



Global Okra
Round Table



GLOBAL OKRA ROUND TABLE

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Organized by :
Foundation for Advanced Training in Plant breeding (ATPBR)
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Background

Okra (*Abelmoschus esculentus* L. Moench) is an important vegetable crop belonging to the family Malvaceae. Okra is grown throughout the tropical and subtropical regions of the world and in warmer parts of the temperate zone. India is the largest producer of okra globally, with a contribution of more than 72% (6 million tonnes) from an area of 0.5 million hectares (NHB, 2020). Okra has vast potential for earning foreign exchange as it has a significant share in fresh vegetable export (APEDA, 2020). Tender pods of okra are used as a delicious vegetable.

Its leaves, buds, and flowers are also consumed especially in West Africa. It is used in canned, dehydrated, and frozen forms to a limited extent. Okra mucilage is used as a food, non-food and medicinal product. Okra dry seeds are a rich source of oil (18-20%) and protein (20-23%). During the sugar production process, okra roots and stems are used to clean the cane juice. The okra development in India got a kick start with the release of Pusa Sawani, the first YVMV (Yellow Vein Mosaic Virus) resistant variety by Dr. Harbhajan Singh, Head Plant Introduction Division at IARI, New Delhi (Now NBPGR) in late fifties. PusaSawani remained a ruling variety for several decades worldwide. Many private seed companies in India, like Mahyco started their seed business with this variety. Later on with the development of Parbhani Kranti by Drs.Jambhale and Nerkar and Arka Anamika by Dr. O.P. Dutta in the nineties, okra cultivation took off all over the country. With the expansion of private seed companies in India after eighties, okra research and development moved towards development of higher yielding & more virus resistant hybrids both by private and public sector on a large scale, e.g Vijay and Varsha (IAHS), Sun 40 (Pioneer), Mahyco-10 (Mahyco), OH 152 (Syngenta) Shakti (Nunhems), CO-4(TNAU),Arka Nikita-First GMS Based (IIHR), Kashi Bhairav (IIVR), Pusa Okra Hyb-1(IARI) etc were most popular since 1992 onwards.

The introduction of a short inter-noded strong virus-resistant hybrid Radhika (15-20% more yield) by Advanta (2018) further enhanced

the popularity of hybrid okra across India. Adaptation of hybrids has been easier as no enhanced agro-technique and hence no significant additional cultivation costs were required to grow the hybrid vs open-pollinated (OP) varieties. Hence, a ₹ 90-crore (\$11 m) seed revenue per year in 2011 has now become a ₹ 1000-crore (\$112 m) annual market and growing continuously at the rate of about around 8-10 percent.

As per FAO estimates around 72 percent of the Okra market is in India and 12 percent is in Nigeria. However, in more than 30 West and Central African countries, okra is cultivated as both rain-fed and irrigated crop and is the most valued and popular vegetable consumed in fresh and dried forms. The last five years have seen okra gaining ground as a global crop as its nutritional values are being recognized by consumers. This is especially after COVID pandemic that healthy and balanced diet is getting imbedded in the global mindset. Okra seeds are getting exported to over 20 countries from India. Recently, increased number of research papers on its genetics, breeding, genomics, and agronomy from Asia and African countries have appeared.

This is further indication of it becoming a global crop. Over 80 percent market is covered by hybrid seeds in India. Global seed requirement is expected to be 6000 mt by 2030 making it a \$ 300m crop soon.

Due to continuously growing importance of Okra, the first ever Global Okra Round Table (GORT) meeting was organized by Foundation for Advanced Training in Plant Breeding (ATPBR) in collaboration with Indian Agriculture Research Institute (ICAR – IARI), New Delhi from October 10-12, 2022, where all stake holders working with Okra value chain came together and discussed various aspects for value addition to this crop.

GORT Summary and Way Forward

The GORT was the first time that a full conference was organised for a single vegetable crop. The fact that over 250 participants from 54 Organizations and 13 States, including 5 from abroad attended the conference was proof that it was a right move. Participants were from different sectors, discipline, and countries and included industrial leaders, policy makers, industrial representatives, entrepreneurs, academicians, farmers, and students.



Photo 1. Group photo of all participants who attended GORT 1 at Delhi

It was clear from the deliberations at GORT 1, at New Delhi, Oct 10-12, 2022, that the current source(s) of resistance for the two important viruses, YVMV & OLCV, in Okra (*Abelmoschus esculentus*) are old and breakdown frequently in many various areas around the country. Probably because of the emerging new strains of the viruses. The presentation on wild relatives of okra by Drs K V Bhat & Dr Joseph John (both Principal Scientists, retd., from NBPGR, indicated that there is an excellent variability existing where not only new sources of resistance are available, but these accessions are also a storehouse of new traits of high value. Seeds of these and the backcross derivatives to *A. esculentus* are deposited at NBPGR. These and the other large number of accessions are deposited at NBPGR. At the panel discussion on Oct 12, 2022, on what projects can be taken up in a PPP mode on the crop, the decision was to look at the possibility of d

developing a consortium among interested private & public sector partners on the following areas:-

1. Identifying and studying new sources of resistance to YVMV & OLCV in Okra and studying their inheritance – especially wide species & their utilization.
2. Genome mapping of Okra pan genome and identifying trait linked associations.
3. Study nutritional quality in okra germplasm and initiate breeding projects on developing high quality Okra. The efforts in this direction in South Africa indicated promise.
4. Discovery of novel traits in the national germplasm repository –e.g.: novel ideotypes, branching behavior, shorter internodes multiflory, nutritional quality diversity etc.
5. Study how the existing GMS trait from IIHR, Bangalore can be successfully utilized by carrying out some basic research.
6. Search for a CGMS & restorer system in the germplasm.

In order to start a PPP (Public Private Partnership) based applied research project the decision by the house was to prioritize one project, get it off the boards and help create a platform for future projects to tackle other research areas that can be taken up as pre-compete research. Priority number 1 looks to be finding new sources of stable resistance to YVMV & OLCV and understand their genetics & develop molecular markers. To do this a draft proposal is being circulated for consideration by the stake holders. Outline of the proposal is as follows:





Photo 2: Glimpse of exhibition area arranged at GORT 1

Proposal

1. List known germplasm having YVMV/OLCV resistance based on previous reports. To this add all accessions of wild relatives that are available and check with NBPGR, WVC. Search what is available at the GRIN, USDA, Geneva in their wild species collections and add to this list.
2. Check how much seed is available & work on getting all these seeds together at IARI/IIHR by Jan 2023. These seeds need to be planted for seed increase in the Feb–May 2023 at IARI/IIHR to get enough seeds for distribution to consortium members for multilocation hot spot screening.
3. Multilocation testing of these listed entries in the Rainy/*kharif* season of 2023 at the research stations of collaborators and the public sector institutes where complete evaluations of key traits particularly the resistance to two viruses are carried out. One multi location testing like that can be analyzed and the top entries for virus resistance be identified.
4. It is proposed that the entries also be put through GWAS so that trait linked associations are identified based on a GxE analysis.
5. At this moment a meeting of stake holders is suggested to look at the data and take a call if one more season's MLT evaluations are required. It is suggested that it is necessary to get best possible information out of these studies.
6. In Phase 2, the best lines can be used to obtain the seeds of F_1 's between resistant & susceptible genotypes in *Kharif* 2024 and BC1 to both parents and F_2 's in Summer 2024. These six generations are again evaluated across

the same hot spots to get a clear idea of the genetics of the resistances to the two viruses. It is suggested to also do the genomics analysis in these.

