

# 21SSAC321 PROBLEMATIC SOILS AND THEIR MANAGEMENT

Hours Per Week :

L	T	P	C
1	-	2	2

Total Hours :

L	T	P
15	-	30



Source:

<https://images.app.goo.gl/4jv2em4AAYqnpXJ6A>

## Course Description and Objectives:

This course impart knowledge on the identification and understanding of processes contributing to formation of problematic soils and their reclamation for crop production

## Course Outcomes:

Upon completion of the course, the student will be able to achieve the following outcomes:

COs	Course Outcomes
1	Demonstrate fundamental knowledge to identify problematic soils and associated problems
2	Identify problematic soils and understand the process contributing to their development leading to deterioration of physical and chemical properties of soils
3	Knowledge about methods for reclamation of problematic soils and the management practices those are required for sustainable use of soil resources

## SKILLS:

- ✓ *Identify problematic soils based on their chemical and physical properties*
- ✓ *Estimation of micro and macro nutrients in soils*
- ✓ *Suggest management practices to reclamation of problematic soils*
- ✓ *Analyse reason for formation of problematic soils*

**ACTIVITIES:**

- o Visit problematic soil fields and collect samples
- o Determination of soil pH and EC
- o Quantification of gypsum requirement of alkali soils and lime requirement of acid soils, estimation of calcium carbonate content in soils
- o Water quality assessment by checking pH, EC, alkalinity, chlorides, SA and RSC

**UNIT - 1**

**Introduction to problem soils:** Soil quality and health; Assessment of soil quality; indicators of soil quality; Land suitability classification; Types and distribution of problem soils in India; Characteristics of saline and alkaline/sodic soil; Acid and acid sulphate soils; eroded and degraded soils; compacted soils; flooded and polluted soils

**UNIT - 2**

**Reclamation and management of problem soils:** Mechanical, hydrological, chemical and physical methods of reclamation and management of problem soils; Gypsum and lime requirements of soils

**UNIT - 3**

**Irrigation water:** Water quality and standards; Classification based on different criteria; utilization of saline water in agriculture; Salt balance under irrigation; Relationship between water use and crop productivity

**UNIT - 4**

**Remote sensing and GIS:** Introduction to GIS and remote sensing; Application of remote sensing techniques to land use surveys; mapping and evaluation of variability, developing watershed management plans, diagnosis and management of problem soils; Crop damage assessment

**UNIT - 5**

**Bio remediation:** In situ bioremediation approaches to clean soils, Advantages and limitations of phytoremediation, biostimulation and bioaugmentation strategies, bioremediation through multipurpose tree species and soil fauna, vermicompost, biochar, and earthworms as complementary strategies, methodologies to evaluate bioremediation effectiveness

**LABORATORY EXPERIMENTS****LIST OF EXPERIMENTS**

1. Field identification of problematic soils and visit to degraded lands
2. Determination of infiltration rates of soils
3. Determination of aggregate stability of sodic soils
4. Diagnosis and evaluation of acidic, saline and sodic soils
5. Determination of GR of sodic soils
6. Determination of LR of acid soils.
7. Determination of lime content ( $\text{CaCO}_3$ ) of calcareous soil
8. Determination of pH and EC of irrigation water and evaluation of its suitability for irrigation
9. Determination of anions ( $\text{CO}_3$ ,  $\text{HCO}_3$ , sulphate and chlorides) in irrigation water
10. Determination of cations (Ca, Mg and Na) in irrigation water
11. Computation of quality class, RSC and SAR of irrigation water
12. Evaluation and interpretation of analytical data of problematic soils and suggesting ameliorating practices
13. Introduction GIS and mapping
14. Collecting data using GPS and mapping
15. Assessing biological activity in soils

**REFERENCES:**

1. Indian Society of Soil Science. 2012. *Fundamentals of Soil Science*, IARI, New Delhi
2. Das, D. K. 2015. *Introductory Soil Science*. 4<sup>th</sup> Edition, Kalyani publishers, New Delhi
3. Soils of Andhra Pradesh, Monograph of I.V. Subbarao