INTERNATIONAL CONFERENCE

System of Crop Intensification (ICSCI 2022) for Climate-Smart Livelihood and Nutritional Security

12-14 December, 2022
Indian Institute of Rice Research, Hyderabad, India

SOUVENIR

Organized by

Society for Advancement of Rice Research

Hyderabad, Telangana, India

INTERNATIONAL CONFERENCE

System of Crop Intensification (ICSCI 2022) for Climate-Smart Livelihood and Nutritional Security

12-14 December, 2022
ICAR- Indian Institute of Rice Research, Hyderabad, India

Extended Summaries

Organized by
Society for Advancement of Rice Research
Hyderabad, Telangana, India

International Conference (ICSCI 2022)

International Conference

on

System of Crop Intensification (ICSCI 2022) for

Climate Smart Livelihood and Nutritional Security

12-14, Dec 2022

ICAR-Indian Institute of Rice Research (ICAR-IIRR), Hyderabad, India

SOUVENIR

Organized by

Society for Advancement of Rice Research
Hyderabad, Telangana, India

Published in December 2022

Dr RM Sundaram
Organizing Chairman
ICSCI 2022
Society for Advancement of Rice Research (SARR)
ICAR-Indian Institute of Rice Research, Hyderabad, 500030, India

Citation
Amtul Waris, Jyothi Badri, R Abdul Fiyaz, SV Sai Prasad, CH Padmavathi, R Mahender Kumar and RM Sundaram 2022 International Conference on System of Crop Intensification (ICSCI 2022) for Climate Smart Livelihood and Nutritional Security: Souvenir. 12-14 Dec 2022, Society for Advancement of Rice Research, Rajendranagar, Hyderabad-500030, India. pp60

Published at:

Sai Maruthi Print Solutions
Hyderabad
Email: saimaruthiprintsolutions@gmail.com
Cell: 9912277127, 7780688102

Contents

MESSAGES FROM KNOWLEDGE PARTNERS

Dr. Himanshu Pathak, Ph.D

Secretary (DARE) & Director General (ICAR)

Department of Agriculture Research and Education (DARE)

Ministry of Agriculture & Farmers Welfare, Govt. of India &

Indian Council of Agricultural Research

Krishi Bhawan, New Delhi-110 001

MESSAGE

I am delighted to know that the International Conference on System of Crop Intensification (ICSCI 2022) for Climate-Smart Livelihood and Nutritional Security being organized by the Society for Advancement of Rice Research during December 12-14th, 2022 at Hyderabad.

Agriculture in India has shown remarkable transformation during the past seven decades, ensuring not only self-sufficiency in food requirement and but also in meeting nutritional security. Inventions and innovations enabled improvement in technologies, and their wider use lead to consistent increase in agriculture output. Every sector of agriculture requires innovation for further improvement and to meet future demand. The System of Rice Intensification (SCI) is one of the most important farming methodology of agriculture for increasing the productivity of irrigated rice by changing the management of plants, soil, water and nutrients. The adaptation of SCI principles/ methods within India and around the world, particularly in Asian countries has been very spontaneous and widely dispersed, the available information on practices needs further study. Therefore, it is right time to address those issues thoroughly, I hope, the conference would deliberate the existing status of technologies available; identify research gaps; and come up with an action plan for resolving the current issues associated with System of Crop Intensification in rice and other crops.

I wish the conference all success.

(Himanshu Pathak)

Dated the 06th December, 2022

New Delhi

भारतीय कृषि अनुसंधान परिषद
कृषि एवं किसान कल्याण मंत्रालय
भारत सरकार, कृषि भवन
नई दिल्ली 110001, भारत

Indian Council of Agricultural Research
Ministry of Agriculture and Farmers Welfare
Govt. of India, Krishi Bhavan
New Delhi 110001, India

डॉ. तिलक राज शर्मा
उप महानिदेशक (फसल विज्ञान)

Dr. T. R. Sharma, Ph.D
FNA, FNAAS, FNASc, JC Bose National Fellow
Deputy Director General (Crop Science)

MESSAGE

I am extremely happy to know that the International Conference on System of Crop Intensification (ICSCI 2022) for Climate-Smart Livelihood and Nutritional Security being organized by the Society for Advancement of Rice Research during December 12-14th, 2022 at Hyderabad.

Climate change impacts agriculture through a number of ways. India being a leading producer of several food commodities and food grain production has increased many folds to meet our domestic needs. New India demands not only food security but also nutritional security. But reducing land resources, unfavorable climatic conditions, limited water availability, crop loss due to biotic and abiotic stresses and increase in the input cost pose major challenges to achieve and sustain agricultural production, productivity and nutritional security. Greater productivity and profitability have to be brought about by improved resource management, diversification and modern breeding approaches. Climate-smart agriculture guide actions to transform agri-food systems towards green and supports reaching internationally agreed goals and aims to sustainably increase agricultural productivity and incomes, adapting and building resilience to climate change reducing and/or removing greenhouse gas emissions, wherever possible. The conference would provide a good opportunity to the researchers and youngsters in utilizing system of crop intensification for climate-smart livelihood and nutritional security leading to better production, better nutrition, a better environment and a better life for all. I am confident that deliberations during the conference will lead to fruitful recommendations to address challenges confronted by Indian agriculture.

I convey my best wishes for the success of the conference.

(T.R. Sharma)

Dated the 06th December, 2022
New Delhi

E-mail: ddgcs.icar@nic.in Phone: 91-11-23382545 Fax: 91-11-23097003

भारतीय कृषि अनुसंधान परिषद
डॉ. राजेंद्र प्रसाद रोड,कृषि भवन,नई दिल्ली-10001
Indian Council of Agricultural Research
Dr. Rajendra Prasad Road, Krishi Bhavan, New Delhi-110001
फोन कार्यालय/Tel (Off.): 011 23382257, 23046457; E-mail: adgseed.icar@nic.in

डॉ. डी. के. यादव
सहायक महानिदेशक (बीज)
Dr. D. K. Yadava
Assistant Director General (Seed)

No. F. CS.29/2/2021-Seed
Dated: 06.10.2022

MESSAGE

It's a pleasure to know that the International Conference on System of Crop Intensification (ICSCI 2022) for Climate-Smart Livelihood and Nutritional Security is being organized by the Society for Advancement of Rice Research during December 12-14, 2022 at Hyderabad.

In recent years, system of crop intensification has emerged in a number of Asian and African countries, raising the productivity of the land, water, seed, labor, and capital resources that farmers can invest in growing a wide range of crops. Even though today's high-chemical, high-irrigation agriculture produces short-term profits, it eventually harms the soil, the eco-system, and agricultural sustainability. Despite growing worries about the sustainability of present agricultural methods and their effects on climate change, the modern strategy for crop intensification that focuses primarily on generating genetic enhancements and increasing external inputs is not the only one that deserves consideration. Traditional crop cultivation methods can be updated by using a crop intensification system for more lucrative and sustainable agriculture. I strongly believe that, the present conference will deliberate effectively on the proposed themes of conference and very good recommendations will emerge from those deliberations.

I wish the organisers and the participants of the conference all success.

(D.K. YADAVA)

Dated the 06th December, 2022
New Delhi

Dr. S.K. Pradhan
Assistant Director General (FFC)
Indian Council of Agricultural Research
KrishiBhavan, New Delhi 110 001

MESSAGE

I am extremely happy to know that the International Conference on System of Crop Intensification (ICSCI 2022) for Climate-Smart Livelihood and Nutritional Security being organized by the Society for Advancement of Rice Research during December 12-14, 2022 at Hyderabad.

System of Rice Intensification is a farming methodology for increasing the productivity of irrigated rice by changing the management of plants, soil, water and nutrients particularly by eliciting greater root growth. I hope the deliberations of the proposed conference on System of Rice Intensificationinvolving subject matter experts, intellectuals, scientists, policy makers and the stakeholders from the rice sector in the country would definitely pave a way to enhance the profitability to the rice farmers and also to bring self-sufficiency in the rice production in the near future.

I convey my good wishes and heartiest greetings to the organizers and participants of the Conference and wish the event all success.

(S.K. Pradhan)

Dated the 06th December, 2022
New Delhi

Message

It is a matter of pride for me to share with you all that Society for Advancement of Rice Research (SARR) is organizing an International Conference on System of Crop Intensification (ICSCI 2022) for Climate-Smart Livelihood and Nutritional Security during 12-14, December 2022 at ICAR-Indian Institute of Rice Research (ICAR-IIRR). The knowledge partners for this conference are IIMR, PJTSAU, NRRI, CRIDA, IISR, IIWBR, IARI, IRRI, ARRW, ICRISAT, NAARMS, AGSRI, WASSAN, PRADAN, IRMA, NABARD, NCSA and PSI.

Modern agricultural practices have severely affected the natural resources like soil, water, environment and food quality. Need of the day is to go beyond genetic improvement and rethink on the choice of technology, practices, policies and strategies for innovations in sustainable crop production. This conference is systematically structured into seven major themes encompassing all the aspects relevant to SCI. It is mainly focussing on the current global status of SCI; breeding, management and disease-pest dynamics of SCI; Resource use and Conservation in SCI; Climate Resilience and Ecosystem Protection; Agro-Industries/Mechanization for Scaling up SCI; SCI Adoption and their Socio-Economic Impacts including Gender, Labour and Institutional Dynamics and Learning Experiences & Success stories of SCI; Farmer and Scientist Interaction. The key note speakers, lead and invited speakers of the conference are renowned researchers in the research and academic arena.

I extend my warm welcome and greetings to all the researchers, promoters, policy makers and all those associated with this conference and wish all the participants of ICSCI 2022 a happy and fruitful stay at Hyderabad during the conference.

Dr RM Sundaram
Director, ICAR-Indian Institute of Rice Research (ICAR-IIRR)
President, Society for Advancement of Rice Research (SARR)
Organizing Chairman (ICSCI 2022)
Rajendranagar, Hyderabad-500030

Dr. A.K. Nayak
Director
ICAR-National Rice Research Institute
Cuttack, Odisha 753006

MESSAGE

I am glad to know that the Conference on System of Crop Intensification (ICSCI 2022) for Climate-Smart Livelihood and Nutritional Security being organized by the Society for Advancement of Rice Research during December 12-14th, 2022 at Hyderabad.

