 2020.

Dr Aliza Pradhan

- DST Sponsored 5 days online Training Programme on 'Climate Change: Challenges and Response' for women scientists from 05 to 09 October 2020.

Dr Basavaraj P S

- As a part of Foundation training for newly joined scientist, undergone three month professional Attachment Training at ICAR-Indian Institute of Oilseeds Research, Hyderabad from 28th Sep, 2020 to 28th Dec, 2020.

Dr Pravin Taware

- Three days Hindi Workshop (on-line) on "Overview of Tools and Techniques in Agricultural Bioinformatics" during 14-16 December, 2020 organized by Centre for Agricultural Bioinformatics, ICAR-Indian Agricultural Statistics Research Institute, New Delhi.

Dr Lalitkumar Aher

- Three days training programme on 'Skill developments in maintaining Soil health, Plant Health for better crop ecosystems' at IIHR Bengaluru from 21 to 23 January, 2021
- Six days training programme on 'Data Visualization in Agribusiness and

Agricultural Research' at NAARM Hyderabad from 22 to 27 February, 2021

Mr Sunil Potekar

- Participated in online training programme on “Time Series Data Analysis” organized by ICAR-NAARM, Hyderabad, during 04 - 09 Jan 2021.

PUBLICATIONS

Research Papers

- Bal S.K., Wakchaure G.C., Potekar S., Choudhury B.U., Choudhury R.L. and Sahoo R.N. (2021) Spectral Signature Based Water Stress Characterization and Prediction of Wheat Yield under Varied Irrigation and Plant Bio-regulator Management Practices. *Journal of the Indian Society of Remote Sensing*. <https://doi.org/10.1007/s12524-021-01325-6>
- Brahmane M. P., Pawar, S.S., Bhendarkar, M. P., Krishnani, K.K., and Kurade N.P.2020. Effect of temperature on body weight, metabolism and thermoregulation of air breathing catfish, *Heteropneustes fossilis*. *J. Agrometeorol* 22 (4): 541-544.
- Debnath M, Tripathi R, Chatterjee S, Shahid M, Lal B, Gautam P, Jambhulkar NN, Mohanty S, Chatterjee D, Panda BB, Nayak PK, Bhattacharyya P, Shukla AK, Pathak H and Nayak AK (2021) Long-Term yield of rice–rice system with different nutrient management in eastern India: Effect of air temperature variability in dry season. *Agric Res*, doi.org/10.1007/s40003-021-00541-3
- Kumar A, Bhatia A, Sehgal V, Tomer R, Jain N and Pathak H (2021) Net Ecosystem Exchange of Carbon Dioxide in Rice–Spring Wheat System of Northwestern Indo-Gangetic Plains. *Land* 10: doi.org/10.3390/xxxxx
- Mohanty S, Nayak AK, Bhaduri D, Swain CK, Anjani Kumar, Tripathi R, Shahid M, Behera KK and Pathak H (2021) Real-time application of neem-coated urea for enhancing N-use efficiency and minimizing the yield gap between aerobic direct-seeded and puddled transplanted rice. *Field Crops Res* 264: doi.org/10.1016/j.fcr.2021.108072
- Móríng A, Pathak H,^[SEP]... Sutton M (2021) Nitrogen Challenges and Opportunities for Agricultural and Environmental Science in

India. *Frontiers in Sustainable Food Systems*, 5: doi: 10.3389/fsufs.2021.505347

- Ratnaparkhe MB, Marmat N, Kumawat G, Shivakumar M, Kamble V, Nataraj V, Ramesh SV, Deshmukh MP, Singh AK, Sonah H, Deshmukh R, Prasad M, Chand S, Gupta S (2020) Whole genome re-sequencing of soybean accession EC241780 providing genomic landscape of candidate genes involved in rust resistance. *Current Genomics*. DOI : 10.2174/1389202921999200601142258.
- Singh RN, Sah S, Das B, Vishnoi L and Pathak H (2020) Spatio-temporal trends and variability of rainfall in Maharashtra, India: Analysis of 118 years. *Theor Appl Climatol*, doi.org/10.1007/s00704-020-03452-5.

Review Papers

- Mahendra Meena, Shalini Pilania, Ajay Pal, Shiwani Mandhania, Bharat Bhushan, Satish Kumar, Gholamreza Gohari, and Vinod Saharan (2020) Cu-chitosan nano-net improves keeping quality of tomato by modulating physio-biochemical responses, *Scientific Reports*, 10(1), pp.1-11
- Pathak H, Mahesh Kumar, Molla KA and Chakraborty K (2021) Abiotic stresses in rice production: Impacts and management. *Oryza* 58:103-125.
- Satish Kumar, Dhiraj Paul, Bharat Bhushan, G. C. Wakchaure, Kamlesh K. Meena, and Y. Shouche (2020). “Traversing the “Omic” landscape of microbial halotolerance for key molecular processes and new insights”. *Critical Reviews in Microbiology* 46, : 631-653.

Book

- Pathak H, Suresh Pal and Mohapatra T (2020) Mahatma Gandhi's Vision of Agriculture: Achievements of ICAR. Indian Council of Agricultural Research, New Delhi, p 228, ISBN: 978-81-7164-206-9.

Book Chapters

- Lenka S, Lenka NK and Pathak H (2020) Reducing emission of greenhouse gases from fertilizer use in India. In *Soil and Fertilizers*. CRC Press, pp. 169-182.
- Raghuram N, Abrol YP, Pathak H, Adhya TK and Tiwari MK (2020) The INI South Asian Regional Nitrogen Centre: Capacity Building

for Regional Nitrogen Assessment and Management. In Sutton et al. (eds.), Just Enough Nitrogen. Springer Nature Switzerland AG 2021. doi.org/10.1007/978-3-030-58065-0-32, p. 1-12.