7. Selfed seeds of best F_2 plants and BC_1F_2 's needs to be harvested and the resultant F_3 families' seeds can be sent to all stakeholders for their breeding purposes – both public and private sector breeders to use in their programs to generate the new generation inbreds carrying the new and diverse gene/genes for resistance to both viruses as they see fit.

7. The whole subject can be part of either a PhD or a Post Doc activity in breeding, virology, biotechnology.

8. Another long-term impact of this can be the development of a self sustainable unit that can be developed into a PPP institute which carries out funded research projects – new projects on Okra and other crops. ATPBR will can be a nodal organization to help coordinate the activities.

Outcome of this phase 1 will be

1. Identify new sources of YVMV/OLCV resistance
2. Study the variability of the two viruses from hot spots by the Virologists
3. Understand the genetics of the resistance for two viruses.
4. Probably identify trait linked sequences.
5. The stakeholders from both sectors carry on the applied part of breeding using these new sources in their respective programs as early as summer 2025 if all actions are taken in time.
6. Bonus will be the novel variation these F_3 's (straight & the back cross F_3 's) will throw out bringing entirely new range of traits to farmers.

Hot Spots suggested for the above

New Delhi, Pune, Surat, Bangalore, Coimbatore/Salem, Guntur, 24 Parganas, Raipur, Any other to be added after consulting Virologists.

Resources to be used

1. Full time Project Lead/s to coordinate the research.
2. Full time Breeding/Virologist/Biotech Scientists to work as a team to execute the actions – Public Sector.

3. Res Assistants to assist in the field & lab work involved – can be Ph. D. students or Post Docs.
4. Designated team members from Pvt sector to carry out the MLT's suggested.
5. A Pvt sector partner for outsourcing the genomics work.
6. Operational budgets – to be prepared once basic plan is accepted by subcommittee.

Intellectual Property:

- Needs to be discussed and made part of MOU among the participants.

Details of progress on this will be communicated to all participants from time to time.

ABSTRACT OF EACH SESSION

Total eight sessions were conducted during GORT meeting starting from Oct 10, 2022.

Session 1: Field Day

A field day was organized by IARI where commercial varieties, wild lines, and developed material from public and private sectors were demonstrated to all participants. Despite bad weather, all delegates attended the field day and appreciated the efforts of the scientists and staff of vegetable division of IARI.



Photo 3. Participants of GORT, 10–12 October, 2022 during Field visit of Okra trial, Division of Vegetable Science, IARI, Pusa, New Delhi.

Besides the hybrid trials it was interesting to see the excellent work being done on interspecific hybridisation in Okra by Dr R K Yadav, Principle Scientist, IARI and his team.

Session 2: Inauguration

Chief guest of the event was Dr.R.B. Singh (former Chairman of ASRB). Dr. Surinder Tikoo, Dr. AK Singh (Director, IARI) and Dr. KK Narayanan emphasized on the value and genesis of GORT. This conference brought all okra crop improvement scientists and other stakeholders together. IARI was the place where okra virus resistance breeding started with the release of variety Pusa Sawani by the Late Dr. H. B. Singh. This was followed by the path-breaking virus-resistant varieties bred at Indian Council of Agricultural Research (ICAR) institutes like the Indian Institute of Horticultural Research in Bangalore and Indian Agricultural Research Institute in New Delhi, Agricultural Universities like Vasantrya Naik Marathwada Krishi Vidyapeeth in Parbhani, Punjab Agricultural University, Ludhiana, Punjab and Chaudhary Charan Singh Haryana Agricultural University, Hisar, Haryana. GORT would be a biennial conference so that Okra stakeholders can meet & take the crop forward. Vision lecture was delivered by Dr. A.K. Singh Sir, DDG-Horticulture Science, ICAR. He emphasized on three main thrust area to improve Okra crop production: Agroclimatic zone and soil specific production protocol, Integrated nutrient, pest and disease management, and Farm mechanization. He also stated that improved varieties and hybrids need to be developed not only for yield, earliness and disease resistance but also for export market and processing industry. He set an appropriate tone for the conference. During the inaugural session, four legendary Okra breeders Dr. O.P. Dutta, Dr. N.D. Jambhale, Dr. B.S. Dhankhar, Dr. Y.S. Nerkar were recognized by 'Life-time Achievement Award' for their extra-ordinary contribution to the crop improvement of Okra Crop. Dr. Dutta has developed 22 varieties of tropical vegetables.

These multiple resistant varieties are widely adopted and recognized in India while his okra varieties are also popular in Africa and other parts of Asia.

Dr N.D. Jambhale worked on the project “Interspecific hybridization in *Abelmoschus* for resistance to Yellow Vein Mosaic Virus” to earn his Ph.D degree at MPKV, Parbhani. He then carried on this work along with his guide Dr Y S Nerkar and successfully transferred YVMV resistance from *Abelmoschus manihot* (L.) Medik into the cultivated okra overcoming barriers of sterility, cross incompatibility, and transmission of linked undesirable genes.

Dr. B. S. Dhankhar has made significant contributions in the improvement of okra by developing four varieties having resistance to YVM virus and released at the national level. Among them Varsha Uphar is a landmark variety which even 25 years after its release is popular in the country and remains a part of the seed production chain.

Dr Nerkar, guided N.D. Jambhale on his project, “Interspecific hybridization in *Abelmoschus* for resistance to Yellow Vein Mosaic” to his Ph.D degree at Marathwada Agricultural University, Parbhani. Both continued this work that helped successful transfer of YVMV resistance from *Abelmoschus manihot* (L.) Medik into the cultivated okra overcoming barriers of cross incompatibility, sterility and transmission of linked undesirable genes. Since the release of the resultant variety, Parbhani Kranti in 1985, 12-15 qtl.

Breeder seed of the variety has been supplied annually. The variety has occupied 40-60% of the okra area in India and brought several crores of rupees profits to the Indian farmers. 'Parbhani Kranti' has since been used as a donor of YVMV resistance by breeders from public and private institutions.



Photo 4. Recognition of four legendary Okra breeders Dr. O.P. Dutta, Dr. N.D. Jambhale, Dr. B.S. Dhankhar, Dr. Y.S. Nerkar by 'Life-time Achievement Award' for their extra-ordinary contribution to the crop improvement of Okra Crop.

Session 3: Okra a Global Crop

Chairman: Mr. Prashant Belgamvar, Business Head, Africa, Asia, International Vegetables. Advanta. (UPL)

Co Chairman: Dr. Roland Schefflietner Head Mol Genetics & Flagship Program Leader, WC, Taiwan

Rapporteur:

- Mr. Ashok Jedhe, Business Head, Vegetables, Advanta (UPL)
- Dr. Brij Bihari Sharma, Scientist, IARI, New Delhi.

At the outset Chairman Mr. Prashant Belgamvar, Business Head Advanta (UPL) welcomed the delegates and briefly informed about his organization. He emphasized on Okra as emerging global crop by detailing its history, market and Advanta's (UPL) position in okra research and development. World okra seed market is approximately 204 million USD with 13100 MT, in which South Asia is leading in global okra market followed by Africa and China, respectively. He emphasized on the need to develop combo tolerance to YVMV & OLCV over all locations (broad spectrum virus) and the emerging importance of okra beyond household use and this was

referred as HORECA (Hotel, Restaurant & Café).