The System of Crop Intensification aims at increasing agricultural production per unit of inputs. The input includes labour, land, time, fertilizer, seed, feed or cash. The purpose is to achieve higher output with less use of or less expenditure on land, labour, capital, and water. System of Crop Intensification is simple to understand and follow and can be practiced by all farmers. It also is a method that can work in any agro-ecological system. It thus can be widely applied across varied crops and ecosystems. I am of the opinion that the proposed conference would act as a forum for open discussions, exchange of views and scientific information and will promote innovation in the system of crop intensification.

I wish the conference a grand success.

(A.K. Nayak)

Dated the 06th December, 2022
Hyderabad

ACHARYA N.G. RANGA AGRICULTURAL UNIVERSITY
Administrative Office, LAM, Guntur, A.P. - 522 034, India
Tel: 91-0863-2347011 (O)
http://www.angrau.ac.in
email: vicechancellor@angrau.ac.in

ANGRAU

Dr. A. Vishnuvardhan Reddy
Vice-Chancellor

MESSAGE

Drylands when managed well, are often fertile and capable of supporting the habitats, crops and livestock that sustain the entire global population. However, they are over-exploited and over-utilized through improper management of soil and water. Above all, climate change is alarming and agriculture, being climate-dependent, is highly vulnerable to weather variations. Soil health is crucial to sustainability and the challenge is to identify the crop management practices that promote soil health, help in moisture retention and ensure productivity as well as short term profitability for farmers. It is important to increase and diversify land-based income sources. Sustainable agriculture is not only about seed improvement, it is also about sustainable and practical methodologies.

The system of crop intensification (SCI) strategy is to diverge from the kind of agricultural strategy that has prevailed over the past 50 years. Modern agriculture enabled the farmers to raise their production by planting genetically improved input intensive varieties. However, input intensive agriculture is not the only kind of intensification that can lead to sustainability and on the other hand it raises concerns about the impact on climate change. SCI involves soil preparation and management, crop spacing, systematic application of locally prepared organic inputs and micro-nutrient foliar sprays. SCI is simple to understand and follow and can be practiced by all farmers. It also is a method that can work in any agro-ecological system. It thus can be widely applied across varied crops and ecosystems. SCI method increases the plant's resilience and adaptive capacity.

It is hoped that this International Conference on System of Crop Intensification (ICSCI 2022) for Climate-Smart Livelihood and Nutritional Security will stimulate the interest of researchers, farmers and student communities to undertake more systematic studies and to help establish scientific explanations for promoting the greater utilization of SCI adaptations. The agricultural experiences shared here concern to assist resource-limited households that must deal with the severe and growing challenges found in degraded environments, which are now being exacerbated by the climate change that adds to their burdens and insecurity. Though, the results of SCI practice, producing more food outputs with fewer inputs, will appear counter-intuitive to the participants, through the exchange of ideas and information and through the creation and strengthening of personal connections, this conference should help to propel and evolve SCI for the benefit of farming communities, consumers, and the environment.

(A. Vishnuvardhan Reddy)

Message

To meet our global food-security requirements, agricultural sectors will need to pursue appropriate strategies for sustainable intensification of agricultural production and raise agricultural productivity in eco-friendly ways. Need of the day is to find ways to increase the productivity of the available resources for producing a wide variety of crops -- in the process, making these crops more resilient to the multiple stresses of climate change -- just by making changes in the ways that plants, soil, water and nutrients are managed. A high-chemical and high-irrigation based modern-day agriculture while giving short-term returns, damages soil-health, eco-balance and agricultural sustainability in the long run. Contemporary strategy for crop intensification way back from the days of green revolution that depends primarily on making genetic improvements and increasing external inputs is, however, not the only kind of intensification that warrants consideration - especially given growing concerns about the sustainability of current agricultural practices and about their impacts on climate change.

In the recent past, farmers and professionals across the globe have begun adapting and extrapolating what they have learned from and about the system of rice intensification (SRI) to a range of other crops - finger millet, wheat, sugarcane, mustard, soya, kidney beans, and various vegetables - in what is being called the system of crop intensification (SCI). SCI is an agro-ecological strategy aimed at improvement of productivity, profitability, sustainability, food security and resilience to climate change by altering the traditional practices of crop, soil, water and nutrient management particularly under constrained land and water resources. The increasing scarcity of our natural resources relative to the needs of our growing populations places an ever-greater premium upon improving the management of the soil systems, water, and biotic resources still available.

The theme of the International Conference on System of Crop Intensification (ICSCI 2022) for Climate-Smart Livelihood and Nutritional Security is not something new to be transferred and adopted, but a set of ideas and experiences that we hope will encourage many people to 'think outside the boxes' of their current practices and to capitalize upon certain biological processes and potentials that exist both within their present crops and within the soil systems in which these crops grow. I presume that farmers, researchers, students, communities and institutions across the globe would like to know more about SCI for climate smart livelihood and nutritional security and to benefit from it to the extent that they can. I hope that this conference will provide more knowledge about SCI opportunities through people's experimentation and experience that this will be communicated and widely shared and up scaled in large areas.

Sri M Raghunandan Rao IAS
Vice Chancellor,
PJTSAU-TS

Message

I'm happy to know that Society for Advancement of Rice Research (SARR) in collaboration with NARES partners is organizing an International Conference on System of Crop Intensification (ICSCI 2022) for Climate-Smart Livelihood and Nutritional Security during 12-14, December 2022.

With the ever increasing global demand for food grains, food crops are also grown on large area in input constrained environments. These environments are highly prone to climate change together with the constraints of availability of highly fertile soil and water. Under these conditions, the challenge is to increase per unit productivity with minimal inputs. In the recent past, the successful scientific ideas, methods and practices of Systems of Rice Intensification (SRI) are being extrapolated to many crops like wheat, mustard, finger millet, bajra, tomatoes, brinjal etc in the name of System of Crop Intensification (SCI). Adoption of SCI practices may enhance the productivity and also increase farm income and nutritional security. Promoting better root growth and enhancing the soil's fertility with organic materials are being found effective means for raising the yields of many crop plants with less water, less fertilizer, fewer agrochemicals, and also enhancing climate resilience.

I hope that this conference would thoroughly discuss on the different elements of SCI including high quality seed, better management practices likely to reduce competition between plants for resources to attain maximum genetic potential, improved soil health and eco-friendly practices. I congratulate the organizers for moving forward with organization of an international conference on "System of Crop Intensification (ICSCI 2022) for Climate-Smart Livelihood and Nutritional Security during 12-14, December 2022. and the institutes for their efforts in promoting SCI.

I extend my warm greetings and felicitations to all those associated with organization and participation in this conference and wish the ICSCI 2022 all success.

Dr Arvind Kumar
Deputy Director General - Research
Patancheru, Telangana, India 502 324
Phone- +91-8455-668800, Ext 2221
Email: arvind.kumar@cgiar.org
Skype- +91-8008883838

Cornell University

College of Agriculture and Life Sciences

Norman Uphoff, *Senior Advisor, SRI International Network and Resources Center (SRI-Rice)*
Department of Global Development
B75 Mann Library
Cornell University, Ithaca, NY 14853
Telephone: 607-257-6660
Email: ntu1@cornell.edu
Website: http://sri.cals.cornell.edu

Greetings to Participants in the 2022 International Conference on

THE SYSTEM OF CROP INTENSIFICATION

for Climate-Smart Livelihoods and Nutritional Security

Twenty years ago, in April 2002, the first international conference on the **System of Rice Intensification** (SRI) was held in Sanya, China. It was organized by the *Cornell International Institute for Food, Agriculture and Development* and was co-sponsored by the NGO *Association Tefy Saina* of Madagascar, the *China National China Rice Research Institute* in Hangzhou, and the *China National Hybrid Rice Research and Development Center* in Sanya, with some financial support from the Rockefeller Foundation and the World Bank. It was hosted by the director of China's hybrid rice center, Prof. Yuan Long-ping, well-known as 'the father of hybrid rice.' The proceedings are available on-line at: http://sri.cals.cornell.edu/proc1/index.html.

I am now extremely grateful and thankful to the Indian colleagues who have organized a successor to that first conference. In 2002, there were representatives from **15 countries** where SRI had been introduced and evaluated, plus over 100 Chinese rice scientists and professionals. Now it is hardly possible to bring together representatives from all of the countries around the world where principles and practices of SRI have been validated – **more than 65**.

In the intervening time, there were three large national symposia on SRI convened in Hyderabad, Agartala, and Coimbatore in 2006, 2007, and 2008. These were organized by the WWF-ICRISAT program on food, water and the environment, under the leadership of Dr. Biksham Gujja, with 150, then 250, then 350 participants attending from all parts of India.

The **System of Rice Intensification** (SRI) has evolved and prospered on the Indian sub-continent, with rainfed versions of SRI coming up in various states, with various kinds of mechanization, fertilization, intercropping, direct-seeding, etc. being introduced. In India and in other countries, the original synthesis of ideas and modification of methods initiated by Henri de Laulanié, SJ, was built upon to make SRI more adaptable to a great variety of conditions and circumstances.

More significant has been the adaptation and extrapolation of SRI ideas and methods to **improve the productivity and resilience of other crops beyond rice**. A new SRI – the system of *ragi* intensification, *aka* the system of finger millet intensification – was started by farmers in Jharkhand state in 2006, followed shortly thereafter by *sugar* intensification in Andhra Pradesh, and the system of *wheat* intensification in Bihar. The ideas and methods were further extended also to *pulses*, *vegetables* – tomatoes, brinjal, onions, etc. – and even to *spices* – turmeric in Tamil Nadu, and coriander and cumin in Gujarat. Thus, India has given leadership to what has become known as the **System of Crop Intensification** (SCI), or in Bihar as another SRI, the **System of Root Intensification**.

SRI and SCI are not to be understood as agricultural technologies, similar to those of the Green Revolution. Both SRI and SCI derive from new ways of thinking and from new kinds of crop management. They introduce a paradigm shift from improving crops through new varieties and agrochemical inputs (and consuming more water) to thinking agroecologically, improving the soil's water retention and fertility with organic matter, growing larger, longer, more vigorous root systems, and enhancing the life in the soil.

