Success story under RKVY Project Implemented at UAS, Raichur

SUCCESS STORY- II

1. **Title : Enhancing Agricultural Productivity by Amelioration of Problematic Soils Using Subsurface Drains**

2. **Category-agriculture, horticulture, animal husbandry:** Food grain production by Natural Resources Management

3. Challenge:

The problems of waterlogging and salinity due to unscientific practices of land and water are common in the command areas of irrigation projects in the country including the state of Karnataka, which threaten the sustainability of irrigated agriculture. About 8.50 M ha has been afflicted by these twin problems in the country, while it is about 4 lakh ha area in Karnataka state. Of this, 90,000 ha is found in the TBP alone out of the command area of 3.63 lakh ha (25%) and about 60,000 ha (11%) in the UKP out of the 6.62 lakh ha irrigation potential created so far. Unless, these problems are addressed, the performance of the irrigation projects in respect of agricultural productivity and production would continue to pose serious concern. Providing subsurface drains (SSDs) has been found useful in reclamation of such affected lands by lowering water table and also reducing soil salinity in the crop root zone.

4. Initiative

A package for reclamation of waterlogged and salt-affected lands using subsurface drains was developed based on systematic research carried out in the UKP and the TBP commands during 1995-2002 by the University of Agricultural Sciences (UAS) Dharwad / presently the region comes under the UAS Raichur. This technology needs to be demonstrated for large scale adoption by the concerned CADAs and the farmers together with funding from the state/central Government(s). Keeping this aspect, adopting these recommendations, a project was taken up with the funding under the RKVY for demonstration of the reclamation technology of waterlogged and salt-affected lands. The farmers of this region were involved in identification of problematic lands, initial planning and execution of the SSD works.

Programme Activities: Following activates were carried out to fulfil the mandate of RKVY project.

- Reconnaissance survey was carried and problematic waterlogged and salt-affected areas in the UKP and the TBP command areas were identified. Two sites one each of about 50 ha in the TBP command area at Mallapur in Sindhanur taluk and the UKP command area at B. Malla in Surpur Taluk were taken up. Detailed surveys were carried out using total survey station and GPS meter and topographic maps were prepared.

- Water table information was obtained and the soils were analysed for pH and EC. Hydraulic conductivity test was carried out. Extent of cropping intensity and crop yield particulars were obtained.
- After the diagnosis of the problems, the design and planning of SSD system involving three spacing of 40, 50 and 60 m, depth and size of drains were worked out for the two selected sites. The project was implemented using the specially suited PVC perforated and corrugated pipes for drainage purpose during 2013-'14 with a total cost of Rs. 94.00 lakh by taking farmers opinion and acceptance of SSD system. Nala cleaning and deepening was also taken up as a supportive measure to SSD Technology.
- The monitoring studies on performance of SSD system was carried out in terms of reduction in soil salinity, reduction in watertable and improvement in the economic status of the farmers.

After the reclamation of affected lands the farmers restarted cultivation with good confidence, yield levels of crops have increased tremendously and the farmers are happy leading to peaceful life with their families without any financial crises.

5. Key result/insight/interesting fact

1. Village : Mallapur, Taluka Sindhanur, District: Raichur

i. The soil pH of the study area reduced from 7.79 before SSD to 7.53 during post-drainage situation. Similarly, the soil salinity decreased significantly from 6.03 to 30.01 dS/m to 5.30-13.52 dS/m.

ii. The water table range of 0.61 to 0.68 m below ground level before SSD was lowered and maintained at 1.13 to 1.32 m in the post-drainage situation indicating significant improvement.

2. Village: Malla-B, Taluka:Surpur, District: Yadgiri

i. The soil reaction (pH) decreased from 7.98-9.36 before SSD to 7.79-8.98 post-SSD. Similarly, the initial soil salinity of 0.92 to 98.82 during pre-drainage reduced significantly to 0.73 to 86.78 after drainage.

ii. The water table before SSD ranged from 0.22-0.87 m bgl which significantly lowered to 0.70-1.11 m bgl during post-drainage conditions with maximum reduction in 40 m drain spacing.

In both cases, adoption of subsurface drainage system was found highly effective in reclamation of water logged and salt affected lands.

6. Impact

1. Village : Mallapur, Taluka Sindhanur, District: Raichur

i. The average paddy yield before SSD ranged from 22 to 27 q/ha that improved considerably from 48.5 to 58.4 q/ha after the installation of drains respectively in 60 and 40 m spacing.

ii. The annual cropping intensity increased from 98 to 171 per cent due to intervention of SSD.

iii. The BC ratio were 1.06, 1.17 and 1.26 respectively in 60, 50 and 40 m drain spacing.