Mr. Tejas Rane, Senior Product Manager, East-West Seed India Pvt Ltd., Aurangabad presented Okra Market Overview, Insights Opportunities in South Asia & Southeast Asian Markets. Mr. Rane highlighted okra market overview and how okra has emerged as number one position in vegetable seed industry. Indian market contributes 700-800 crore and it has potential to increase 5-6 percent growth (volume wise). The speaker informed the house about awareness of Indian farmers about okra viruses, symptoms, losses etc. He also presented insights on how okra processing is bringing high value addition to both farmers and consumers.

Mrs. Vineeta Sudhanshu Dy. General Manager, APEDA, New Delhi presented on Export Potential of Okra. APEDA is exporting 17 agri products. Fruits and Vegetable is contributing nearly 13 % in total agri export. India is ranked 8th position in exporting okra in world. Speaker emphasized various packaging materials, post-harvest management, GAP being standardized in okra by APEDA to facilitate its export by creating high quality produce. APEDA has created common facility for packaging for general exporters who don't have their own facility. Mrs. Sudhanshu informed the house various promotional schemes and quality initiatives by APEDA.

Dr. Hellen A. Adeniyi, Chief Research Officer, Farming Systems & Ext. Res., Ibadan, Nigeria was the last speaker in this session. She presented "Okra Area, Productivity and Key Improvements in Nigeria". Dr. Hellen informed okra national importance; various local food cooked /prepared using almost all parts of okra except stem. Lastly, she highlighted various factors for poor productivity and production problems in okra in Nigeria – poor inputs, small holder farmers, poor agronomic knowledge, water availability and poor marketing linkages.

The Chairperson in his concluding remarks appreciated the presentations made by various speakers which further emphasized on the importance of okra that clearly sets it up as a futuristic global crop for seed industry, farmers, processors & consumers.

Session 4: Okra Germplasm Diversity and Disease Resistance Breeding

Chairman: Dr. T. K. Behra (Director, ICAR-IIVR, Varanasi, India)

Co-chairman: Dr. Krishna Reddy (Head, Plant Pathology, ICAR-IIHR, Bangalore)

Rapporteurs:

- Dr Umesh Shelkar, Trait Lead, Okra, Syngenta.
- Dr Suman Lata, ICAR-IARI, New Delhi.

In his opening remarks the Chairman Dr. T. K. Behera highlighted the importance of germplasm for trait specific breeding and traits like small to medium plant height and short internodal bearing habit being important. Further, anti-nutrients factors should be considered for nutritional breeding in okra particularly during introgression of the important agronomic traits from the wild relatives. To overcome the drudgery of manual harvesting, Dr Behera has informed the house about the practicality of mechanical harvesting and/or selecting the genotypes with easy picking. Besides, he also focused on capturing the diverse segments for okra export from India to various European and Gulf Countries. Co-chair of the session Dr. Krishna Reddy briefed about the global status of okra viruses such as are *bhendi* yellow vein mosaic virus and okra enation leaf curl virus. He also mentioned about importance of field screening at the hotspots as well as patho tests through white fly mediated artificial screening.

Dr. Roland Schafleitner was the first speaker and in his presentation on “Genomic Resources for Okra Breeding” emphasized the role of transcriptome sequencing and K-mer mapping the traits of interest in okra

where reference genome is lacking. With K-mers, GWAS and GBS studies can also be performed without a reference sequence. Further, he emphasized that presence/absence of variations that are not captured by SNP are also important. Dr. Krishna Reddy delivered presentation on “YVMV and OLCV distribution and their management in Okra” highlighting the importance of specific primers and sequencing rather than random primers for identification of plant viruses.

Dr. Dorcas O Lbitoye emphasized “Okra Breeding Overview in Nigeria and Challenges Ahead” addressing collaborations among private and public okra working groups and germplasm sharing to increase the genetic base.

Dr. Joseph John, shared his expertise with “Okra Germplasm Collection, Conservation and Utilization” focusing on the hotspot screening of okra collection and wild gene pool for YVMV and other biotic stresses and generation of amphidiploid by backcrossing. Besides, he also emphasized on introduction of leafy vegetable types from South-East Asia and elimination of duplicates from okra germplasm repository.

Dr. S. K. Yadav delivered presentation on procedures for Germplasm Exchange in Changing Scenario where he mentioned the procedures and guidelines for import and export of germplasm from inside and outside of the country which needs to be followed strictly.

Dr. Mamata Pathak in her presentation on “Exploitation of wild species of okra against Yellow Vein Mosaic Virus disease” mentioned that *A. moschatus* derived lines found highly resistant to YVMV. Her experience on wild species utilization comes with a conclusion that for successful crosses in okra, cultivated parent should be use as female donor and wild species as male parent. There is need to attempt a greater number of crosses for interspecific hybridization programme.

How mechanical harvesting is possible in okra? where continuous harvesting at every node after certain interval.

Recommendations:

- Germplasm to be screened for easy picking or easy harvesting and suitable genotypes can be identified.
- Anti-nutritional/undesirable factors should be considered during inter specific crosses followed by back cross breeding. For successful inter specific cross combination, a much greater number of crosses need to attempted to get higher success.
- Screening of the germplasm at different hotspot and whitefly mediated screening is highly essential.
- Introduction of leafy vegetable types from South-East Asia and elimination of duplicates from okra germplasm repository



Photo 5. Participants attending GORT 1 held at NAAS Complex, New Delhi

Session 5: Okra Breeding

Chair: Dr. A. S. Dhatt (Additional Director of Research [Horticulture and Food Sci], PAU, Ludhiana

Co-chair: Dr. Shirshail Hadpad (General Manager, R & D Vegetable Crops, IAHS & Member, APSA R & D Advisory committee

Rapporteur:

- Dr. Krishna Prasad, Res Advisor, Tierra Agrotech Ltd. Hyderabad
- Mr. Venu Gopal, Principal Breeder, Advanta (UPL), Hyderabad, India

Five lectures were delivered in the session and the speakers are from India, West Africa, North Africa and South Africa. The role of past breeding work in India was highlighted who brought okra to a global status, besides the future problems and way forward/road map to overcome future problems was extensively addressed in this session by various speakers in their respective presentation. The key topics covered in this session were as follows:

- Okra Breeding: History, Key Milestones and Challenges- Indian Perspective was presented by Dr. R.K. Yadav, IARI, New Delhi.
- Trait Associations of Okra Genotypes in South Africa – Agronomic Traits by Dr Abe S. Gerrano Veg & Ornamental Crops, Ag. Res Council, Pretoria, South Africa.
- Utilization of Male Sterility and its Use in Hybrid Seed Production of Okra by Dr M Pitchaimuthu Principal Scientist, ICAR-IIHR, Bengaluru.
- Okra Improvement in Egypt & North Africa, Status & Opportunities by Professor Ehab Awad-Allah Ibrahim Chief of Research, Hortic. Research Institute, Giza, Egypt.
- Okra Improvements: Tales from West Africa by Dr. Sanjeet Kumar, Plant Breeder, ExICAR & World Veg, India.