From the start, we have said that **SRI is a work in progress**. It is not finished yet. Through the exchange of ideas and information and through the creation and strengthening of personal connections, this conference should help to propel and evolve SRI and SCI -- for the benefit of farming communities, consumers, and the environment. SRI and SCI have been multi-sectoral enterprises, involving collaboration among farmers, NGOs, government agencies, and the private sector.

When these enterprises began in India, they offered multiple benefits: higher yield with less expenditure and less dependence on external inputs, water saving, more resistance to pests and diseases, etc. **Now making significant changes in the practice of agriculture is no longer optional and actually imperative**. The climate-resilience that SRI and SCI have demonstrated in the face of water stress and temperature variation strengthens the case for making widespread changes in agricultural practices so that they are more ecologically-informed and more farmer-centered.

Norman Uphoff
Professor emeritus of Government
and International Agriculture
Cornell University, Ithaca, NY, USA

Message

From Dr. Biksham Gujja.

The global SRI community is pleased with the initiative of Advancement of Rice Research (SARR) for organizing this 'International Conference on Crop Intensification with focus on Climate-smart livelihoods. This conference will address the three global challenges.

Improving the farm income: India has specific initiative known as 'doubling the farmer's income'. System of Crop intensification (SCI) is in general reduce the farmer's dependency on external inputs such as seeds, fertilizers and pesticides. SCI also improves the productivity; this will increase the income from the produce. Together, reduction of costs and improvements in production, contribute to doubling of the farmer's income.

Climate crisis: Agriculture is contributor to the greenhouse gases and also impacted by climate change. The SCI practices addresses both these simultaneously. SCI practices are in general require much less water and external inputs. SCI practices are by design climate smart.

Improving the livelihoods. SCI practices are particularly suitable for small and marginal farmers. There is trend many farmers are leaving farming due to increase in costs of cultivation and less and less income from crops. SCI practices which improve the income, could reverse the trend of migration to cities

SCI is well established in India and many developing countries. Many civil society organizations and Governmental institutions have worked hard in promoting these practices. This conference is particularly important in building the experiences from earlier conferences (2006, 2007 and 2008) organized as part of WWF-ICRISAT project "Dialogue on Water, food and Environment".

I thank the conference organizers for their hard work in bringing such rich and diverse experiences together. My sincere appreciation for Dr. Mahendra Kumar and team in undertaking important task.

Dr. Biksham Gujja
Former Head of Freshwater program,
WWF-International and
Ex. Principle Scientist at ICRISAT

DR. SUDHANSHU SINGH
Director, IRRI South Asia Regional Centre
NSRTC Campus, G. T. Road
Collectory Farm, P.O. Industrial Estate
Varanasi 221 006, Uttar Pradesh, India
Telephone: +91-542-2518900
Email: sud.singh@irri.org

Message

I commend the Society for Advancement of Rice Research (SARR) for organizing the International Conference on "System of Crop Intensification for Climate-smart Livelihood and Nutritional Security" at ICAR-Indian Institute of Rice Research, Rajendranagar, Hyderabad, Telangana, India.

It's an excellent opportunity for scientists, researchers, academicians, scholars, students, extension workers, and entrepreneurs to discuss various aspects of scientific accomplishments, advancements, and strategies in agriculture and allied sectors. Frontier technologies and situation-specific innovations are required to optimize productivity, profitability, and resilience through sustainable intensification of rice-based agri-food systems. Moreover, our focus must be on addressing the emerging challenges due to yield gaps, postharvest losses, climatic vulnerabilities, malnutrition, depleting natural resources, and declining profit margins.

While conveying my best wishes to all participants of ICSCI 2022, I sincerely hope that the conference will deliberate on the emerging issues, challenges, and opportunities in agriculture and allied sectors and will develop appropriate recommendations for shaping a better future through transformative agriculture.

I wish the conference a grand success!

(Sudhanshu Singh)

Dated, Varanasi
The 9th December 2022

ABOUT THE KNOWLEDGE PARTNERS

Indian Council of Agricultural Research (ICAR)

The Indian Council of Agricultural Research (ICAR) is an autonomous organisation under the Department of Agricultural Research and Education (DARE), Ministry of Agriculture and Farmers Welfare, Government of India. Formerly known as Imperial Council of Agricultural Research, it was **established on 16 July 1929** as a registered society under the Societies Registration Act, 1860 in pursuance of the report of the Royal Commission on Agriculture. The ICAR has its headquarters at New Delhi.

The Council is the apex body for co-ordinating, guiding and managing research and education in agriculture including horticulture, fisheries and animal sciences in the entire country. With **111 ICAR institutes** and **71 agricultural universities** spread across the country this is one of the largest national agricultural systems in the world. The ICAR has played a pioneering role in ushering Green Revolution and subsequent developments in agriculture in India through its research and technology development that has enabled the country to increase the production of ***food grains by 5.6 times, horticultural crops by 10.5 times, fish by 16.8 times, milk by 10.4 times and eggs by 52.9 times since 1950-51 to 2017-18***, thus making a visible impact on the national food and nutritional security. It has played a major role in promoting excellence in higher education in agriculture. It is engaged in cutting edge areas of science and technology development and its scientists are internationally acknowledged in their fields.

Mandate

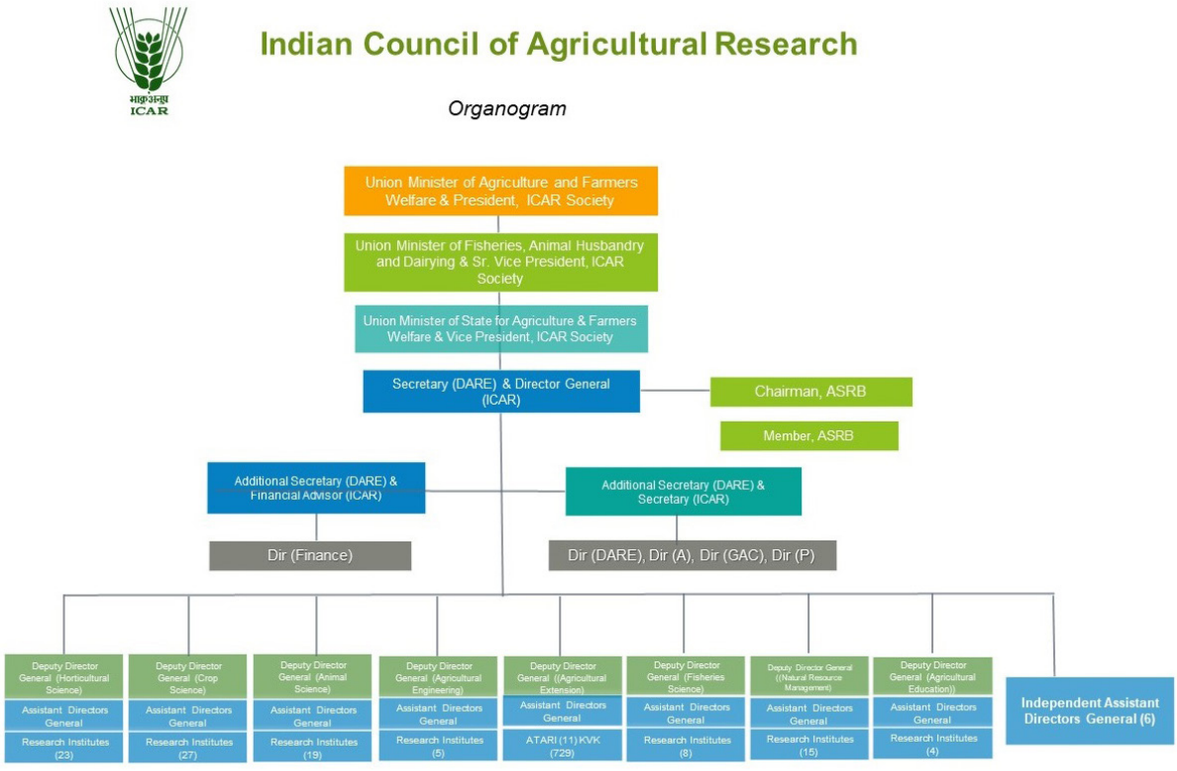
- Plan, Undertake, Coordinate and Promote Research and Technology Development for Sustainable Agriculture.
- Aid, Impart and Coordinate Agricultural Education to enable Quality Human Resource Development.
- Frontline Extension for technology application, adoption, knowledge management and capacity development for agri-based rural development.
- Policy, Cooperation and Consultancy in Agricultural Research, Education & Extension.

Vision Documents

The Indian Council of Agricultural Research is an apex research organization of the country with a high standing amongst international agricultural research institutions. Since its inception in 1930, the Council has been spearheading agricultural research, education and extension activities for productivity enhancement and diversification of Indian agriculture.

The world as a whole is undergoing several transformative changes. Growing population, changing lifestyles, expanding urbanization and accelerated climate changes are creating new challenges for the national agricultural research system. Whereas in the past, the challenge was to supply adequate food, but now it is to provide adequate nutrients to promote health; and in the future, the challenge would be to provide optimal nutrients based on individual's genetic profile. Fortunately, along with challenges, the developments in science are creating new avenues for tackling the challenges. The Indian Council of Agricultural Research (ICAR) and the National Agricultural Research and Education System at large, are determined to harness the advances of science for the welfare of society. The Council is committed to transform itself into an organization engaged fully with the farmers, industry, entrepreneurs and consumers at large.

To keep pace with the changing environment, the ICAR has been updating its visions and strategies from time to time. The first systematic effort to envision the challenges and opportunities, and formulate its own strategy was undertaken in the last year of the 20th century by preparing 'Vision 2020 document'. The next attempt was after five years by bringing out the 'Perspective Plan' and the 'ICAR Vision 2030', coinciding with XI plan. 'ICAR Vision 2050', provides the strategic framework for innovation-led inclusive and sustainable agricultural growth in the country.



