

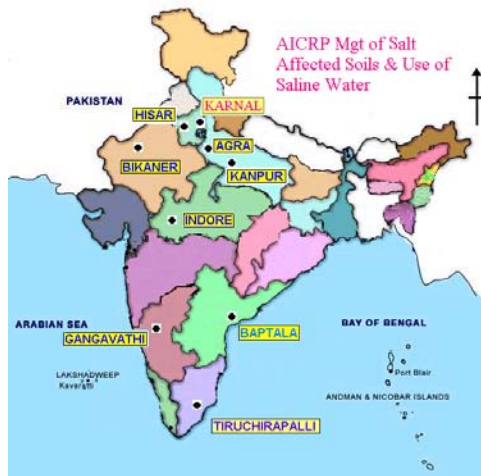
All India Coordinated Research Project on Management of Salt Affected Soils and Use of Saline Water in Agriculture

Historical Background

The All India Coordinated Project for Research on Use of Saline Water in Agriculture was first sanctioned during the Fourth Five Year Plan under the aegis of Indian Council of Agricultural Research, New Delhi at four research centers namely Agra, Bapatla, Dharwad and Nagpur to undertake researches on saline water use for semi-arid areas with light textured soils, arid areas of black soils region, coastal areas and on the utilization of sewage water respectively. During the Fifth Five Year Plan, the work of the project continued at the above four centers. In the Sixth Five Year Plan, four centers namely Kanpur, Indore, Jobner and Pali earlier associated with AICRP on Water Management and Soil Salinity were transferred to this Project whereas the Nagpur Center was dissociated.

As the mandate of the Kanpur and Indore centers included reclamation and management of heavy textured alkali soils of alluvial and black soil regions, the Project was redesignated as All India Coordinated Research Project on Management of Salt Affected Soils and Use of Saline Water in Agriculture. Two of its centers located at Dharwad and Jobner were shifted to Gangawati (w.e.f. 1.4.1989) and Bikaner (w.e.f. 1.4.1990) respectively to work right at the locations having large chunks of land afflicted with salinity problems. During the Seventh Plan, the project continued at the above locations. During Eighth Five Year Plan, two new centers at Hisar and Tiruchirapalli were added. These Centers started functioning from 1st January 1995 and 1997 respectively. During the Tenth Plan, Project continued with an outlay of Rs. 1090.00 lakh at the following centers with the Coordinating Unit at Central Soil Salinity Research Institute, Karnal.

Cooperating Centres with Addresses



(Map for showing locations of the Stations only)

1. R.B.S. College of Agriculture, Bichpuri, Agra–283105 (Uttar Pradesh)
2. Regional Research Station, Acharya N.G. Ranga Agricultural University, Bapatla–522101 (Andhra Pradesh)
3. Agriculture Research Station, Rajasthan Agricultural University, Bikaner–334002 (Rajasthan)
4. Agricultural Research Station, University of Agricultural Sciences, Gangawati, Koppal–583227 (Karnataka)
5. Department of Soils, Agriculture College, CCS Haryana Agricultural University, Hisar–125004 (Haryana).
6. Agricultural College, J.N. Krishi Vishwa Vidyalaya, Indore–452001 (Madhya Pradesh)
7. Agriculture College, C.S. Azad University of Agriculture & Technology, Kanpur–208002 (Uttar Pradesh)
8. AD Agriculture College & Research Institute, Tamil Nadu Agriculture University, Navalur, Kuttapattu, Tiruchirapalli–620009 (Tamil Nadu)

AICRP Tenth Plan Mandate

- Survey and characterization of salt affected soils and ground water quality in major irrigation commands.
- Evaluation of the effects of poor quality waters on soils and crops.
- Develop standards/guidelines for the assessment of quality of irrigation waters.
- Develop management practices for utilization of waters having high salinity/alkalinity and toxic ions.
- Develop and test technology for the conjunctive use of poor quality waters in different agro-ecological zones/major irrigation commands.
- Develop alternate land use strategies for salt affected soils (Agro-forestry).
- Screen crop cultivars and tree species appropriate to salinity and alkalinity soil conditions.