The salient recommendations of this session are as follows:

Recommendations:

- Need to breed okra hybrids with low volatile expression so that we can minimize the white fly infection.
- Emphasized to bred new ecotypes having iodine content vitamins minerals and anti-oxidants.
- Future breeding strategies must focus on ideal ecotypes suitable for and protection
- Gene pyramiding can be used as tool to improve YVMV and OLCV resistance levels.
- Need to improve okra pod quality, yield stability and resistance to biotic and abiotic stress under South African Conditions.
- Pre-breeding procedures have been initiated towards okra improvement in South Africa.
- Emphasized to utilize GMS in okra so as to reduce labor costs, time, quality & seed productivity.
- For North Africa, there is an urgent need for developing hybrids/improved varieties for tolerance to drought, salinity and disease resistance through MAS along with traditional breeding.
- A callei can be used as multiple sources of resistance in okra breeding in West Africa conditions.



Photo 6. Demonstration session of exhibition area

Session 6: Genomics and genetic engineering research its future in okra

Chair: Dr. K. C. Bansal, Ex-Director, ICAR-NBPGR, New Delhi

Co-Chair: Dr. Elangovan, Molecular Breeding Lead, Advanta (UPL)

Rapporteurs:

· Dr. S. S. Dey, Sr. Scientist, ICAR-IARI, New Delhi

· Mr. Paresh Chokhander, Scientist, ICAR-IARI, New Delhi

Chairman Dr. K. C. Bansal (Ex-Director, ICAR-NBPGR, New Delhi) highlighted the role of okra improvement in genomics era and efforts to implement the genetic engineering technology to address the key biotic and abiotic stresses affecting the crop yield. While, the co-chair of the session Dr. Elangovan (Molecular Breeding Lead, Advanta, UPL) has given emphasis on the role of private sector in okra yield enhancement through NGS technologies.

This session had 5 talks elaborating on the present status and advancement made in the area of genomics in okra. The first speaker was Dr. H. Ravishankar (Principal Scientist, Biotechnology, ICAR-IIHR, Bengaluru) on the topic entitled, "Genomic Studies in Okra for Trait-linked Marker Development an Overview" mentioned that there is a need to work on KASP and DArT based sequencing to accelerate the okra genetic gain for YVMV tolerance and yield enhancement. Besides, he also emphasized on importance of the improvement of biochemical traits such as phenols, flavonoids through molecular approaches in okra. There is need to discover the feasibility on research inclining towards association mapping as till date only single study has been reported in okra. For high frequencies transformation and gene editing standard tissue culture techniques must be implemented.

Dr. Achuit Singh (Principal Scientist, ICAR-IIVR, Varanasi) delivered presentation on "Gene Editing Initiatives for Trait Development in Okra" highlighting the novel initiatives in okra in the form of genome editing tools such as CRISPR/Cas9 and multiplexed genome editing technology. He also highlighted the important challenges in the form of emerging viral diseases and development of resistance among vectors to a large number of pesticides. He also briefed about the recent SOPs recommended to work on SDN1 A, SDN2 and SDN3 based CRISPR/Cas9 based approaches.

Dr. K.V. Bhat (Retd. Principal Scientist, ICAR-NBPGR, New Delhi) shared his expertise on the “Utilization of Wild Species in Okra Improvement” in which he studied in-depth 17 wild species for okra yield gain. He explained the importance of gene pool and breeding strategies for introgression of desirable traits from GP-1, GP-2 and GP-3. To utilize genes from wild species, more backcrosses and selections are required. Virus tolerance in the derivatives appear to be dominant, however, extensive characterization of the derivatives in hotspots are required. Besides, he also advised to utilize the platform in the form of public-private partnership for harnessing the wild species in the okra improvement.

Dr. M. B. Arun Kumar (Principal Scientist, Division of Seed Science & Technology, ICAR-IARI, New Delhi) on the aspect of “Quality Assurance using molecular markers for genetic purity”. He mentioned that prolific growth of DNA markers and dominant markers in testing hybrid variety in okra for assured quality is getting attention. Besides, he also emphasizes on increasing discovery of SNP through GBS, KASP and LAMP for genotyping in okra improvement in terms of genetic purity.

Dr. Suman Lata (Scientist, Division of Vegetable Science, ICAR-IARI, New Delhi) in her presentation on “Biotechnological Tools for Management of Yellow Vein Mosaic Virus in Okra” focused on *de novo* transcriptome analysis studies in okra and development of web-based portal for greater visibility of the said work. She has also explained the importance and application of large set of molecular markers developed through her study for their use in okra improvement program.



Photo 7.
Release of Souvenir book
during the inauguration
session of the conference.

Session 7: Agronomic interventions and nutritional quality

Chair: Dr. Y.S. Nerkar, Ex-Vice Chancellor, MPKVV, Rahuri, Maharashtra, India
Co-Chair: Dr. Shridhar Hegde, General Manager (Production), IAHS, Bangalore.

Rapporteurs:

- Dr. Shrawan Singh, Sr. Scientist, ICAR-IARI, New Delhi
- Mr. R.Y. Vishwanath, Scientist, Division of SST, ICAR-IARI, New Delhi

Chairman Dr. Y.S. Nerkar, Ex-Vice Chancellor, MPKVV, Rahuri, Maharashtra, India, in his opening remarks highlighted the role of improved agronomy in enhancing productivity, profitability and quality of okra. Dr. Nerkar also stressed on conducting experiments on role of PGRs (Plant Growth Regulators) for okra vegetable and seed yield. The co-chair of the session Dr. Shridhar Hegde, General Manager (Production), IAHS, Bangalore, emphasized the role of seed quality in attaining higher yield levels. He stressed for developing CMS system for use in hybrid seed production.

This session had 11 talks including two progressive farmers and one start-up. Dr. S.K. Singh, Principal Scientist, Agronomy, IIVR, Varanasi presented on the topic 'Agronomic management for enhance productivity of okra -overview' and highlighted the role of agronomy to realize the yield potential of improved varieties and hybrids. Dr. Singh emphasized proper crop geometry, use of biofertilizers in nutrient management, use of drip irrigation with mulching, weed management, optimum harvesting intervals, intercropping systems and role of root architecture to enhance yield and income of okra growers.

Dr. B. S. Tomar (Head, Division of Vegetable Science, ICAR-IARI, New Delhi) delivered presentation on "Technological innovations for quality seed production in okra" and highlighted the necessity to give due consideration to genetic purity of the seed following the established protocols. He highlighted the significance of the season

(i.e. kharif) and sowing time (15th July) for obtaining high yield of quality seeds in Okra in Delhi conditions (Var. Pusa Bhindi-5). Similarly, he highlighted the significance of first three pods, climate parameters, following of IPM measures and timely harvesting of harvesting quality seeds. He also highlighted the potential of mechanical harvesting and Okra seed extractor developed by IARI, New Delhi.

In his presentation on 'Challenges in seed quality assurances in okra' Dr. V. K. Pandita, Ex-Head, IARI Regional Station, Katrain emphasized the need to consider the measures for seed quality assurance for trust building of the farmers and seed industry. He showed the robustness of Indian Minimum Seed standards which are by and large matching or better than International Seed Quality Association Standards. He stressed on need of strengthening seed testing labs to assist in maintaining the quality of seeds.