भारतीय वरि परिशोधना संस्थ
भारतीय चावल अनुसंधान संस्थान
ICAR-Indian Institute of Rice Research

ICAR-Indian Institute of Rice Research

The Organization

The All India Coordinated Rice Improvement Project (AICRIP) was established in 1965 at Hyderabad, with the responsibility to organize multi-disciplinary, multi-location testing and develop suitable varietal and production technologies. AICRIP was started with 22 centers (19 main and 3 testing centers) with 7 zonal centers and 12 regional centers. Currently there are 45 funded centres and more than 100 voluntary centers. The AICRIP strategy of multilocation testing has been adopted in the International INGER trials.

AICRIP capitalized upon the available research infrastructure in different states of India and successfully introduced a national perspective in technology development and testing. AICRIP was later elevated to the status of Directorate of Rice Research (DRR) from April 1983 and recently to ICAR-Indian Institute of Rice Research in December 2014 with additional responsibilities and major role at National and International platforms.

Our Vision

Welfare of the present and future generations of Indian rice farmers and consumers by ensuring food, nutritional and livelihood security.

Our Mission

Develop technologies to enhance rice productivity, resource and input use efficiency and profitability of rice cultivation without adversely affecting the environment.

Mandate and Objectives

- ✓ Basic and strategic research for enhancing rice productivity under irrigated ecosystem.
- ✓ Coordination of multi-location testing to develop location specific varieties and technologies for various ecosystems.
- ✓ Dissemination of technologies, capacity building and establishing linkages.
- ✓ To serve as major center for exchange of research material and information

Infrastructure Facilities

The Institute is equipped with state of the art facilities such as fully equipped laboratories for all departments with latest equipment, Temperature controlled greenhouses, Net-houses, Growth chambers, Screening nursery beds, Containment transgenic poly-houses and Heat tunnels. Field facilities include a well laid out experimental farms at Rajendranagar (20 ha) and Ramachandrapuram (40 ha) with a wild rice garden and pollination chambers.

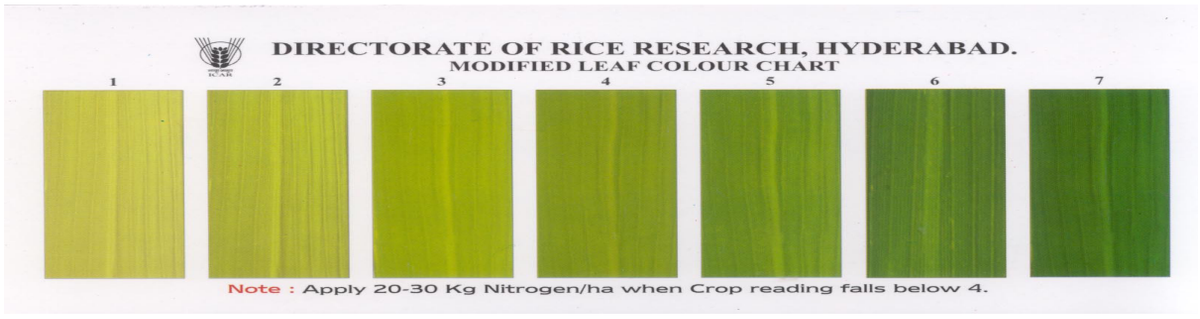
A centrally air conditioned auditorium with 350 seating capacity, seminar halls, guest house and hostel facilities for imparting training and to disseminate information using latest multi-media and ICT tools.

The Central library of the institute is a fully digitized with over 4,654 books, 6,500 bound volumes and subscribes to 55 Indian and 13 foreign journals. The significant achievements of the directorate are exhibited through a state of the art museum.

Salient achievements

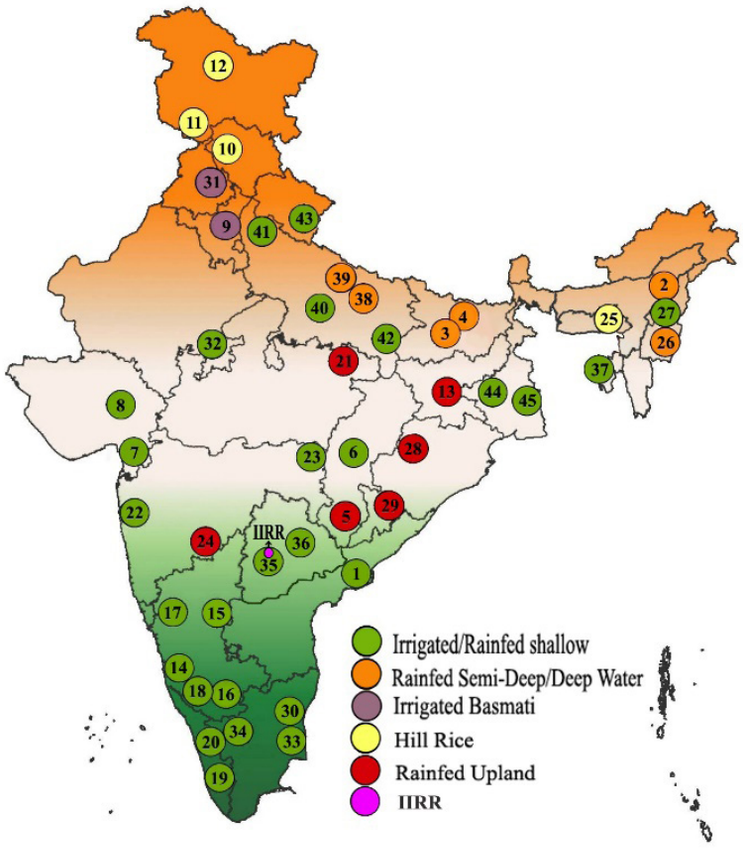
- ✓ A total of 1436 rice varieties including 127 hybrids have been released to date for various ecologies across the country through All India Coordinated Rice improvement programme.
- ✓ First BLB resistant "Improved Samba Mashuri" was developed through MAS, first drought tolerant variety (DRR Dhan 42), First Biofortified (DRR Dhan 45), first drought and submergence tolerant (DRR Dhan 50), first heat tolerant (DRR Dhan 52) and first low P tolerant (DRR Dhan 60) and first MS grain hybrid (DRRH3) were developed from the Institute.
- ✓ IIRR has developed a rapid and reliable assay for assessment of purity of seed-lots of rice hybrids and CMS lines and a rapid diagnostic kits for Rice Tungro virus and artificial screening technique for false smut under glass house and field conditions
- ✓ A major QTL for gelatinization temperature qGT6 fine-mapped and functional marker BADEX 7-5 for aroma identified.
- ✓ Novel resistant genes fine mapped: *Xa33* (for BB), *Gm3 & Gm8* (for gall midge). *Pi68t*, *Bph33*, Polygalacturonase *AG1IA_04727*, Sugar transporter gene *LOC_Os11g42430* and published draft genome sequence of yellow stem borer.

- ✓ Developed genome edited lines of Samba Mahsuri (*Gn1a*) with increased grain number (350-500).
- ✓ Identified promising heat tolerant and nitrogen use efficient rice genotypes.
- ✓ Crop husbandry practices were standardized for organic cultivation of rice.
- ✓ A Modified leaf colour chart (LCC) was developed for better nitrogen management.
- ✓ An efficient 8 row drum seeder, ridding type drum seeder, pot pudler have been designed and developed for saving labour, time and water.
- ✓ Novel concept of trap crop for yellow stem borer management developed and Ecological engineering for control of insect pests.
- ✓ Value added products like Rice Riche Pain Relieving Gel, Rice Riche Moisturizing Lotion, Rice Riche Cream for Dry and Cracked heel and Rice based face scrub which keeps skin smooth, soft and moist developed.
- ✓ Organized as many as 300 training programmes during the last 25 years and trained more than 20000 farmers and extension functionaries.
- ✓ IIRR coordinates Breeder seed production and frontline demonstrations across the country popularising and disseminating technologies to farmers and Effective implementation of Tribal Sub plan and SCSP activities.
- ✓ Developed Rice Knowledge Management Portal (www.rkmp.co.in) which is the largest repository of knowledge on any single crop (rice).
- ✓ An economical & portable, Soil testing kit was developed and 1000 soil health cards were distributed for the benefit of farmers.
- ✓ Water saving technologies, Integrated pest management, Integrated Nutrient management packages were developed for rice ecologies.
- ✓ Six Copyrights and two patents received.



Linkages & Collaborations

ICAR-IIRR has a strong and wide network of linkages and collaborations with research organizations both in India and abroad. Under AICRIP, it has 45 funded centres affiliated to State Agricultural Universities and Departments of Agriculture of 27 states and 2 Union territories besides five ICAR institutes. 90-100 voluntary centres are providing support in the evaluation and testing work. It is the largest network for single crop in the world.



Research Linkages: ICAR-IIRR has a strong collaboration with CGIAR institutes such as International Rice Research Institute (IRRI), Philippines and International Crop Research Institute for Semi Arid Tropics (ICRISAT), Hyderabad and many National institutes like CRIDA, NBPGR, New Delhi (ICAR); PPV&FRA, New Delhi, IICT (CSIR) and NIN (ICMR), Hyderabad and IICPT, Delhi University, Centre for Cellular and Molecular Biology (CCMB), Hyderabad and Centre for DNA Fingerprinting and Diagnostics (CDFD), Hyderabad.

Academic linkages: ICAR-IIRR has accreditation from several universities such as ANGRAU, PJTSAU, Osmania University, University of Hyderabad, Jawaharlal Nehru Technological University, Yogi Vemana University, Kakatiya University, University of Agricultural Sciences, Bangalore, Acharya Nagarjuna University etc.,

ICAR-IIRR also has a strong **Public Private Partnership** (PPP) mode of operational linkage with the private sector, especially relating to hybrid rice technology and its commercialization. This partnership started two decades back has turned out to be one of the best examples of PPP in the country.

Thrust areas of Research

1. Breeding for improvement of yield, grain and nutritional quality, durable stress resistance and nutrient use efficiency using conventional and molecular tools
2. Application of hybrid rice technology for breaking yield ceiling barriers
3. Development of novel crop production and processing technologies for enhancing rice production, improving resource use efficiency and sustainability of DSR and increasing profits in the realm of climate change
4. Development of protection technologies for the holistic management of existing and emerging multiple biotic stresses
5. Adoption of novel strategies to accelerate the diffusion of rice technologies among farmers and other stake holders and their impact assessment.