Project Coordinator : Dr. S. K. Gupta, CSSRI, Karnal

Names of the Officer-In-Charge & their Addresses of Cooperating Centres

1. Dr. C.P.S. Chauhan (Officer In charge, AICRP Saline Water Project), R.B.S. College of Agriculture, Bichpuri, Agra–283105 (Uttar Pradesh)
2. Dr. V. Shankara Rao (Officer In charge, AICRP Saline Water Project), Regional Research Station, Acharya N.G. Ranga Agricultural University, Bapatla–522101 (Andhra Pradesh)
3. Dr. B.L.Verma (Officer In charge, AICRP Saline Water Project), Agriculture Research Station, Rajasthan Agricultural University, Bikaner–334002 (Rajasthan)
4. Dr. M. Hebbra (Officer In charge, AICRP Saline Water Project), Agricultural Research Station, University of Agricultural Sciences, Gangawati, Koppal–583227 (Karnataka)
5. Dr. S. K. Sharma (Officer In charge, AICRP Saline Water Project), Department of Soil Science, Agriculture College, CCS Haryana Agricultural University, Hisar-125004 (Haryana).
6. Dr. S. K. Verma (Officer In charge, AICRP Saline Water Project), Agricultural College, J.N. Krishi Vishwa Vidyalaya, Indore–452001 (Madhya Pradesh)
7. Dr. Samir Pal (Officer In charge, AICRP Saline Water Project), Agriculture College, C.S. Azad University of Agriculture & Technology, Kanpur–208002 (Uttar Pradesh)
8. Dr. D. Jaya Kumar (Officer In charge, AICRP Saline Water Project), AD Agriculture College & Research Institute, Tamil Nadu Agriculture University, Navalur, Kuttapattu, Tiruchirapalli–620009 (Tamil Nadu)

Technologies Developed/Tested

Doruvu Technology



Conventional *Doruvu*

A dug out conical pits locally called Doruvu in Andhra Pradesh and Kottai in Tamil Nadu, is used to skim fresh water floating

on the saline water. It is used to draw water manually and is splashed on crops, vegetables, flower plants, groundnut, nurseries of paddy, vegetables, tobacco and chillies using pitchers.

Each Doruvu occupy an area of about 200 m²

The water collected from each Doruvu is just sufficient to irrigate 800 m². As such 10-12 Doruvu are needed for 1 ha area.



Improved *Doruvu*

- As an alternative to traditional *Doruvu*, AICRP center at Bapatla developed a popularly known Improved *Doruvu* Technology. In this set up, flow of water 1.8-2.0 m below the ground surface in collectors embedded is collected in a sump. This water is pumped and used to irrigate crops using sprinklers/drip and specially designed hand held jelly.

Use of Industrial wastes

Distillery Spent Wash for reclamation of sodic soils

In India, about 257 distilleries generate 40.72 million-kilo litres of spent wash annually. It can be utilized as an amendment for reclaiming sodic soil. Its application @ 5.0 cm in the first year of

reclamation helps to lower ESP and increase in yield of rice. The technology has been perfected at AICRP centers of Tiruchirrapalli and Indore.

Distillery Spent Wash for reclamation of sodic waters



Distillery Spent Wash Treatment for alkali water using drip irrigation.

At Tiruchirrapalli, the Distillery Spent wash (DSW) has also been found effective to reclaim sodic waters. 1 litres of DSW in 250 litres of sodic water is sufficient to neutralize RSC of around 10 meq/l to a level that it would not harm the sugarcane crop.

Raised and Sunken bed technology for reclamation of rainfed alkali Vertisols



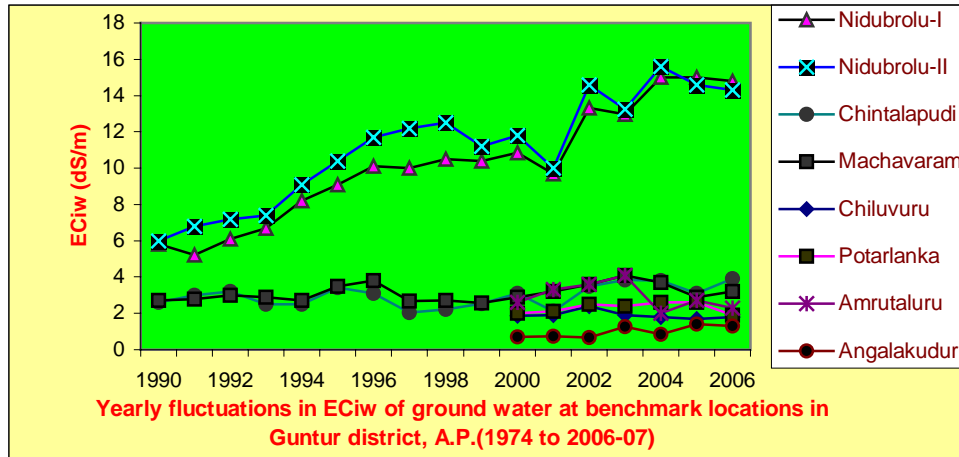
Raised and Sunken Bed

For the reclamation of sodic Vertisols under rainfed condition, raised and sunken bed technology has been developed wherein cotton crop was planted on raised beds whereas paddy crop was transplanted in sunken beds. The results indicated that raised and sunken bed system is good to conserve soil, water and nutrients and provides

good surface drainage to upland crops grown on the raised beds. The system helped in water (50 %), soil (95 %),

nutrients (90 %) conservation and improved crop production. The system is economically viable.

