

AGT-855	Water Quality Management	<u>3(3-0)</u>
----------------	---------------------------------	----------------------

Outcomes

Upon successful completion of the course, the student will be able to:

- Irrigation and drainage water quality, water quality terminology, water treatment.
- Characteristics, quality of drainage water, alternates for disposal of drainage water drainage water reuse techniques, chemical management techniques.
- Methods to use different water quality for different types and crop to enhance agricultural productivity.

Contents

1. Introduction

- a. Definition and concepts
- b. Irrigation and drainage water quality,
- c. water quality terminology,
- d. water quality objectives, quality criteria and standards for irrigation water
- e. water quality status in Pakistan.

2. Water Composition and Salinity Measurement

- a. Units of Concentration
- b. Irrigation water Composition and Salinization
- c. Electrical Conductivity
- d. Measuring Soil Salinity

3. Water treatment

- a. Water pollution and their sources
- b. Water treatment techniques (. coagulation, softening, mixing and flocculation, sedimentation, filtration etc.

4. Plant Response to Salinity and Crop Tolerance

- a. How plants respond to salts
- b. Crop Salt Tolerance
- c. Sodium and Chloride Toxicity in Crops

- d. Salt Accumulation, Boron Toxicity and Crop Tolerance
- e. Combined Effects of Salinity and Boron
- f. Salinity-Fertility relationship

5. Sodicity and Water Infiltration

- a. Estimating the Sodium Adsorption ratio
- b. How Water Quality Affects Infiltration

6. Drainage Effluents and Management Techniques

- a. Sources of drainage water
- b. Quality of drainage water,
- c. Alternates for disposal of drainage water drainage water reuse technique
- d. Crop management, soil management, chemical management techniques,

7. Agricultural chemicals and Groundwater Contamination

- a. Agricultural chemical, their uses, trends and properties
- b. concept of nitrate nitrogen and pesticides transport; through the soils
- c. Behavior of agricultural chemicals in flooded/water logged soils,.
- d. Management practices to avoid groundwater contamination

8. Assessing Water Quality and Soil Sampling

- a. Assessing the Suitability of Water for Irrigation
- b. Soil sampling

9. Soil Salinity Patterns and Irrigation Methods

- a. Salt Movement and Distribution with Depth in Soil
- b. Salt Distribution under different Irrigation Systems (Drip, furrow, sprinkler etc)
- c. Upward flow of Saline Shallow Groundwater

10. Managing Salinity and Reclaiming Soil

- a. Crop Response to Leaching and Salt Distribution
- b. Maintenance Leaching, Reclaiming Leaching, Leaching under Saline Shallow Water Tables
- c. Irrigation with Saline Water
- d. Irrigation Frequency, Salinity, Evapotranspiration and Yield

Suggested Reading:

1. Hanson, B.R., Grattan, S.R., and A. Fulton, 2006. Agricultural Salinity and Drainage, Division of Agriculture and Natural Resources Publication, 3375, University of California Irrigation Program University of California, Davis, USA.
2. Ruth, F. W. 2007. Environmental Engineering, Elsevier, New Delhi, India.
3. Tyagi, O.D. and M. Mehar, 1990. Environmental Chemistry, Report No.103. Agriculture and groundwater quality. Form Council for Agricultural Science and Technology, USA.