Publications

IIRR Published thousands of research papers, popular articles, bulletins, books, book chapters and abstracts. IIRR also brings out periodic publications like Annual Reports covering lead research, Progressive Reports covering AICRIP research. Newsletters, activity calendars, training calendars etc., to keep the stakeholders upto date in IIRR activities.

Impact

Impact of intensive research and coordination done by IIRR is evident in the impressive increase in production and productivity of rice in the country. During the period between 1965 to 2020, even though there was only one and half time increase in rice area, the production rose manifolds and productivity increased by three times resulting in record rice production of 130 million tonnes. Every year, more than 20 million tons of rice is exported resulting in foreign exchange earnings of INR 70,000 crores. India is now the largest exporter of rice in the world.

Awards and Recognitions

IIRR as an institute and its staff members received several prestigious national and international awards for their contribution in rice research & development.

- Padma shri Awards (Dr S V S Shastry & Dr E A Siddiq)
- The Chauadhary Devi Lal Outstanding All India Coordinated Research Project (AICRP) Award 2001
- ICAR award for outstanding team research for 2001-2002.
- Hari Om Ashram Trust Award
- ICAR Award for Outstanding Multi-disciplinary team research in Agriculture and allied Sciences for the Biennium.
- Dr. R.H. Richaria Award for excellence in Rice Janna Reddy Venkatreddy bianneaal award – (Dr. JS Bentur 2005)
- Jawaharlal Nehru Award for Post-Graduate Agricultural Research
- ICAR Young Scientist Awards
- Rafi Ahmed Kidwai Award
- Panjabrao Deshmush Outstanding Woman Scientist Award.
- Lal Bahadur Shastri Outstanding Young Scientist Awards.
- Best Institute Award.

ICAR-Indian Institute of Millets Research

The Indian Institute of Millets Research (ICAR-IIMR), Hyderabad with its linkages with All India Coordinated Research Projects (AICRPs) on Sorghum, Pearl millet and Small millets has been instrumental in developing high yielding varieties and hybrids of Sorghum and Pearl Millet, and high yielding varieties of Small millets, as well as novel production, protection and product development technologies. The IIMR conducts basic and strategic research, while AICRPs on sorghum with 18 centres across 11 states, pearl millet with 14 centres located in 10 states, and small millets with 14 centres over 9 states undertake applied research and pilot extension work in a network mode. In fact, the All-India Coordinated Research Project on Sorghum (AICRPS) was established in December 1969 with the main objective of conducting research on grain and forage sorghum improvement. Its coordinating unit was initially located at the main station of Indian Agricultural Research Institute (IARI) at New Delhi, which in 1970 was shifted to IARI Regional Station, Hyderabad. The IARI regional station at Hyderabad was reframed as the National Research Centre for Sorghum (NRCS) in 1987 and the AICRPS was integrated with this centre, which was later upgraded as Directorate of Sorghum Research (DSR) in 2009 and as the Indian Institute of Millets Research (IIMR) in 2015. During 1991, a research station to support the research activities of rabi sorghum was established at Solapur (Maharashtra). Another centre on off-season nursery was also established at Warangal (Telangana) in 1995 as a national facility to support AICRP-sorghum researchers of the country.

Objective

The overall objective of IIMR is to enhance production, productivity and profitability of millets to enable the agricultural sector to accelerate the transformation of "subsistence farming" to "market and income-generation oriented" millet production system. Accordingly, IIMR focuses on resolving commodity-specific production constraints, matching agricultural, processing and value addition processes and technologies to market opportunities which provide additional farm income and creating off-farm employment especially in the semi-arid tropical millet growing regions in India to usher in livelihood, food and nutritional security, thus justifying amply the need for public and private investment in millets research and development.

Vision

IIMR vision is to transform subsistence farming of millets into a globally competitive climate resilient nutri-cereal enterprise through value addition to meet food, feed, fodder, nutrition, and bio-fuel requirements of the country for equitable prosperity.

Mandate of IIMR

- Basic and strategic research to increase productivity of millets and their diversified utilization for enhancement of profitability.
- Coordination and development of improved crop production and protection technologies of millets.
- Training and consultancy on millet production and utilization.
- Dissemination of technologies and capacity building.

Awards to the ICAR-IIMR Institute

The following prestigious awards received by the ICAR- Indian Institute of Millets Research in recent times

- "Indian institute of Millets Research" has been placed in **6th position** among 93 ICAR Institutes and in **1st position** under **Crop Science Division** according to the recent **list on Ranking** of **Indian Council of Agricultural Research** Institutes year 2019-20 and 2020-21
- In recognition to its outstanding performance, ICAR- Indian Institute of Millets Research, Hyderabad bagged first time the prestigious **ICAR's *"Sardar Patel Outstanding ICAR Institution Award 2018***" in the small Institute category.
- Received "***Chudhury Devilal Best AICRP Award to AICRP on Sorghum -2019*** " from Indian Council of Agricultural Research, New Delhi
- IIMR-Hyderabad received "***Best Millets Research Organization Award***" from Government of Karnataka in January, 2018 at Bengaluru.
- IIMR-Hyderabad also bagged the "***ICAR's Best Annual Report Award -2019***"
- IIMR-Hyderabad's Hindi Journal "*Kadanna Saurabh*" -Received **ICAR award** entitled "***Ganesh Shankar Vidyardhi –Hindi Patrika Puraskar."*** for the year 2016-17.
- ICAR- IIMR- Hyderabad received prestigious Telangana State's "**National Public Relations Awards**" organized by the Public Relations Society of India- Hyderabad chapter, for its Annual Report- 2016-17 (First Prize) and in the category of Best Wall-Calendar (First prize) on the occasion of 2nd Telangana State Public Relations Conference held on 6 August, 2017.

All India Coordinated Research Projects

1. AICRP on Sorghum, Hyderabad

At present, the All India Coordinated Research Project on Sorghum (AICRP on Sorghum) has 18 centres, spread throughout the sorghum-growing areas of the country, covering the *kharif* and *rabi* types of sorghum. Out of these, eleven centres conduct research on *kharif* sorghum (Akola-Maharashtra, Indore - Madhya Pradesh, Palem - Telangana,

Nandyal-Andhra Pradesh, Coimbatore-Tamil Nadu, Chamrajnagar- Karnataka, Surat and Deesa-Gujarat, Udaipur-Rajasthan, Pantnagar-Uttarakhand, Hisar-Haryana, Ludhiana -Punjab), while 4 centres (Rahuri-Maharashtra, Vijayapura and Hageri –Karnataka, and Tandur-Telangana,) concentrate on *rabi* sorghum. Two centres work on both *kharif* and *rabi* sorghums (Dharwad-Karnataka and Parbhani-Maharashtra). The centres at Hisar, Pantnagar, Ludhiana and Deesa also conduct research on forage sorghum. Besides above centres, several voluntary centres also work in tandem to conduct multi-location trials and add to novel technology and products. Under Tribal Sub-Plan focused efforts and execution of the programmes is in place in tribal areas of Maharashtra, Andhra Pradesh to popularize the new high yielding cultivars to increase profitability to tribal farmers. The improved sorghum production technologies and practices are also being demonstrated in tribal areas, apart from extensive training for improving sustainable livelihood of tribals.

Mandate of AICRP-Programmes

- Develop hybrids, varieties, parental lines, novel genetic stocks and conduct and monitor multi-location testing of coordinated trials.
- Develop and popularize integrated crop production technologies and plant protection practices to major insects and diseases.
- To participate in Breeder Seed Production (BSP), Front-line Demonstrations (FLDs) and Tribal Sub-Plan (TSP) programmes.

2. AICRP- Pearl Millet

Project Coordinating Unit of All India Coordinated Research Project on Pearl Millet (AICRP-PM) is based at Jodhpur. The coordinated research programme is multi-locational and it is being conducted at 14 project centers including Jodhpur, two voluntary centers, 18 cooperating centres in public sector and more than 30 partners in private sector.

3. AICRP- Small Millets

Project Coordinating Unit of All India Coordinated Research Project on Small Millets (AICRP-SM) is located at GKVK, Bengaluru. The project has been designed to carry out multi-location testing in 14 project centres and about 20 voluntary centres covering more or less all the major small millet growing regions of the country to work on location specific problems.

भाकृअनुप - राष्ट्रीय कृषि अनुसंधान प्रबंध अकादमी
ICAR-National Academy of Agricultural Research Management
(ISO 9001 : 2015 Certified)

ICAR-NAARM: Spearheading Think Tank of ICAR and Capacity Building of NARES System of India

ICAR-National Academy of Agricultural Research Management (NAARM), a key constituent of ICAR, was established in 1976 at Hyderabad. The mandate of the Academy is to build individual and institutional capacity in agricultural research, education and extension systems management, and to provide policy advocacy for the National Agricultural Research and Education System (NARES).

As an apex research management organization of National Agricultural Research and Education System (NARES), the total clientele comprises of agricultural researchers (>35,000), development functionaries and policy makers across the entire country. Over the last four decades, the Academy has contributed in building the capacity of individuals (over 70,000) and institutions (>200) in various domains across the agricultural value chain from India and abroad.

Apart from the training and capacity building, the Academy contributes in creation and dissemination of knowledge through its Academic, Research, Consultancy, and Policy Support Programmes; strengthen the paradigm of *'research for development'* and facilitate the organizational renewal of the Institutions under NARES and beyond.

The Academy has been developing focused policy briefs and frameworks on diverse aspects *viz.,* climate smart agriculture, use of Artificial Intelligence (AI) in agriculture; marketing models to minimize structural bottlenecks faced by small farmers; farmers' perspectives for Doubling Farmers' Income by 2022; Upscaling digital technology in agricultural education; Zero-budget natural farming (ZBNF); assessing teaching competencies and training needs for Agricultural faculty; Institutionalizing "Farmer FIRST approach" in NARES, etc.

Academy conducts a Post Graduate program in Agri-business management and has been ensuring 100% placement of its graduates for the past 10 consecutive years since its inception in premier ag-business firms in India. It also offers a Post Graduate Diploma program in Technology Management (PGDTM) and Educational Technology Management (PGDETM).