Temporal changes in ground water quality and soil properties at benchmark sites in coastal belt of Guntur district (Andhra Pradesh)



In order to assess the temporal dynamics of water quality in coastal regions , 8 benchmark sites have been identified in Guntur district of Andhra Pradesh. While profound changes have been observed at two sites, not many changes

were observed at other sites. Continuous monitoring would help to understand the reason of deterioration in water quality over long-run so that necessary mitigation measure at similar sites could be initiated well in time.

Tolerance of Vegetables/ Fruit Trees to saline irrigation under drip irrigation.

IW/CPE ratio of 1.0 , fruit yield of pomegranate was higher in drip method by 23 % with best available water , 43 % in EC_{iw} 8 dS/m , 33 % in EC_{iw}12 dS/m over surface method.

At Gangawati, highest cotton yield (1.64 t/ha) was recorded with drip irrigation with single row method of planting at 1.2 ET level of irrigation while the lowest in case of furrow irrigation with paired row planting at 1.2 ET (0.97 t/ha).

Response of cotton was better under drip irrigation than surface irrigation with 1.2 ET level of irrigation in both the single row and paired row method of planting. For vegetable crops, highest ridge gourd yield (8.28 and 7.91 t/ha) in two salinity blocks was recorded under drip irrigation at 1.4 ET while the lowest yield (2.2 and 1.15 t/ha) was recorded under drip irrigation at 0.8 ET. The yield levels under drip irrigation were higher than furrow irrigation.

At Tiruchirrapalli, drip irrigation with

alkali water and farmers practice gave cane yields of 59.3 and 42.3 t/ha respectively. Drip irrigation with untreated alkali water and no soil application of gypsum recorded the lowest cane yield of 30.0 t/ha. The commercial cane sugar recovery was higher in drip irrigation without water treatment. The amount of water used under drip and furrow irrigation indicates that the irrigation water saving during 2004-05 and 2005-06 were 42 and 20 percent respectively.

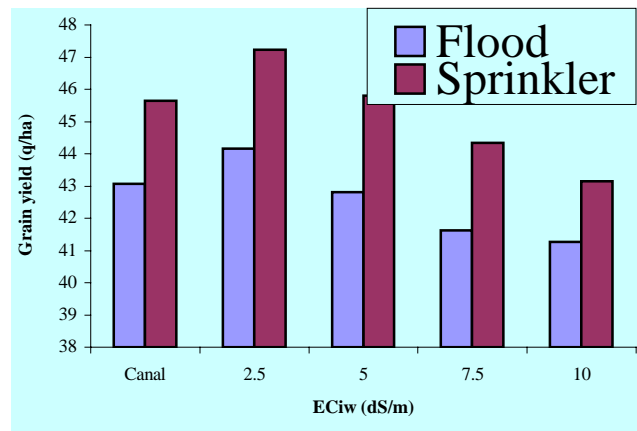
Sprinkler Irrigation

At Hisar, sprinkler irrigation proved better than flood irrigation at all levels of

saline water irrigation.



Sprinkler irrigation



Wheat grain yield under different salinity irrigations in flood and sprinkler irrigation.

Subsurface drainage for reclamation:

Subsurface drainage studies have been carried out at Bapatla, Gangawati, Indore and Bikaner centers. At all the centers subsurface drainage lowered the water table, reduced soil Ece and increased the yield of crops grown

following subsurface drainage treatment. It has been shown that pay back period of this technology is 2-3 years depending upon the initial status of soil and crops grown following land reclamation.

Bio-drainage:



Bio-drainage studies at Gangawati revealed that tree species such as *A. nilotica*, *D. sissoo* and *C. equisetifolia* were quite efficient in intercepting the canal seepage. Planting of 2-4 rows of these trees, 5 m away from the canal could intercept more than 80 % of the seepage and relieve water logging problem along the canals.