

SEP 06 2000

Grande Prairie Regional College
Department of Science and Technology

FOREST SOILS & HYDROLOGY FO 2130 3(3-0-3)

Fall 1999

Instructor: Anwar-ul-Haq

Lecture Tuesday and Thursday 6:00-7:20 P.M.

Textbooks Pritchett, W.L. and R.F. Fisher. 1987. Properties and Management Of Forest Soils, 2nd ed. John Wiley & Sons, New York.

Hewlett, J.D. 1982. Principles of Forest Hydrology. The University of Georgia Press, Athens, GA

COURSE OUTLINE

PART 1. Formation of Forest soils and ecological Classification

1. Forest floor and forest soils
 - 1.1 Forest floor classification
 - 1.2 Formation of forest floor (litter fall and decomposition)
 - 1.3 Overview on organic matter study methods
 - 1.4 Podzolization and Podzolic soils
 - 1.5 Forest soils in Alberta
2. Ecological classification and land capacity
 - 2.1 Land capacity classification
 - 2.2 Site description
 - 2.3 Ecological classification of forest soils

PART 2. Chemical and Biological Processes

3. Chemical process
 - 3.1 Acidity and acidification in forest soils
 - 3.2 Diffuse-double-layer (DDL) theory and cation retention
 - 3.3 Anion sorption, phosphate fixation and the fate of phosphate fertilizers
4. Ecology of organisms in forest soils
 - 4.1 Overview on organism world in forests
 - 4.2 Biochemical pathways of forest litter decomposition
 - 4.3 Microbial-plant interactions

PART 4. Tree Nutrition and Soil fertility

5. Tree nutrition and nutrient cycling
 - 5.1 Root systems
 - 5.2 Movement of nutrients to plant roots
 - 5.3 Nutrient uptake by trees
 - 5.4 Geochemical nutrient cycling
 - 5.5 Biological nutrient cycling
6. Fertilization

- 6.1 Forest nutrition assessment
- 6.2 Principles of fertilization
- 6.3 Fertilizers and fertilizer application
- 6.4 Effects of fertilizers
- 6.5 Use of wastewater and sludge as fertilizers
- 6.6 Economics analyses

PART 4. Forest Soil Management

7. Soils and Silviculture

- 7.1 Harvesting and nutrient cycling
- 7.2 Effects of land cleaning and site preparation
- 7.3 Soils and species selection
- 7.4 Nutrition management (including symbiotic N-fixation)

8. Management of nursery soils

- 11.1 Site selection
- 11.2 Soil management for nursery
- 11.3 Christmas trees and seed orchards

9. Fire-affected soils and management

- 8.1 Effects of fire on soil properties
- 8.2 Effects of fire on water quality
- 8.3 Management implications

10. Management of problem soils and Land reclamation

- 10.1 Aforestation and reforestation sites
- 10.2 Reclamation of land to forest (reforestation)

11. Soil erosion and control

- 11.1 Definitions
- 11.2 Factors affecting soil erosion
- 11.3 Prediction (USLE) and measurement of soil erosion
- 11.4 Control and prevention

12. Environmental problems in forest ecosystems

- 12.1 Water quality (definition and parameters)
- 12.2 Soil quality
- 12.3 Effects of land management practices on soil and water quality

PART 5. Forest Hydrology

13. Engineering properties of soils

14. Introduction to hydrology

14.1 Definitions

14.2 Water and energy balance

14.3 Drainage basin morphology

15. Water budget

15.1 Atmospheric water and precipitation

15.2 Subsurface water

15.3 Evaporation and evapotranspiration

15.4 Surface water and water yield

COURSE EVALUATION

	Quantity	Weighting
Assignments	3	15
Labs including a lab exam	10	20
Presentation	1	05
Mid term exam	1	20
Final exam	1	40
Total		100