Centre for Agri-Innovation (CAI) of the Academy extends services related to business incubation and IP management. Organizes entrepreneurship development programs, Boot Camps, Road shows, Sensitization Workshops across the country for Entrepreneurship Development.

The Academy besides maintaining functional linkages with various state and central government ministries, it also has a strong international network spanning several leading, Land grant and State Universities of USA, Australia, Europe and several other developing and developed nations, CGIAR Institutions; World Bank, FAO and other United Nations Organizations, etc.

The major institutional recognitions during the last five years include: (i) Sardar Patel Outstanding ICAR Institution Award (2021) (ii) National Award for the excellence in training for the year 2015; (iii) Digital Media Initiatives award of Public Relations Society of India (PRSI); (iv) National Award for Emerging Technology Business Incubator 2017 from Department of Science and Technology, Government of India.

CRIDA

भाकृअनुप – केंद्रीय बारानी कृषि अनुसंधान संस्थान

ICAR - Central Research Institute for Dryland Agriculture

An ISO 9001 : 2008 Certified Institute

ICAR-Central Research Institute for Dryland Agriculture

Rainfed agriculture is the predominant form of agriculture in arid, semi-arid and sub-humid regions of the country. Rainfed agriculture constitutes a major part of Indian agriculture, necessitating a comprehensive approach and multi-disciplinary research for improving food and nutritional security while conserving and managing natural resources in the country. Food and Agriculture Organization (FAO) of the United Nations indicated the tremendous potential of rainfed agriculture which could feed the entire world by use of improved technology.

Realizing the enormity and complexity of rainfed agriculture, the Central Research Institute for Dryland Agriculture (ICAR-CRIDA) was established at Hyderabad on April 12, 1985, to provide leadership in basic and strategic research in dryland agriculture and to address the location-specific problems in association with AICRPDA and AICRPAM centres. ICAR-CRIDA is a constituent organization of the Indian Council of Agricultural Research (ICAR) under the Natural Resource Management Division, an autonomous body of the Ministry of Agriculture and Farmers Welfare, Government of India.

Mandate

- To undertake basic and applied research for sustainable and climate resilient agriculture in rainfed areas
- To Co-ordinate network research for generating location-specific technologies in rainfed areas
- To serve as a centre for capacity enhancement in natural resource management in drylands

Based on the work done under the National Project on Climate Change (NPCC), ICAR launched the National Innovations in Climate Resilient Agriculture (NICRA) in 2011 as a network project which is being coordinated by CRIDA. The project has four major components viz., strategic research to address long-term climate change, technology demonstration in farmers' fields in the most vulnerable districts to cope with the current climate variability, competitive grant/ sponsored research component and capacity building of stakeholders at different levels

Infrastructure

ICAR-CRIDA has a 9000 m^2 spacious building located at Santoshnagar in the eastern corner of Hyderabad city. The Institute has excellent laboratories, guest houses, trainee hostels, conference halls, dryland gallery, auditorium and two well laid out research farms. Free Air Temperature Elevation (FATE) facility, Carbon dioxide and Temperature Gradient Chamber (CTGC) facility, Supervisory Control and Data Acquisition (SCADA) based rainfall simulation facility and precision lysimeters with open type climate chambers a state-of-the-art facility are also available at CRIDA to conduct climate change impact studies on crops, pests and natural resources.

Significant achievements during the last five years

- District agricultural contingency plans for 650, updated (386 *districts*), validated (*23 village clusters in 15 states*) and sensitized officials for preparedness through 48 State-level interface meetings
- Risk and vulnerability assessment of Indian agriculture to climate change at district level as per IPCC AR-5, widely used by different stakeholder's / policy makers
- Real-time contingency measures (soil, crop and water) to cope with early/midseason/ terminal drought and flood
- Drought proofing action plans for 24 vulnerable districts of Karnataka, Andhra Pradesh and Rajasthan
- Developed, evaluated and commercialized implements (raised bed planter cum herbicide applicator, maize harvester, zero till planter, etc.) for small farm mechanization suiting to dryland ecologies
- Issued daily, weekly and monthly crop weather bulletins
- Developed weather triggers and peril-specific protocols for crop damage assessment due to frost, hailstorm and pest outbreak
- Established climate change research infrastructure at 41 ICAR institutes and SAUs. Studied the impact of eCO_2 and temp on crops, livestock, fisheries, soil, water, pests and diseases using simulation models and GHG inventorization and C sequestration under predominant production systems
- Capacity building of 5.15 lakhs comprising researchers, farmers, entrepreneurs, line department officials, policy makers and NGOs in the field of climate resilient agriculture.

ICRISAT
INTERNATIONAL CROPS RESEARCH INSTITUTE FOR THE SEMI-ARID TROPICS

About ICRISAT

The International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) is a pioneering, non-profit international scientific research for development organization, specializing in improving dryland farming and agri-food systems. The Institute was established in 1972, by a consortium led by the Ford Foundation and Rockefeller Foundation with the support from the Government of India. ICRISAT works with global partners to develop innovative science-backed solutions to overcoming hunger, malnutrition, poverty and environmental degradation serving the 2.1 billion people who reside in the drylands of Asia, sub-Saharan Africa and beyond.

Accolades

- Africa Food Prize 2021
- 9th India CSR Award 2020
- National CSR Award India 2019
- King Baudouin Award 1996, 1998 and 2002

Varieties/hybrids released

1,184 ICRISAT varieties released in **81 countries** across the globe as of 2021

Germplasm shared

More than **1.5 million** seed samples distributed to **149 countries**

ICRISAT locations

ICRISAT - Hyderabad, India (Headquarters); New Delhi, India (liaison office).

ICRISAT - Nairobi, Kenya (Regional hub ESA); Addis Ababa, Ethiopia; Lilongwe, Malawi; Bulawayo, Zimbabwe; Maputo, Mozambique; and Dar es Salaam, Tanzania.

ICRISAT - Bamako, Mali (Regional hub WCA); Niamey, Niger; Kano, Nigeria; and Dakar, Senegal.

Research focus

The challenges facing the drylands are inextricably linked. As such the Institute adopts an holistic approach to its research with a focus on:

- Evidence based solutions
- Markets to make farming more profitable
- Partnerships
- Environmental and business sustainability
- Participation, gender and social inclusion

Global Research Programs

1 Accelerated crop improvement

- Our genebank conserves biodiversity
- Development of new varieties to counter biotic and abiotic stress - **chickpea, pigeonpea, groundnut, pearl millet, sorghum, finger millet** and **small millets**.
- Seed systems provide access to high quality modern variety seeds

2 Enabling systems transformation

- Inclusive and sustainable value chains, post harvest management, processing
- Market access and linkages
- Capacity development, raising entrepreneurs
- Women and youth empowerment

3 Resilient farm and food systems

- Climate resilience
- Water management, prevention of soil degradation and nutrient loss
- Digital agriculture and geospatial technologies

ICRISAT's work contributes to the Sustainable Development Goals

www.icrisat.org | Email: Communications-ICHQ@cgiar.org

Institute of Rural Management Anand (IRMA)

The Institute of Rural Management Anand (IRMA) was founded by **Dr. Verghese Kurien** – fondly known as the **father of the White Revolution** in India – in 1979. His professional management and governance were the key contributors for the success of the White Revolution, and IRMA was set up to replicate these skills for the underserved sector. Doing so requires utmost commitment, perseverance and dedication. IRMA's programmes have been designed in a manner that exemplifies these virtues.

IRMA's journey started with the flagship **Post Graduate Diploma in Management (Rural Management) – the PGDM(RM)** – which is the two-year course that has given nearly 4000 changemakers to the world as its alumni. The **Fellowship Programme in Management (Rural Management) – the FPM(RM)** - was introduced to stimulate academic and research work and develop scholars and teachers in the domain of Rural Management. The 15-month **Post Graduate Diploma in Management (Rural**

Management-Executive) – the PGDM(RM-X) – was introduced specially for executives with work experience who want to upskill and take their careers to the next level.

The values and culture of IRMA are reflected in the pedagogy of our programmes. The fieldwork component therein is crucial as it introduces the participants to the rural realities but more importantly, it makes them a part of the said realities. This exposure to the grassroots informs the IRMA graduates and they not only stand tall but also stand out from their peers elsewhere.

Apart from its academic commitments, IRMA is known for its well-designed **Management Development Programmes (MDPs)**, as part of its contribution to supporting management education. Each programme is meticulously structured to ensure high levels of efficiency while offering unique learning propositions to participants, equipping them with current as well as evolving concepts, perspectives, and practices within the context of rural management.

Apart from its core activities in teaching and training, IRMA also offers **research and consulting** across a broad spectrum of areas. It is predominantly academic in nature and seeks growth in order to expand the body of knowledge while also providing relevant end-to-end solutions for rural governance and development. IRMA's strong research and consultancy component enables our active faculty to monitor and contribute to the changing realities of the rural environment. As a result, organizations of national and international repute regularly collaborate with us to offer support for research on issues including innovations, gender-related practices, sustainable development, energy and the environment, urban-rural dynamics, leadership, and education, with a strong rural emphasis.

Over the last **42 years**, IRMA has exemplified the virtue of working for the underserved segment of the society through its commitment, perseverance and dedication.

--

Spreading Agroecology

WASSAN is a national resource organisation working with a vision of achieving resilient and prosperous rainfed agriculture in India. WASSAN works in the interface of communities, research and policy to connect, inform and innovate in the spheres of practice, research and policy. WASSAN works intensely in four states (Andhra Pradesh, Telangana, Odisha and Jharkhand). It anchors the Network Hub of the Revitalising Rainfed Agriculture (RRA) Network and the Secretariat of the National Coalition on Natural Farming (NCNF).

WASSAN's journey in the System of Rice Intensification (SRI) started way back in the early 2000 with a focus on its own learning on SRI working with large number of farmers in Telangana region under borewell irrigation. Soon realising its potential to impact small holder rice farmer and the rainfed ecosystems where water for rice production is a major challenge, WASSAN has made SRI / SCI one of its core institutional strategies. Our understanding of SRI is immensely benefitted by interactions with Dr. Norman Uphoff.

