AN EVOLUTIONARY ECONOMICS APPROACH TO EVALUATION : GYPSUM BASED TECHNOLOGY FOR IMPROVEMENT OF ALKALINE SOILS

BY

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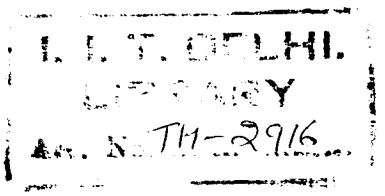

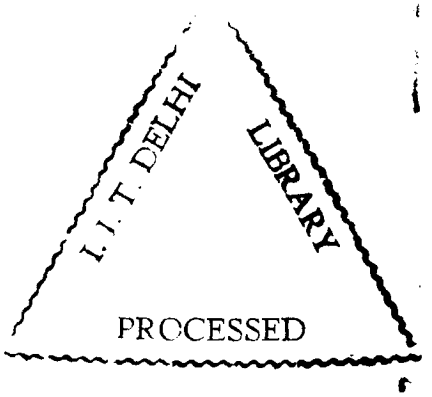

CERTIFICATE

This is to certify that the thesis entitled " *An Evolutionary Economics approach to Evaluation: Gypsum based technology for improvement of Alkaline soils'* being submitted by Mrs. Sunita Sangar to the Indian Institute of Technology, New Delhi, for the award of the Degree of Doctor of Philosophy, is a record of bonafide research work carried out by her.

Mrs. Sunita Sangar has worked under my guidance and supervision and has fulfilled the requirements for the submission of the thesis, which to my knowledge has reached the requisite standard.

The results carried in the thesis have not been submitted in part or full to any other University / Institute for the award of any degree or diploma.

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ABSTRACT

An evolutionary economics approach has been used for the evaluation of a technology. Gypsum based reclamation technology (GBT), an established successful technology for the reclamation of alkaline soils is evaluated for its impact on the reclamation / improvement of natural resources in Haryana / Karnal. GBT includes application of gypsum along with other agricultural practices, as part of the GBT package advocated for the reclamation of alkaline soils. Co-evolution of GBT along with input intensive agricultural technologies, which have resulted in natural resources exploitation (soil and water) are explored. This is from the research phase to the development and diffusion phase.

To evaluate impact of GBT on the reclamation / improvement of natural resources in Haryana / Karnal, an evolutionary economics approach has been used to explore the nature and extent of alkalinity in Haryana and the assessment of the technology generation, development and diffusion effort for GBT for crop production in alkaline soils. This framework emphasizes the historical, political and institutional variables as well as the economic forces that determine the evolution of this technology. The framework helps us to explore the evolution of GBT through the trajectory of technology generation, diffusion and adoption as there are many actors involved in the development process of GBT.

The study starts with a brief introduction (chapter 1) giving justification for the problem selected. Chapter 2 explains the analytical framework used in this study. It explores the need for a theoretical framework used to evaluate the GBT. This framework helps capture most of the interlinked and systemic processes operating in the generation, diffusion, adoption and impact of GBT for the improvement of alkaline soils. This is followed by chapter 3, dealing with the nature and extent of problem soils in India along with reclamation and management of these soils. It points towards a total lack of estimates for most categories of the problem soils. An overall neglect of natural resources research is also reflected through the organization of R&D system (mainly ICAR) responsible for these soils.

The overall picture of the organization of research on alkaline soils in Haryana has been done through the analysis of the structure, conduct and performance of research at CSSRI, Karnal, with its specific mandate of dealing with problem soils (saline and alkaline soils) (chapter 4). The variables used to analyse research direction at the institute include, research allocations, research content, human resources and publications in the institute. Chapter 5 describes the immensity of alkalinity problem in the Haryana State, which has little changed in the last two decades of reclamation effort. The State lacks awareness about the extent and specific processes of degradation. The co-evolution of intensive cultivation, resource degradation and GBT in Karnal district has been explored in chapter 6. GBT has been widely adopted in the district. Indicators of intensive agriculture and resource degradation in Karnal district brings out in detail the evidences of soil and water resources.

The organization and role of the extension system in Haryana, for the diffusion and adoption of GBT are explored in chapter 7. The adoption and perception of the farmers, perceptions of a few extension officers, and political economy of GBT explored through the case of repeat application of gypsum reveals the same production orientation even in a technology for the improvement of natural resources. There are few alternatives available within the policy framework imposed by the central Government, and carried out through the research system, the extension system and land development / reclamation bureaucracies. The farmer in his resources decision is absolutely dependent on them.

GBT has been very successful in increasing the yield of some favoured crops (rice and wheat), which have contributed to the food basket of the country, but GBT as a technology for the improvement of degraded natural resource is not to be rated as success. The success of GBT is more of a success of the institutions / organizations around it, their relationships, favourable policies, rather than success of the technology as such. The production based paradigm of agricultural policies have percolated to the adoption system (farmers) through the research as well as the extension system. All this leads to impending threats on the sustainability of natural resources in the State.

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