



Theme 1 Status and trends of global soil nutrient budget



Nutrient management and crop establishment methods in paddy to improve productivity and income from salt-affected coastal soils: From a fallow land to a bountiful harvest

Gopal Ramdas Mahajan*, R Ramesh

ICAR – Central Coastal Agricultural Research Institute, Old Goa, Goa 403402, India

*Corresponding author: gopal.soil@gmail.com, gopal.mahajan@icar.gov.in

Introduction

- Soil salinity is one of the major abiotic stress posing constraint to agricultural production worldwide.
- The extent of salt-affected coastal soils in India is 1.23 million ha in coastal region (ICAR-CSSRI).
- In the coastal region of India, soil salinity due to the saline water ingress and intrusion poses a severe constraint to crop production leading to fallowing and abandonment of agriculture by the farmers.
- A two-year study was carried out on a 10-year fallow land with an aim to develop a strategy of nutrient management and crop establishment methods for the salt-tolerant rice varieties to improve the yield and income from these marginally productive soils.

Methods

- The experiment was laid out in the split-split-plot design. The nutrient management strategy was assigned as the main plot (Soil test based fertilizer recommendations, modified blanket recommendations, recommended dose of fertilizers, control), crop establishment method (broadcasting and transplanting) as the sub-plot and variety (Goa Dhan 1, Goa Dhan 2 and Goa Dhan 3) as the sub-sub-plot.

Results

- The effect of nutrient management strategy, crop establishment methods and variety were significant on the grain yield, straw yield, net income and benefit to cost ratio.

- A nutrient management strategy of soil test-based fertilizer recommendation or modified blanket recommendation ($120\text{-}30\text{-}00 \text{ kg N:P}_2\text{O}_5\text{:K}_2\text{O ha}^{-1}$) recorded a significantly higher grain yield, straw yield, net income and benefit to cost ratio compared to the control (without nutrient management) and farmers' fertilizer practice. The lowest values were observed in the control.
- Significantly higher grain (2.92 t ha^{-1}), straw yield (4.62 t ha^{-1}), net income (Rs. 35276/ha) and benefit to cost ratio (2.09) was achieved with the transplanting 35-days old Goa Bio-1, a talc-based bioformulation of *Bacillus methyllotrophicus* STC-4, nursery treated seedling than the broadcasting (2.41 t/ha , 3.08 t/ha , Rs. 28313/ha and 1.92).
- The variety, Goa Dhan 3, outperformed Goa Dhan 1 and Goa Dhan 2 with the highest grain yield (3.61 t/ha), net income (Rs. 49334/ha) and benefit to cost ratio (2.50).
- Though the grain yield of Goa Dhan 1 and Goa Dhan 2 was at par, the performance with respect to the net income and benefit to cost ratio of the order was observed as Goa Dhan 3 > Goa Dhan 2 > Goa Dhan 1.
- Thus, a package of the practice of transplanting of 35-days old Goa Bio 1 nursery treated seedlings of an improved salt-tolerant rice variety with improved nutrient management is the potential to increase the paddy productivity and income under salt-affected coastal soils.

Transfer of technology:

- A systematic transfer of technology through a consecutive two-year demonstration on a 29 ha land with 35 farmers revealed a 38% increase in the net annual income over the farmers' practice.
- The package identified in the study has the potential to generate an additional net income of about Rs. 22 crores by covering 18,000 hectares of salt-affected coastal soils in the state of Goa alone (Mahajan and Ramesh, 2022).

Conclusion

- Feeding the fallow land with appropriate nutrient management coupled with suitable crop establishment methods yielded a bountiful harvest of paddy and improved the income of the farmers providing scope for improved livelihood security.

Acknowledgements

- The authors gratefully acknowledge the financial support provided by the Indian Council of Agricultural Research, New Delhi, India, and ICAR-Central Coastal Agricultural Research Institute, Goa, India, for research activities.

References

- Mahajan GR, Ramesh R (2022) Improved crop establishment with goa bio-1 (a bio-formulation for plant growth promotion) in paddy cultivation under salt-affected soils of coastal regions for enhanced income. ICAR-CCARI Success Story 2022-1.



A fallow salt-affected field due to the salt-water intrusion



Field demonstration of the package of practice to improve the crop productivity and income of the farmers

