



## **Recommendations of Golden Jubilee International Salinity Conference on Resilient Agriculture in Saline Environments under Changing Climate: Challenges & Opportunities (7-9 February, 2019) held at Central Soil Salinity Research Institute, Karnal**

Indian Society of Soil Salinity and Water Quality (ISSSWQ) and ICAR-Central Soil Salinity Research Institute, Karnal in association with Indian Council of Agricultural Research (ICAR), New Delhi organized Golden Jubilee International Salinity Conference on “*Resilient Agriculture in Saline Environments under Changing Climate: Challenges & Opportunities*” during 7-9 February 2019 at Central Soil Salinity Research Institute Karnal. The NABARD and industry, Reliance Industries, NTPC, Panipat Refineries, Rex Poly Extrusion, Inter Drain and other industries also actively participated in the conference. More than 40 international delegates representing 12 countries and 370 national delegates comprising salinity experts from international institutes, universities, state agricultural universities, ICAR institutes, students, line department functionaries of state agriculture and irrigation departments and farmers representing 14 states deliberated on various issues of resilient agriculture in saline environments under changing climate during the conference. The deliberations were on the following 6 sub-themes:

- Drivers, stresses and key indicators/parameters of soil salinity and diagnostic criteria for assessment and mapping
  - Mechanisms of salinization, its impacts on soils, crops, vital ecological functions and novel strategies for up scaling the saline agro-ecosystems amelioration.
  - Newer approaches and breeding protocols for inducing stress tolerance in plants
  - Alternate land use systems for saline agro-ecosystems
  - Climate resilient approaches for higher agricultural productivity of salt-affected soils and livelihood security
- Impact assessment, framing dynamic policies, addressing gender and other socio-economic issues for mitigating negative effects of salinization
- Based on the presentations, thorough deliberations and expert opinions; the following major recommendations were emerged:
1. For delineation and characterization of salt-affected soils, application of modern tools such as hyperspectral remote sensing can help with reasonable accuracy. Further, L band radar data is useful for salinity mapping and modelling in sub-surface soil layers. Soil salinity being dynamic in nature and its assessment using remote and proximal sensors and Geographical Information System (GIS) supported with optimum ground truth/ laboratory analysis should be carried out on regular basis.
  2. There is need of convergence of ideas and approaches for salinity and sodicity management under climate change scenario. We must search for alternate amendments, advance technologies such as nano-technology and use of organic resources and micro-organisms for reclamation of salt-affected soils. It is high time to re-visit the reclaimed areas to check resodification. After land reclamation, integration of salt-tolerant crops, multi-enterprise agriculture, conservation agriculture and precision farming through development of human resources with up-gradation of skills of different stakeholders and infrastructural facilities can be possible solutions for adapting to climate change.
  3. Better participation of farming community is needed for expansion of sub-surface drainage

(SSD) technology in large saline areas as implementation of technology is community based. Research on use of cut-soiler for low cost sub-surface drainage, needs to be taken up and standardised for different conditions.

4. Timely availability of quality and certified seeds of salt tolerant crop varieties and organic, inorganic, and biological amendments in sufficient quantities in the targeted areas must be ensured with public-private partnerships including NGOs.
5. In the scenario of climate change, diversified cropping systems such as agroforestry-based models must be developed. We need to domesticate potential high value salt-tolerant halophytes in high salinity regions including arid and coastal regions. Saline aquaculture/shrimp culture along with multi-enterprise agriculture systems must get priority. There is need to develop climate smart saline agricultural models for carbon sequestration and ecological restoration of salt-affected soils. Integrated package and practices including rootstock and scion cultivars and appropriate agro-techniques need to be developed with market and industrial linkage for promoting underutilized and high yielding fruits in highly saline and alkali soils. Biodrainage technique must be refined for waterlogged areas.
6. There is better scope for mining the new genes for salt tolerance from wild progenitors and halophytes through Next Generation Sequencing/ map-based cloning and it must be validated with conventional breeding approaches for its utilization in the crop improvement. Reverse genetic concept is the best option to identify and enhance the salt tolerance in crops. Genetic manipulation of the crop genotypes need to be done under salt stress environments for increasing nutrient use efficiency. Use of microbes predominant in high saline areas (including mangrove substratum) must find a place in trans-generic research.
7. Conservation agriculture (CA)-based farming has large potential to face the challenges posed by climate change, especially extreme weather events like heavy downpour induced water-logging in the region. It can reduce crop residue burning, and improve crop and land productivity by enhancing energy use efficiency and water use efficiency. Mechanization is an integral part for success of conservation agriculture. It can ensure sustainability of agriculture with improved ecosystem services even in case of salt-affected soils and poor-quality irrigation waters. Government policy support is very much important for large scale adoption.
8. Resilient agro-technologies for salt-affected Vertisols under irrigated and rainfed environments needs to be promoted with concept of agri-business model to ensure livelihood security for farmers in Gujarat, Maharashtra, Karnataka, Telangana and Tamil Nadu.
9. Technologies must be strengthened to check over-exploitation of groundwaters and judicious utilisation of poor-quality waters including underground water in dry areas and sea water in coastal areas for developing different agricultural bio-saline systems. Technologies of water harvesting and recharge in areas of over-exploitation must be strengthened.
10. National and international networks of salinity institutions may be established for collaborative research partnership to promote exchange of knowledge/ experience/ technologies and human resource development (training) for solving salinity problems in different regions of the world. Research partnership and technology transfer including crop improvement technologies with international institutes such as JIRCAS, ICBA and others may be attempted to address inland and coastal salinity problems in India. Indian Society of Soil Salinity & Water Quality, Karnal must develop linkages with other organizations working on salinity and sodicity management in different parts of world for sharing knowledge and experiences for betterment of mankind.