- Satish Kumar, Mahesh Kumar, G. C. Wakchaure, Bharat Bhushan, K.K Meena, Ajay Kumar Singh, Gurumurthy and J.Rane (2021) "Microbial management of crop abiotic stresses: Current trends and prospects" in *Microbial Management of Plant stresses* (In Press), Elsevier publishers.
- Satpute GK, Ratnaparkhe MB, Chandra S, Kamble VG, Kavishwar R, Singh AK, Gupta S, Devdas R, Arya M, Singh M, Sharma MP, Kumawat G, Shivakumar M, Nataraj V, Kuchlan MK, Rajesh V, Srivastava MK, Chitikeneni A, Varshney RK, and Henry T. Nguyen HT (2020). Breeding and Molecular Approaches for Evolving Drought-Tolerant Soybeans. In: *Plant Stress Biology: Strategies and Trends*. (Eds. Giri B and Sharma MP). Springer. Pp.83-130.
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Technical folder

- ब्राह्मणे एम पी, मुकेश भेंडारकर, सचिन पवार , राजकुमार, भास्कर गायकवाड आणि संजीव कोचेवड. मत्स्य शेतीतील अजैविक ताण : कारणे आणि व्यवस्थापन. तांत्रिक फोल्डर 37;
- Potekar, S. and Singh RN. (2020). Hailstorms: Damage and Mitigation Strategies for Horticultural Crops. ICAR-NIASM Technical Folder No.42

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- Ajay Kumar Singh, Mahesh Kumar, Neeraj Kumar, Jagadish Rane, Narendra Pratap Singh and Himanshu Pathak (2020) NIASM-A Decade of Service. ICAR-National Institute of Abiotic Stress Management, pp 65. Technical Bulletin No: 45.
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- मुकेश भेंडारकर, सचिन पवार, भास्कर गायकवाड, राजकुमार, नितिन कुराडे, धनंजय नांगरे, अविनाश निर्मळे, आलिजा प्रधान. मत्स्य संवर्धन मार्गदर्शिका. तांत्रिक बुलेटीन:31 भाकृअनुप-राष्ट्रीय अजैविक स्ट्रेस प्रबंधन संस्थान, बारामती, पुणे, महाराष्ट्र, भारत.

Popular Article

- भेंडारकर एम पी, ब्राह्मणे एम पी. 2021. गिफ्ट तिलापीया.शेतकरी,10: pp.46-47.

VIDEOS

- NIASM Geet
- NIASM Farm Development
- NIASM Institute Profile
- NIASM Laboratories
- NIASM Plant Phenomics
- NIASM Building, Conference Halls & Auditorium
- NIASM Guest House, Hostel & Residence

PERSONALIA

Awards / Recognitions

1. Dr. Ajay K Singh, Principal Scientist, (Agricultural Biotechnology) was felicitated with best scientist award during 13th Foundation Day.
2. Dr. Satish Kumar, Scientist SS (Plant Biochemistry) was felicitated with best scientist award during 13th Foundation Day
3. Best Poster Award: KK Jangid, Mahesh Kumar, Lalit Aher, J Rane (2020) at International Plant Physiology Virtual Conference organised by ISPP during 6-7 Dec 2020.
4. Mr. Mukesh Bhendarkar, Scientist (Fisheries Resource Management), received 'Young Scientist Award-2020' from Society of

Fisheries and Life Sciences for outstanding contribution in the field of Fisheries and Aquaculture.

5. Mr. Mukesh Bhendarkar, Scientist received Best Oral Presentation for the presentation entitled “Unintended Impact of the Covid-19 Lockdown on the Fisheries Sector” under the theme COVID-19 impact on agriculture, policy response and livelihood security at 4th International Conference, Global Approaches in Natural Resource Management for Climate Smart Agriculture (GNRSA-2020) during Pandemic Era of COVID-19 from February 26-28, 2021.
6. Mr. Sunil Potekar, Mr. Rushikesh Gophane and Mr. Madhukar Gubbala were felicitated with Best Technical Assistant Award during the 13th foundation day of ICAR-NIASM.
7. Mr. Girish Kulkarni was felicitated with Best Administrative Assistant Award during the 13th foundation day of ICAR-NIASM.

Promotions

1. Dr. Ajay K Singh promoted as Principal Scientist (Agricultural Biotechnology) since 06.10.2018
2. Dr Dhananjay D Nangare promoted as Principal Scientist (Soil and Water Conservation Engineering) since 09.10.2018.
3. Dr Yogeshwar Singh promoted as Principal Scientist (Agronomy) since 29.10.2018
4. Dr S S Pawar promoted as Senior Scientist (Animal Biotechnology)) since 31.8.2017.
5. Dr Satish Kumar promoted as Scientist Senior Scale (Plant Biochemistry) since 15.09.2016
6. Dr Harisha B promoted as Scientist Senior Scale (Spices, Plantation, Medicinal & Aromatic Plants) since 01.01.2019

New Joining

1. Mr Ravi Kumar joined as Scientist (Agricultural Extension) on 23.11.2020 after transfer from IIPR, Kanpur

Transfer

1. Dr K K Meena, Senior Scientist (Agril Microbiology) trasferred to CAZRI, Jodhpur (Rajsthan) on 28th November,2020.

2. Mr Madhu Gubbala, Senior Technical Assistant transferred to DOPR, Hyderabad (AP) on 29th October, 2020.
3. Mr. Rupesh Kumar Amarghade, Senior Technical Assistant transferred to ICAR-NBSS&LUP, Nagpur on 7th October, 2020.