The work started with understanding critical bottlenecks in the spread of SRI –weeding, manual labour and irrigation issues. SRI manuals were prepared and widely used in different languages. Scaling Up SRI has been a major policy challenge. Apart from spreading SRI to various regions and organisations – within Andhra Pradesh and Telangana, Uttarakhand, Jharkhand etc., WASSAN's efforts were focussed on innovating solutions to the challenges identified.

Weeders Development

A workshop organised in an 'Innovation Systems framework' brought various farmers who innovated on different types of weeders and the agriculture engineers who developed Cono-weeder together in a field to try out all the models. A farmers' committee closely examined the useful innovations in each of the weeder types brought to the workshop. An ideal type of a weeder for SRI evolved from this workshop. WASSAN along with an innovative engineer-farmer developed, tested and made a prototype of this ideal-type weeder – "Mandava Weeder" emerged from this exercise which is now spread across the entire country supplied by even the private manufacturers.

The innovation continues with further improvisation of the Mandava Weeder by hot-dip galvanisation of the parts that go into water, changing the bearings and others.

Policy Initiatives

The policy challenges in the spread of SRI are two-fold: how to get an appropriate frame of the extension program and getting public investments for its spread.

JAI SRI Program in Telangana: The Joint Action Initiative on SRI resulted from advocacy with the Agriculture Department of the combined Andhra Pradesh along with ICAR-IIRR. A program was evolved with the guidelines deviating from the convention of technology spread with subsidised inputs; the program envisaged investments on experienced farmers as resource persons, intensive field demonstrations and engagement with farmers facilitated by a Civil Society Organisation.

National Consortium on SRI: Actively networking with the research institutions, CSOs and experienced farmers, WASSAN played a key role in the evolution of the National Consortium on SRI (NCS) and supported its initiatives as a member, that includes several advocacy meetings and a round-table discussion on SRI spread at the erstwhile Planning Commission. WASSAN team anchored the website and the Google-group of the NCS connecting various players.

The argument on including manual work components of SRI into MGNREGS was much talked about advocacy proposition. Delving deep into this issue, reconciling the positions and concerns of the 'rights based' advocates and SRI advocates, the issue was analysed and a framework evolved for inclusion of SRI spread components into MGNREGS.

Also, the potential water saving with SRI translating into saving in energy subsides for the government was studied and published; to make a case for public investments into SRI. WASSAN has been actively engaged in the national initiatives and dialogue in the spread of SRI supporting the NCS and various other platforms in the advocacy process.

Moving towards Agro-ecology

While SRI in itself is a major agroecological innovation, the introduction of WASSAN into Natural Farming has further deepened the understanding of and resulted in further expanding the scope of SRI.

A major breakthrough is in applying SRI principles in Ragi (finger millet) cultivation. A combination of SRI, some of the Natural Farming principles and Guli – a traditional method of running a low weight plank or log after weeding are giving extraordinary results both in the high rainfall tribal areas and the drylands. The yields are nearly doubling from the conventional finger millet cultivation. This is now spreading in the respective areas and has become of the key strategies of the AP Community Natural Farming program and the Odisha Millets Mission.

SRI with Traditional Varieties

Higher performance of finger millet with indigenous/ traditional varieties has been revealing. Screening of over 400 indigenous varieties in finger millet with higher yield potential resulted in the selection of four traditional varieties by farmers which are outperforming local checks (notified varieties); these are slated for release by the government creating a special window for release of traditional varieties. Some of the traditional varieties in Rice are also performing equally well under SRI.

SRI and agro-ecology has become mainstay of WASSAN included in all its programs and the programs evolved from its advocacy efforts. The organisation continue to make small contributions to the spread of SRI and agroecology in India.

Contact: nemani@wassan.org bhagya1@wassan.org
Websites: www.wassan.org; https://milletsodisha.com/

Resources: The links to access various resources

https://www.wassan.org/research-papers/

Potential of the system of rice intensification for systemic improvement in rice production and water use: the case of Andhra Pradesh, India | Ravindra Adusumilli and S. Bhagya Laxmi | October 24, 2010

Enhancing employment and sustaining production - Framework for Integration of System of Rice Intensification (SRI) with Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) - NCS (2012)

https://www.wassan.org/books-and-booklets/

- Taking Roots – Experiences with System of Rice Intensification in Andhra Pradesh
- Realise Full Potential of Paddy Plant – SRI Method of Paddy Cultivation in different language
- Weeders - A Reference Compendium (System of Rice Intensification)
- System of Rice Intensification - Desirable and Non Desirable Practices.

Google Group: https://groups.google.com/g/jaisri

** ** **

HYDERABAD CITY

Hyderabad City: potpourri of history, science and gourmet

Hyderabad is the capital city of the Indian state of Telangana and is the fourth-most populous city in India and has the fifth-largest urban economy in India. **Qutb Shahi** sultan **Muhammad Quli Qutb Shah** built the city of Hyderabad on the southern bank of the Musi River in **1591 CE.** A confluence of traditional and modern cultures can be seen in the city of Hyderabad in its architecture, costumes, cuisine and cultural spaces. Unity in diversity is experienced at its best in this city of peaceful co-existence of various religions, languages and traditions. The predominantly spoken languages are Telugu and Urdu with its unique *Deccani* dialect reflecting the cool and laidback nature of the city and its people. ***Lite Lo Yaaron – Take it easy*** is the most used phrase! And the century-old ethos, humour, and absurdity are cherished by people from all walks of life.

Music and dance forms found patronage of the rulers of the erstwhile Deccan. Kuchipudi is a famous dance form and involves extensive stage movements and exacting footwork, wherein the underlying drama is mimed by expressive gestures of hand (mudras), eye and face movements. The expressive style is through a sign language and is accompanied with Carnatic music, and the recital is in Telugu language. Some of the popular folk dances are Perini Sivatandavam, Lamadi, Dhimsa, Gussadi and Dappu dance. One also finds many dance schools offering training in western hip hop and more recently kpop to keep up with the times!

Heritage and Historical Monuments

Hyderabad city is known for its rich heritage and historical monuments. The era of Nizams played an important role in the culture and monuments of Hyderabad. There are a number of famous historical places and heritage monuments which form a major part of tourist attractions in Hyderabad.

Charminar

The monument was built in 1591 by Muḥammad Qulī Quṭb Shah, the fifth king of the Quṭub Shāhī dynasty. Over the years, it has become a signature monument and an iconic symbol of the city's heritage. The structure has 4 towers or minarets which have domes over it and has a spiral staircase which leads to the upper floors of the structure. It was used to propagate and announce important messages from the kings to the common man. It formed the centrepiece around which Hyderabad was planned. Charminar is well lit during National festivals and provides a beautiful sight for viewing at night time,

Qutb Shahi Tombs

CC BY 2.0

The seven **Qutb Shahi Tombs** are situated about a kilometer away from Golconda fort and are dedicated to the 7 great rulers and kings of the Qutb Shahi Dynasty who ruled the state of Hyderabad for about 170 years. The tombs vary from each other in size and design and some are built quite simple while others have intricate designs carved on them created with finesse and are surrounded by landscape gardens called Ibrahim Bagh.

Salar Jung Museum

Salar Jung Museum is a very popular and most visited art museum in the state of Hyderabad and is well known for its excellent collection of sculptures and paintings. It lies on the southern banks of the river Musi and is located in an area known as Darush Shifa which is known for its unani medicines. The museum has antique pieces ranging from carvings, textiles, wide variety of manuscripts, a number of different metallic artifacts, different type of clocks, furniture and a number of delicately crafted sculptures. Most of these items belong to the family of Salar Jung and its generations and were used by them in those days. The remaining items have been shipped from countries like Japan, China, Persia, Egypt and Europe. This museum boasts to be one of the largest museums in the world and attracts tourists from all parts of the world.

Golconda Fort

Located towards the western province of Hyderabad, the Golconda Fort was the capital of the Qutub Shahi Kings. It is assumed to be a 2000 years old structure. This fort is one of the most magnificent and massive fortress ever made and stands on a granite hill which is about 120 meters high giving a bird eye's view of the city to the person standing on it. The structure of **Golconda fort** has eight gateways, huge halls and four draw bridges. The first gateway or enclosure is known as Fateh Darwaza literally meaning Victory Gate in Urdu because Aurangzeb's army marched through this very enclosure successfully for the first time. The Fateh Darwaza has an outstanding feature of excellent engineering been executed where a sound produced at the entrance dome creates an echo at the hilltop pavilion which is nearly a kilometer away from the dome. This feature was used as a warning signal if the fort witnessed any invasions by enemy.

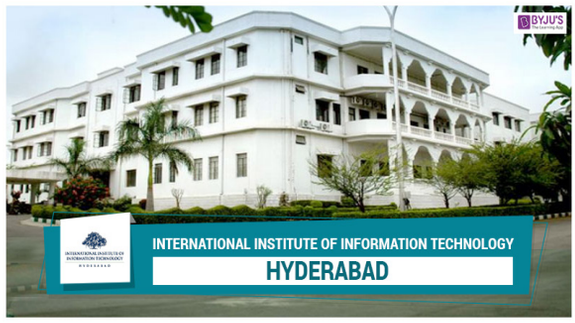
Birla Mandir

Birla Mandir is located towards the southern end of Hussain Sagar Lake in Hyderabad atop the Kala Pahad at a height of 280-feet. The Birlas built this temple with white marbles imported from Rajasthan during the year 1976 which took almost ten years to complete it. The temple combines the architectural styles of Utkal (Oriya) and South Indian style. The Rajagopuram represents South Indian architectural style while the tower over the main shrine also called the Jagadananda Vimanam represents the Oriyan style. The temple also boasts of finely sculpted marbled images depicting the great epics of Ramayana and Mahabharata. The 42-feet high sanctum sanctorum (garbha gudi) is an impressive replica of the Venkateshwara temple at Tirumala.

Hussain Sagar Lake

Hussain Sagar alternatively known as ***Tank Bund*** is one of the most popular tourist places in Hyderabad. The lake connects two parts of the city (Secunderabad and Hyderabad) to each other. The largest artificial lake in Asia, Hussain Sagar Lake was excavated in 1562 AD during the reign of Ibrahim Quli Qutub Shah. It was initially build to cater to the irrigation needs and other water needs of the city. A large monolithic statue of the Gautama Buddha, erected in 1992, stands on Gibraltar Rock in the middle of the lake. A popular recreational spot, the Hussain Sagar Lake attracts visitors of all age groups and is a must visit during school vacations by every Hyderabadi to enjoy boating and the cool breeze!