Table. Economic feasibility of SSD in Mallapur, Taluka Sindhanur, District: Raichur

Spacing, m	Cost of installation, Rs ha^{-1}	Annual crop yield, q ha^{-1}	Total returns, Rs. ha^{-1}	NPV	B:C ratio	IRR (%)	Payback period (seasons)
40 m	62449	111	140955	239314	1.26	177	3
50 m	51644	101	128520	150534	1.17	117	4
60 m	43611	91.2	116115	58357	1.06	51	6

2. Village: Malla-B, Taluka:Surpur, District: Yadgirii.

i. The average paddy yield before SSD was 37.5 q/ha that improved considerably to 48.1 q/ha after the installation of drains. Similarly, the average cotton yield during pre-drainage was 13.57 q/ha that increased significantly to 19.26 q/ha during post-SSD situation.

ii. The annual cropping intensity increased from 25.12 per cent before SSD to 146.20 per cent due to intervention of SSD.

iii. The BC ratio under 40, 50 and 60m drain spacing were 1.26, 1.17 and 1.06 respectively.

Table 2. Economic feasibility of SSD in Malla B, Taluka Surpur, District: Yadgir

Total cost of cultivation, Rs. ha^{-1}	Total returns, Rs. ha^{-1}	Net returns, Rs ha-1	NPV, Rs ha^{-1}	BCR	IRR (%)	Payback period (seasons)
49061.28	73740.48	24679.19	155330.77	1.35	76	2
49061.28	73740.48	24679.19	165119.65	1.37	77	2
Total cost of cultivation, Rs. ha^{-1}	**Total returns, Rs. ha^{-1}**	**Net returns, Rs ha-1**	**NPV, Rs ha^{-1}**	**BCR**	**IRR (%)**	**Payback period**
49222.14	79575.00	30352.86	199842.78	1.45	139	1.6 ≈ 2
49222.14	79575.00	30352.86	226992.35	1.51	149	1.6 ≈ 2

In both cases, adoption of subsurface drainage system was found highly cost-effective even though the initial investment was high. In the years to come, the net returns would still improve considerably due to improvement in soil conditions of the lands.

7. Lessons Learned

The identification of problematic areas within the command area is in itself a challenging task, further taking the farmers consent for installation of SSD in their field was difficult task to convince them about the effectiveness of SSD system. The selection of suitable outlet position in the project area with a free fall of 30 cm. Once the SSD were installed and start functioning the farmers felt that the water would drained out of the area and the crop is affected by shortage of water, hence they had the tendency to block the outlet, which actually increases the reclamation period.

Farmer's interaction meeting were conducted where all their misconceptions about SSD were clarified. The farmers were involved in all the activities during the installation of SSD. Farmer's used to block the SSD during low rainfall period and during lean period of the canal flow. The farmers were advised to keep the outlets open soon after the release of water in the canals at least during the first season and block during critical stages of the crop.

For reclamation of large areas affected with salinity and water logging in TBP and UKP command area farmers cooperation would be taken first and to overcome the problem of blocking of outlets by the farmers, SSD drainage with variable head controlled mechanism would be incorporated as solution to this problem.

8. Supporting Quotes and Images

The farmers realised the cause of degradation of lands due to over irrigation and insufficient drainage. The farmers of the area having observed the dual menace of salinity and water logging and accepted the SSD Technology as a only solution for reclamation of degraded lands.

While interacting with the members of the of the water user's association following were the opinion evolved.

- Mis-use of soil and water leads to land degradation
- If the farmer care for the land and water, in-turn it supports the farmer in long run.
- Irrigation and drainage should work in hand in hand for sustainable agriculture.
- For efficient functioning of the SSD, annual maintenance works of SSD and the nala desilting works have to be taken up periodically by Water users association.

Surveys, samples, photographs

Pre and post-scenario of the study area were studied and the photographs are presented below.

Improvement in paddy crop due to installation of SSD at Mallapur

Improvement in cotton crop due to installation of SSD at B. Malla

Iteration with office bearer of water user association

9. Additional information

10. Checklist

Sl. No.	Question to consider	Yes	No
1	Is the story interesting to the target audience of the project/activity report?	Yes	
2	Does the story explain what new insights the project brings? What is the main lesson learned from this story? Does the story describe a key insight on what works and what doesn't and something that future project could build on	Yes	
3	Does the story describe the outcomes the project produced and the people who are benefitting? What changes–in skills, knowledge, attitude, practice, or policy–has the project brought, and who is benefitting from these changes?	Yes	
4	Does the story make a compelling point that people will remember? Does the story show how the project makes a difference to improving livelihoods and lessening poverty?	Yes	
5	Does the story provide an interesting fact that people will remember? For example, how much yields increased, how many hectares of land could become more productive from this innovation or technology?	Yes	
6	Does the story explain what kind of impact this innovation or technology could have if scaled up?	Yes	
7	Does the story show which partners contributed and how?		No
8	Does the story include quotes from Stackeholders or beneficiaries?	Yes	
9	Have I provided links to other media (journal articles, website news, newsletter, blogs, annual reports of other Programme/ project) that also feature this story?		No
10	Have I provided the contact details of people who can provide more information?	Yes	

11. Contact person for this story (name, position, email address)

Dr. B.S. Polisgoudar
Professor
Department of Soil and Water Engineering
College of Agricultural Engineering
University of Agricultural Sciences-Raichur
Raichur – 584104, Karnataka (India)
Phone (R): 08532-220244
Mobile (India): 9448570701
E-mail: polisgowdar61@yahoo.com, polisgowdar19361@gmail.com