Mr. Vijay Kori, Leader, Technology Development International, UPL Advanta Seeds, India presented on 'Okra Agronomy Platform for Evaluation and Informed Decision Making'. In his excellent presentation, Mr. Vijay highlighted the significance of mapping of okra potential in product development chain and developing a robust platform of multilocation testing for identifying best hybrids for a zone or country by showing the extensive work done by his department in Advanta.

Mr. Satish Hedge, Head, Seed Production, Advanta Seeds, presented on 'Seed Production Challenges in Okra' and highlighted the role of good agronomy, precision agriculture and location-based measures in higher seed yield at farmers' fields. He showed how better agronomic interventions & limiting pod set per plant to main stem & 12 pod per plant they were able to increase average seed yields per acre from 79 kg to 349 kg. In the session, two progressive farmers Mr. Sucha Singh from Sonapat, Haryana and Mr. Mishri Lal Rajput, Madhya Pradesh also shared their views on profitable okra cultivation.

During the session, three presentations were on nutritional quality of okra. Dr. Abe S. Gerrano, Senior Researcher, Agriculture Research Centre, South Africa presented his study on existence of significant 'Variability' for nutritional quality in germplasm and its potential for breeding higher quality okra.

Dr. Neena Chawla, Principal Biochemist, PAU, Ludhiana presented on 'Nutritional Quality of Okra: a global overview' and Dr. Pradeep Karmakar, Scientist, IIVR, Varanasi, presented on 'Harnessing bioactive phytochemicals in okra: Nutritional & therapeutic perspective.

Recommendations:

1. Fertilizer use efficiency should be improved through precision methods of plant delivery system.
2. The work on root architecture for improving nutrient and water use efficiency is required to attain yield potential of new genotypes/hybrids.
3. Modern methods of automated irrigation based on sensors should be researched for higher nutrient and water use efficiencies.
4. Okra seed extractor should be promoted to enhance efficiency and quality seed recovery.
5. Indian Seed standards should be harmonized with ISTA and OECD seed standards.
6. Solid matrix priming on on-farm technique for rapid uniform seed emergence should be promoted among okra growers.
7. Nutritional quality, nutraceuticals and processing traits of okra should be investigated thoroughly with more robust scientific database on health benefits.
8. Breeding for easy to harvest genotypes or mechanical harvesting should be explored considering the harvesting related problems to the labour.
9. The role of PGRs should be explored intensively in vegetable and seed crop of Okra.

10. The product development protocol developed and practiced by ADVANTA may be explored in public sector breeding programmes too.

Session 8: Public Private Partnership

Chair: Dr. Hari Har Ram, Ex-Professor and Head Vegetable Science, Gbpuat, Pantnagar and Ex-Fao Consultant (Myanmar, Libya and Dpr Korea)

Co-Chair: Dr. C.S. Pathak, Advisor, Vegetable Research, Nath Bio-Genes, India, Ltd, Aurangabad.

Rapporteurs:

- Dr. Harshvardhan Choudhary, Principal Scientist, Division Of Vegetable Science, IARI, New Delhi
- Dr. Jeetendra Kumar Ranjan, Senior Scientist, Division Of Vegetable Science, IARI, New Delhi

Following three speakers having long experience in public sector research institutions made presentations on the topics as indicated.

1. Dr. Sameer Sawant, Chief Scientist and Prof. CSIR, National botanical Research Institute, Lucknow-Experiences in genomic research in cotton and potential learnings for okra.
2. Dr. O. P. Dutta, ex-Head, Vegetable Science, Indian Institute of Horticultural Research Bangalore-Potential for breeding consortium projects on okra-public and private partnership
3. Dr. Sanjeet Kumar, ex-Senior Hot-Pepper Breeder, Indian Institute of Vegetable Research, Varanasi, ex-World Veg Centre Representative in Africa and ex-Hot-Pepper Breeder at World Veg Centre, Taiwan-Potential innovative research collaboration and ideas.

Following three speakers having long experience in private sector research institutions made presentations on the topics as indicated.

1. Dr. Manish Bhatnagar, Growth Unit Head, Mahyco Seeds, Jalna, India-

Potential pre-breeding projects in okra for PPP collaboration.

2. Dr. Dushyant Singh Baghel, CEO, Nucleome, Hyderabad-Possibilities for genomic research for trait linked marker development in okra.

3. Dr. Surinder K. Tikoo, Tierra Agrotech, Hyderabad and Independent Director, ATPBR- Views on developing collaborative PPP projects.

Recommendations:

Dr. Sameer Sawant handling a collaborative cotton genomics project in partnership with Tierra Agro-tech highlighted 50K cotton SNP-chip utilization in linkage mapping and QTL analysis of five populations under DBT cotton umbrella project and summarized the status of re-sequencing of 320 core populations of *Gossypium hirsutum*(cotton) contributed by Tierra Agrotech for identification of markers linked with agronomically important traits for precision and accelerated breeding in cotton. He advocated consortium approach in okra for formulation and execution of structured project in okra and Dr.Tikoo endorsed his views and strongly expressed his views in support of consortium approach among the stake holders for handling complex projects and access to quick results.

Dr. O. P. Dutta, a veteran vegetable breeder of repute, decorated with recognition award during this GORT along with Dr.Nerkar, ex-VC-MAU, Parbhani, Dr.Jambhale, ex-ADG (Seeds), ICAR and Dr. B. S. Dhankar, ex-ADG-Veg Crops (ICAR) for outstanding contributions in okra breeding, listed following challenges in okra breeding:

- i) Need of okra varieties/hybrids with durable resistance to YVMV and ELCV through transfer of resistance from validated resistant cultivated/wild donors in combination with MAS and QTL mapping.
- ii) Redesigning of okra plant type with higher yield (from existing less than 1 kg per plant to 15 kg per plant), more productive branches, more productive nodes, intermodal productivity per se, bigger fruit size (from existing 15 g to 50 g) and large numbers of fruits per plant (from existing 35

to 300). He showed photos of plants types in support of the better okra plant architecture as proposed by him.

iii) Shift from manual method of hybrid seed production to cytoplasmic genetic male sterility system through intensive research.

Dr. Sanjeet Kumar presented an overview of okra research based on his experiences in West Africa (World Veg ICRISAT Project at ICRISAT Sahelian Centre, Niamey, Niger from 2007–2011) where Nigeria is the major okra producing country. He pointed out that the amphidiploid okra being cultivated in West Africa is *Abelmoschus caillei*. He emphasised the role of local landraces from which an improved type known as Konni was commercialized in West Africa. He also mentioned that his organization entered into PPP mode with a local seed company Ainoma Seed Farm in Niger for commercial seed production of variety Konni. Dr. Manish Bhatnagar highlighted the damages caused by YVMD, okra enation leaf curl virus, cercospora leaf spot/blight and powdery mildew besides jassids, mites, and spotted boll worm. He emphasised upon collaborative pre-breeding projects in PPP mode in the area of MAS, transferring resistances from wild okra (*Abelmoschus manihot*, *A. caillei*, and *A. tetraphyllus*).