City of Student's choice



Hyderabad is one of the premier destinations in India in the field of agriculture, biotechnology, information technology, Pharma, medicine, defense industries, etc. Tech-savvy students and individuals consider Hyderabad a treat to gain more knowledge and exposure to world-class research institutions and internationally recognized institutions. The presence of IIIT, Indian School of Business and other key institutes of national and international repute have contributed to making Hyderabad as a hub of education for youngsters.The numerous sports academies, overseas consultancies, spiritual centers, fitness clubs, film-training institutes, culture and theater groups all make Hyderabad, a place to live and cherish the value of life. The luxury resorts, farmhouses and the close by rural hinterlands are increasingly being chosen by young people to de-stress and have fun during weekends.

Choice city of Corporate sector

The State's ICT policy is towards the digital empowerment of citizens and use of technology for social good, with impetus on innovation and entrepreneurship.The salubrious climate of Hyderabad has attracted national and international professionals in the city. The ITIR region, the popular IT district of Madhapur and Business district of Gachibowli are home to the global best information technology industries with many having their biggest work centers situated in Hyderabad. Hyderabad continues to be a favorite destination for corporate sector. Firms of international reputation such as Google, IBM, Microsoft, Oracle, Facebook and scores of other companies have their key R&D set-ups in the city. The city is home to exuberant and healthy corporate lifestyle and this has a positive effect on the city by contributing more revenues and ushering a metropolitan experience for tourists and residents of the city.

Life Sciences industrial hub

Hyderabad has a thriving Life Sciences Industry and the city is regarded as a leading life sciences hotspot in Asia

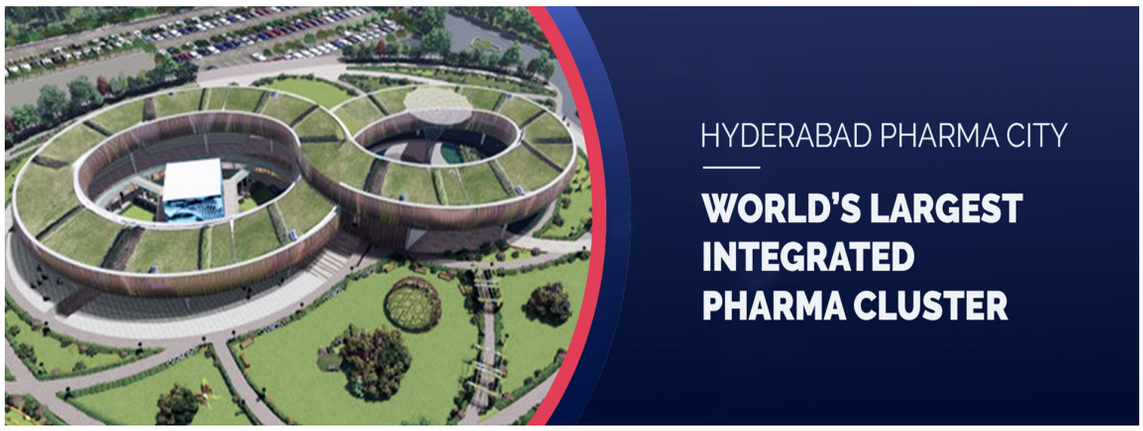
Genome Valley

Genome Valley is India's first organized cluster for Life Sciences R&D and Clean Manufacturing activities, with world-class infrastructure facilities in the form of Industrial / Knowledge Parks, Special Economic Zones (SEZs), Multi-tenanted dry and wet laboratories and incubation facilities. It is home to more than 200 companies with a scientific workforce of about 15,000 professionals including presence of the marquee global names like Novartis, GlaxoSmithKline, Ferring Pharma, Chemo, DuPont, Ashland, United States Pharmacopeia, Lonza amongst many others. companies in Genome Valley benefit from the single point contact for all Government related approvals and further facilitate infrastructure development in the cluster.

Medical Devices Park

Hyderabad has a dominant position in Life Sciences and Technology and is also known as the Healthcare hub of the country. Country's largest Medical Device Park spread over 302 acres was established in Hyderabad in 2017. In addition, Hyderabad has numerous companies with expertise in plastics, precision engineering, electronics, etc., all of which are vital for medical device innovators and manufacturers. As a natural outcome, the city is already making rapid strides in redefining healthcare.

Hyderabad Pharma City



Hyderabad Pharma City (HPC) is the world's largest integrated cluster in Hyderabad for pharmaceutical industries with thrust on R&D and manufacturing .It offers significant cost and set-up time optimization for the pharma industry with its centralized smart infrastructure solutions. HPC will provide a jumpstart platform to Life Sciences companies and help companies move-up the value chain.

Festivals

Festivals such as Dusshera, Ramzan, Eid, Christmas, Diwali and Navaratri are celebrated on a grand scale all over Hyderabad. Being a melting pot of cultures and ethnicity, Hyderabad has its very own range of festivals that are unique to its culture and traditions. The Deccan Festival is an important event and is held in Hyderabad annually. Other festivals such as Muharram, Bonalu, Sankranti and Rakhi are also celebrated with great fanfare across the city and state.

Cinema

Hyderabad is home to the Telugu Film Industry, also known as Tollywood and it forms the lifeline of the entertainment hub in Hyderabad and the rest of Andhra Pradesh. Local Hyderabadis and Telugu inhabitants are believed to be extremely passionate about their film industry, making Telugu films one of the most popular sections of films around the world. Hyderabad is home to Ramoji Film City and also hosts some of the biggest film festivals in India such as the Busan Film Festival. If you are willing to take a glimpse of the entertainment in Hyderabad, it would be best to watch a Tollywood film or even just visit Ramoji Film City. **Film Nagar**, is a neighborhood in the western part of Hyderabad, notable as the home of the entertainment industry, including several of Tollywood's historic studios like Ramanaidu Studios, Annapurna Studios, Ramakrishna Studios, Padmalaya Studios etc.

Hyderabadi Food

A heady blend of Mughal, Persian, traditional Andhra and Telangana cuisine is relished by the city dwellers and tourists alike. Hyderabadi Haleem is a meat-based dish with lentils, wheat, spices, and other ingredients. During the month of Ramadan, it is the most popular dish in the city. Hyderabadi Haleem received GI status for the first time in 2010 and it has been extended for a period of ten more years. The traditional Hyderabadi Dum Biryani is primarily made up of meat, basmati rice, fried onion, and spices that carry a distinct aroma. It is served with Raita or Mirchi-ka-salan. Desserts like Double-ka-Meetha(bread pudding), Khubani-ka-Meetha(apricot pudding), Seviyon-ka-Meetha(vermicelli) Pheni ,Kaddu ki Kheer(bottle gourd**),** Ariselu, Kajjikayalu, Gavvalu and Burelu satisfy the sweet tooth.

The variety of snack foods in Hyderabad is a test of your taste buds and willingness to try out eclectic tastes and textures. The onion samosa is ultimate gulped down by the famous irani chai(tea).The cut mirchi bajji tingles the olfactory senses to the hilt. Osmania biscuit is a not be missed accompaniment with cups and cups of ***irani chai*** over rounds and rounds of famous hyderabadi talkathons! (People love to reminisce).

Cut Mirchi

Onion Samosa

Irani Chai

Biryani

Shoppers' Paradise: Pearl City

The city of Hyderabad, known as "the Pearl City," provides visitors with a one-of-a-kind opportunity to shop for pearls, jewellery, semi-precious stones, silverware, Bidri ceramics, handicrafts, kalamkari, silk, fragrances, and more. Trading of pearls enjoyed the imperial patronage of the Nizams and thus the city is a hub for high-class pearls, housing the largest number of pearl drilling centers in the entire world. The Laad Bazar is a primary street market in Hyderabad near Charminar in old city which offers an extensive collection of glass bangles with exquisite lacquer designs.

Pearls

Lacquer Bangles

Never a dull moment in the city ,walk, shop, gaze, entertain, eat and pray at any time of the day and night in this city of Nizams and the young nerds!

SPONSORS


PIONEER
MADE TO GROW™
पायोनियर
सेंकड धान
25P30
28P67
27P22
27P31
27P37
27P38
27P63
27S45
PIONEER
HYBRID RICE SEED
CORTEVA™
agriscience
www.corteva.in


aban
ABIDAT
[Aban-BGU Institute for Dryland Agriculture Technology]
An institution initiated in partnership with Israel's Ben Gurion University of the Negev (BGU) for innovatively solving the extreme challenges of the current millennium, faced particularly by the arid and semi-arid ecologies.
2nd Batch of
PGCDS Program
(PG Certificate in Dryland Studies)
(Program of 2 Semesters).
For those who foresee a career in dryland agriculture, the avenue for future global food security.
Possibility of being enrolled for higher learning in Israel with Full Fellowship.
A Certificate that would add value to Entrepreneurship.
Admission Criteria:
Graduate in Biological Science, Agriculture or allied subjects like Horticulture, Forestry, Animal Husbandry, Dairy, Agricultural Engineering, etc from a recognized university.
With Minimum of 50% Aggregate Score.
For details log in: www.abidat.in
Contact: info@abidat.in

DIAMOND SPONSORS

NABARD

PROFESSOR JAYASHANKAR TELANGANA STATE AGRICULTURAL UNIVERSITY

एपीडा APEDA

BASMATI EXPORT DEVELOPMENT FOUNDATION बी ई डी एफ BEDF

IRRI

german cooperation DEUTSCHE ZUSAMMENARBEIT

Implemented by giz

GOLD SPONSORS

CORTEVA™ agriscience

PAN® Good seed good life

BAYER Bayer CropScience

SILVER SPONSORS

BIOSEED

VNR®

JFE

BiocoloSSal

OTHER SPONSORS

BioSquare™

Savannah®

TRIMURTI Plant Sciences

TriMurti Plant Sciences Private Limited

101, MGR Estates, Dwarakapuri Colony, Punjagutta, Hyderabad-500 082, Telangana, India.
E-Mail: info@trimurti.in, Customer care no.: 040-30611979

aban