Dr. Dushyant Singh Baghel informed the house that it is possible to assess accurate structural variations like gene presence/absence, gene copy numbers, and epigenetic differences using accurate long HiFi reads. He further mentioned that the ultra-low- depth genome re-sequencing provides the most economical way to identify genome-wide SNP markers for GWAS study. He was willing to offer the services of his organization, Nucleome to develop low and mid density trait specific panels for foreground and background selection and was emphatic that these end-to-end advanced genomic solutions can speed up the molecular breeding programs in okra under PPP mode of working.

Dr. Surinder K. Tikoo, co-founder of Tierra Agrotech Ltd and an independent Director, ATPBR, touched upon historical developments in the area of YVMV and OLCV resistance breeding in okra and emphatically mentioned that many a times, these resistances are not stable across the country and show sudden and sporadic break-down at certain locations. These problems get further compounded due to menace of thrips transmitted TSV (tobacco streak virus) against which no resistance is available. Accordingly, there is an urgent need to look for new sources of resistance to YVMV, OLCV and TSV to help generate broad spectrum stable horizontal resistance across locations.

Recommendations:

After in depth discussion among the participants, speakers, Chair and Co-chair, following recommendations were made.

1. A special committee shall be constituted under the chairmanship of Dr. Tikoo who will identify other key members both from the public sector research institutions and the private sector seed companies to list concrete projects and the road map to implement them in time bound manner to be operated under PPP mode using preferably consortium approach as is being done between World Veg Centre (previously known as AVRDC), Taiwan and few seed companies. Similar model is under operation between ICRISAT, CIMMYT, IRRI etc and other interested stakeholders. Time-line is within three months. (ACTION: Dr. S. K. TIKOO)
2. It was generally agreed that public sector research institutions are well equipped to do basic and fundamental research and ultimately to develop the commercial products but their capability to commercially produce the seeds (OPs and hybrids) is limited and the product does not reach to the end users in the desired quantity. This part of supply chain management can be done more effectively by the private seed companies who have better infra structure for commercial seed production , processing, and delivery to the end users through a network of channel partners

(retailers/distributors) and thus to leverage the strength from both the sectors, the public sector research institutions should devise simple MoUs to be signed between public and private sector organizations where the finished product seed/seed of parental lines/seed of elite lines is given to the private seed companies for onward production, processing and marketing and use in their research programs and vice-versa..

The Chairman in his concluding remarks appreciated the efforts of IARI under the leadership of Dr. A. K. Singh, Director, IARI who has simplified the procedure of MoUs and large numbers of seed companies are taking IARI seeds for production, processing and marketing. For illustration sake, let us take the example of okra where IARI Bhindi-5 (OP) 4 kg seed is given to any seed company after signing of a simple and brief MoU and paying one-time lump sum payment of Rs. 75,000/ with annual purchase of minimum of 4 kg breeder seed at the rate of Rs. 5000/kg. No complication is encountered as royalty clause is just not there. This example, can be replicated and scaled up and is certainly an excellent example of PPP. Similar model is under operation at IIHR, Bangalore and IIVR, Varanasi, etc. (ACTION: ALL CONCERNED)

3. Encouraged with discussion as above, Dr. B. S. Tomar, Head Division of Vegetable Science came forward with a proposal that he will organize a meeting of all concerned under the Chairmanship of DG-ICAR to discuss the issues and policy matters related to sharing of IARI technologies among the seed companies under PPP mode in hassle-free manner and also to short-list few concrete research proposals to operate them under PPP mode/consortium mode with overall objective of easing out the process further and remove the obstacles, if any. This will be done within next three months. (ACTION: DR. B. S. TOMAR)

4. Steps need to be taken to import elite lines of okra/selected germplasm of okra primarily of African origin from World Veg Centre following due procedures as available on website of World Veg Centre. Once such seeds are available, the importing seed company may multiply the same and distribute among the interested seed companies as per terms and

conditions of Material Transfer Agreement signed between World Veg Centre and the germplasm importing Seed Company.(ACTION: INTERESTED SEED COMPANY/COMPANIES & Public Sector Breeders)

5. A committee constituted under Chairmanship of Dr. Tikoo as under in Sl No 1 may revisit the following issues which were flagged by the Chairman of the session and inconclusively discussed during this session and take appropriate steps on some of these, as he may deem fit.

i) Bringing out joint publication/manual between public sector scientists and private seed company scientists on HYBRID SEED PRODUCTION OF VEGETABLE CROPS AS PRACTICED ON FARMERS FIELD for overall benefit of students and faculty members. A typical example is a MANUAL ON HYBRID SEED PRODUCTION IN PEARL MILLET BY DR. O. P. YADAV OF CAZRI, JODHPUR AND DR. R. S. MAHALA, CORTEVA SEEDS.

ii) Extending research facilities by private seed companies for post-graduate students thesis work within the same city on mutually agreed terms and conditions. This will be something like student's internship. This model works between some selected students of Jalgaon Univ. and Jain Irrigation Systems, Jalgaon.

iii) Listing of some of the private seed company's lead breeders as adjunct faculty members in the universities located in the same city for lectures on selected topics of few courses based on mutually agreed terms and conditions. The typical example is that of Dr. Roland Schafleitner of World Veg Centre listed as Adjunct Professor at Inst. Tropical Plant Sciences and Microbiology at National Cheng Kung Univ. Tainan.

iv) Pooling together of all types of wild okra from various sources, their seed multiplication and karyotype analysis for accurate identification and then distribution to the users.

The session ended with vote of thanks to the Chair and Co-chair.



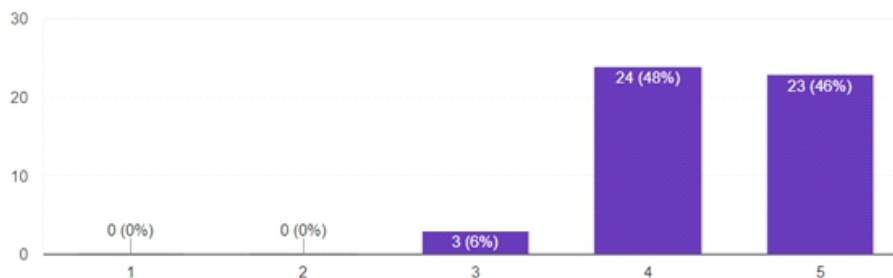
Photo 8. Group photo of all participants at the end of the GORT conference

Feedback Report

How to you rate the choice of invited speakers (1 is worst, 5 is the best)

 Copy

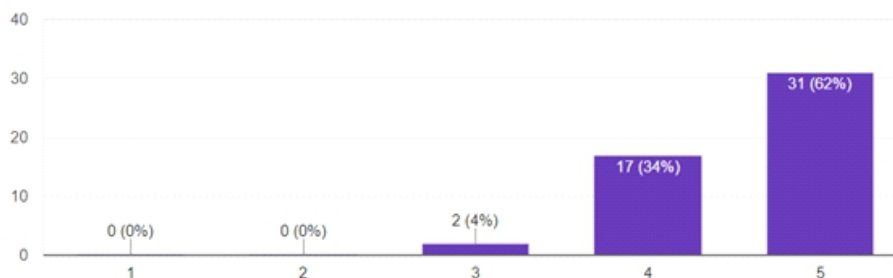
50 responses



How to you rate the choice of Venue (1 is poor and 5 is excellent)

 Copy

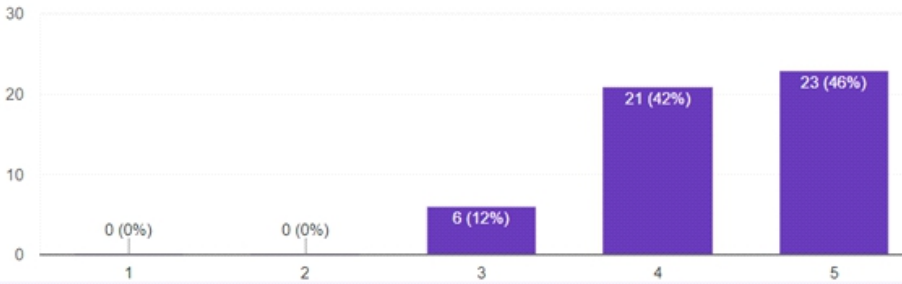
50 responses



How do you rate the overall management of the program (1 is poor and 5 is excellent management)



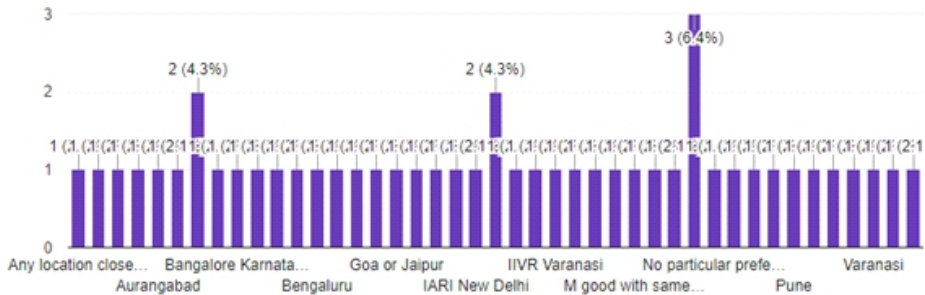
50 responses



Where do you like to have next GORT conference



47 responses



Any specific suggestions for the ATPBR

44 responses

Involve students in all the coming programmes

Online management

Need to support for more basic scientific work on Okra.

The presentation should contain the most recent data. Looking at old data misleads the audience.

Many of the lectures were not audible properly due to connectivity issues. Time management was poor.

On the final discussion, I recommend the international okra consortium to be established. This will help collaboration, germplasm exchange, experience sharing, visiting scientist scholars....and helps to get funds from donors as well....

Public domain data compiled and prepared in simple formate so breeder could be used for breeding programme.

It's fantastic even and would like it congrats for the Gr8 efforts.

Give preference to research paper presentation

Please provide venue for students who are working on okra for poster presentation which will boost up PhD student to work more and wil be worth enough fr us in future as it is crop specific

Please provide conference kit and venue for participates and students. Thank you...

No any suggestions

All r full length of research papers or abstract must be published in Springer publications since we have paid the fees. certificate of publication may also be provided. an E copy of the proceedings may be provided as assured to all participants.

Take discussion Session with scientist

Good insights from various presentation and exposure to different kind of experienced people from public and private sector

OUR INSTITUTE WE HAVE SENT FOUR FULL LENTH RESEARCH ARTICLE PERTAINING TO OKRA IMPROVEMNT AND MANAGMENT STUDIES. KINDLY PUBLISH IN THE SPRINGER EDITION. MOREOVER, WE HAVE PAID Rs.2000/- each.

Overall good experience

It was a wonderful conference we had on Okra, a first of its kind. Following are my humble opinions that you may consider:

1. You may need to hire a better person who can operate computer properly. I think we have lost lot of time in either setting up the slides or explaining how slider changer works to the speakers. PA systems were not in sync eith microphones, especially
2. There was no drinking water available near/ in the auditorium. We can't go outside every time we want to drink water
3. Inviting speakers to talk online may not be a good idea considering connectivity issues and latency. We were not able to interact with those speakers as well.
4. Sessions of third day were more engaging than second day. Even though focus was more on breeding
5. Registration process at NASC could have been done in more organised manner. It look me and many others lot of time to get ID cards, in my case, which was not printed even though I had registered well before.
6. It really impressed me that you didn't spend unnecessarily on goodies like diaries etc which will be thrown after the conference is over. Instead the focus was on invited as many speakers as possible. Great job!
7. I was expecting some technical sessions in addition to field visits on first day. There was around 2 hrs time slot available between field visit and inauguration.

It was a wonderful experience with ATPBR in GORT. Looking forward to participate in more such programs

Thank you!

The conference was great. Got to learn a lot and field trips added more to learning. Kindly conduct such conferences more often.

More involvement of R&D persons from
Private sector as speakers

If possible try to end session before 5pm.

It was so good and well organised. ATPBR team took care of everything. And speakers they gave us every detailing about the topics with proper explanation. Thankyou so much to surendera sir and Aparna mam. 🙏

There should be all okra segments from Govt. as well as private organisations for field visit. Make a core group for Okra to take further action.

On next time try to arrange poster presentation because of that many graduate & post graduate actively involved it

Next time try to arrange poster presentation so graduate and post graduate students actively took part in it.

Thank You!

Excellent job done

I think some of the data presented are out dated, the presentations should be crisp and need to put it in an understandable way. put restrictions to maximum 8 slides for 20 minutes slot and design accordingly. The speakers are expected to extract the publication reports if any and put it precisely to the audiences in mind.

1. GORT-1 Programme was vary nice initiation and informative.
2. Need to use more private speakers for breeding purpose.
3. Need to show some more success story's in private sector.

Would be good to have less no. of speakers with good quality and more time should be given for presentation and discussion instead of covering everything in one round table.

Suggested project should bring to reality mode by active involvement of ATPBR

The Presentations were too crowded. There should be a good balance & choice of speakers from Public Sector. Very few speakers from Private sector and that too was only dominated by one company.

Expected a few talks on breeding for specific traits in okra, but they were missing . Presentations from Advanta, Dr. Bhat, Dr. Joseph , Dr. Krishna Reddy , Dr. Ravishankar , Dr. Neena , Dr. Tomar , were well chosen.. Dr. Achuit Singh's presentation had nothing to do with okra ...so was the talk on cotton genomics .Sorry to say that the rest were not up to the mark.

While it is nice to have senior people from ICAR to chair sessions please ensure that they keep their discussions brief and have some knowledge regarding the subject being discussed.

The conference was very useful for all the people involved in Okra crop. This has brought few key issues which may need to be taken further by the group. We may involve more people from other countries to make it really global. Excellent efforts by the organizing team in managing this successful event.

More time should be given to Discussion part

Very well manage and thank you for give platform for okra community.



Well organized.

Need to increase more talks on molecular markers. Need to give each speaker at list 30 min and must have question ans session.

Would it be of interest to also invite participants from the academics to get more basic science input?

News Bulleting / Calender to share for year round activity to outside members interested

res

Organize solo conference of Chili

Media Coverage

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HOME > EDUCATION > The first Global Okra Round Table conference (GORT-1)

The first Global Okra Round Table conference (GORT-1)

October 11, 2022 > Sujata > Education > Comments Off



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Dr. Surendar Tikku Independent Director, ATPBR, graced the GORT inaugural session with his presence at JP Pal Auditorium, Pusa Campus, New Delhi.

On this occasion Dr. Aparna Tiwari, Co-Founder and CEO ATPBR said, "Okra isn't the origin of India, but we are doing very well globally. Africa, the USA, and some countries in Europe have a good market for okra and the climate is also very suitable for its cultivation, but India is importing to these continents. India has a very high potential to become a leading importer of okra and beat the rest of the world. People and the market can also bear it as it's not expensive. The purpose of this conference was to mobilize the momentum across the globe that we are the one who has every suitable condition from the geological to production and technology to grow any crop. Here, we are not just doing conventional farming but with updated technology as well using different types of breeding tools to produce the best crop in the market in less time. One of its types is Speed Breeding, where through continuous light, we try to speed up the whole breeding process. It's a new technology, a lot of investment is done in this and we are the first and only one to use the updated technology in Okra. India has the best combination in terms of policymakers, executors, farmers, students, scientists, and breeders who are working only on one crop. Either on production, marketing, value chain, or processing people are working in it. Instead of duplication here we can collaborate and make proper synchronization of the research and service which can be beneficial for both."

The conference was aimed to be developed into a biennial conference so that Okra stakeholders can meet & take the crop forward.

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The first Global Okra Round Table conference (GORT-1)

ANN, News Bureau

Tuesday 11th of October 2022 04:48:34 PM



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EDUCATION

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Oct 11, 2022



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CollegeDekho appoints Sushant Kashyap and Dr Ashfaq-Ul-
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Education

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The conference was aimed to be developed into a biennial conference so that Okra stakeholders can meet & take the crop forward.

Education

The first Global Okra Round Table conference (GORT-1)

October 11, 2022



New Delhi, October 11th, 2022: Advanced Training in Plant Breeding & Research (ATPBR), in conjunction with the Indian Council of Agricultural Research (ICAR) and Indian Agricultural Research Institute (IARI) organized the Global Okra Round Table (GORT) at AP Sinder Auditorium, NASC Complex.

The GORT '22 was aimed to bring together all okra crop improvement scientists and other stakeholders together at the very campus where the okra virus resistance breeding started with the release of the variety Pusa Sawani by the Late Dr. H. B. Singh. ICAR is known to have introduced the path-breaking virus-resistant okra varieties bred at institutes like the Indian Institute of Horticultural Research (IIHR), Bangalore and IARI, New Delhi. Agricultural Universities like Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani, Punjab Agricultural University (PAU), Ludhiana and Chaudhary Charan Singh Haryana Agricultural University, Hissar. This time, the GORT conference included a field day at the IARI campus.

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EDUCATION

The first Global Okra Round Table conference (GORT-1)



By Sujata

OCT 11, 2022



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Dr. Surendar Tikku Independent Director, ATPBR, graced the GORT Inaugural session with his presence at JP Pal Auditorium, Pusa Campus, New Delhi.

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The first Global Okra Round Table conference (GORT-1)

October 11, 2022

 Read Time: 2 Minute, 15 Second



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Dr. Surendar Tikku Independent Director, ATPBR, graced the GORT Inaugural session with his presence at JP Pal Auditorium, Pusa Campus, New Delhi.

On this occasion **Dr. Aparna Tiwari, Co-Founder and CEO ATPBR** said, "Okra isn't the origin of India, but we are doing very well globally. Africa, the USA, and some countries in Europe have a good market for okra and the climate is also very suitable for its cultivation, but India is importing to these continents. India has a very high potential to become a leading importer of okra and beat the rest of the world. People and the market can also bear it as it's not expensive. The purpose of this conference was to mobilize the momentum across the globe that we are the one who has every suitable condition from the geological to production and technology to grow any crop. Here, we are not just doing conventional farming but with updated technology as well using different types of breeding tools to produce the best crop in the market in less time. One of its types is Speed Breeding, where through continuous light, we try to speed up the whole breeding process. It's a new technology, a lot of investment is done in this and we are the first and only one to use the updated technology in Okra. India has the best combination in terms of policymakers, executors, farmers, students, scientists, and breeders who are working only on one crop. Either on production, marketing, value chain, or processing people are working in it. Instead of duplication here we can collaborate and make proper synchronization of the research and service which can be beneficial for both."

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Okra crop export opportunities explored at GORT '22

The Global Okra Round Table (GORT) was organized by Advanced Training in Plant Breeding & Research (ATPBR) in collaboration with the Indian Council of Agricultural Research (ICAR) and Indian Agricultural Research Institute (IARI), at AP Sride Auditorium, at NASC Complex on October 10.

SNS | New Delhi | October 11, 2022 4:14 pm



(Photo: Kishijagan)

The Global Okra Round Table (GORT) was organized by Advanced Training in Plant Breeding & Research (ATPBR), in collaboration with the Indian Council of Agricultural Research (ICAR) and Indian Agricultural Research Institute (IARI), at AP Sride Auditorium, at NASC Complex on October 10.

The main aim of GORT '22 session was to bring together all okra crop improvement scientists and other stakeholders so they can work towards its development.

ICAR is known to have introduced the path-breaking virus-resistant okra varieties bred at Institutes like the Indian Institute of Horticultural Research (IIHR), Bangalore and IARI, New Delhi, Agricultural Universities like Vasuvarao Naik Marathwada Krishi Vidyapeeth, Parbhani, Punjab Agricultural University (PAU), Ludhiana and Chaudhary Charan Singh Haryana Agricultural University, Hissar.

This time, a field day was also included at the IARI campus during the conference.

Dr. Surinder Tikku, Independent Director, ATPBR, was present at the GORT inaugural session at the JP Pal Auditorium, Pusa Campus, New Delhi.

On this occasion Dr. Aparna Tiwari, co-founder and CEO, ATPBR said, "Okra isn't a crop that originated in India, but we are doing very well globally. Africa, USA, and some countries in Europe have a good market for okra and the climate is also very suitable for its cultivation, but India is exporting to these continents."

She further added, India has a very high potential to become a leading exporter of okra and beat the rest of the world. The crop is not very expensive and is accessible to the majority of the population.

Furthermore, India has a very suitable conditions from the geological and technological point of view to grow any crop. Here, farming is being done with the latest technology, along with the conventional one, using different types of breeding tools to produce the best crop in the market, with lesser turnaround time, Dr. Aparna Tiwari said.

Talking about the breeding and production of Okra, she said, "One of its types is through Speed Breeding, where through continuous light, we try to speed up the whole breeding process. It's a new technology, a lot of investment is done in this and we are the first and only ones to use the updated technique in Okra production."

She further added, "India has the best combination in terms of policymakers, executors, farmers, students, scientists, and breeders who are working on one crop, in terms of production, marketing, value chain, or processing, instead of duplication, here we can collaborate and make proper synchronization of the research and service which can be beneficial for both, the producer and the consumer."

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EDUCATION

The first Global Okra Round Table conference (GORT-1)

by SUJATA 2 WEEKS AGO

🕒 Read Time: 2 Minute, 15 Second



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(Director ICAR,IARI)



Dr. K.K Narayanan
(Director ATPBR)

Chairman



Dr. Surinder. K. Tikoo
(Tierra Agrotech, Independent Director,
ATPBR)

Co- Chair



Dr. B. S. Tomar
(Joint Direct Extension,
IARI)

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(Founder, Director, ATPBR)

Co- Organizing Secretary



Dr. R. K. Yadav
(Principal Scientist, IARI)

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(Director, ATPBR)

Treasurer



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(Scientist at IARI)

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