

Water Science and Technology Library

DROUGHT MANAGEMENT ON FARMLAND

by

J.S. Whitmore



TABLE OF CONTENTS

PREFACE.....	ix
INTRODUCTION.....	1
CHAPTER 1 - DROUGHT CONCEPTS AND CHARACTERISTICS.....	4
Drought Definitions and Criteria.....	4
Types of Drought.....	7
Misconceptions.....	9
Relationship between Drought and Sustainable Agriculture.....	11
CHAPTER 2 - PRINCIPLES OF DROUGHT RISK MANAGEMENT.....	13
Introduction.....	13
Risk Assessment.....	14
The Law of Limiting Factors as a Risk Assessment and Management Tool.....	16
Risk Management Planning.....	16
The Joseph Principle.....	18
CHAPTER 3 - SOIL MANAGEMENT IN RELATION TO DROUGHT.....	21
Relevant Soil Physical Properties.....	21
Water Relations of Soils.....	23
Soil, Water and Plant Interactions.....	27
Curbing Evaporation of Soil Moisture.....	31
CHAPTER 4 - SOIL CULTIVATION AND TILLAGE IN DROUGHT-PRONE AREAS.....	36
Cultivation Methods.....	36
Tillage Practices.....	43
CHAPTER 5 - PLANT RESPONSES TO DROUGHT.....	49
Regulatory Functions of Leaves during Drought.....	49
The Regulatory Role of Roots.....	51
Attempts to Curb Moisture lost by Transpiration.....	53
Water Use Efficiency and the Harvest Index.....	56
Drought Evasion.....	58
Drought Avoidance.....	60
Drought Resistance.....	61
Weed Competition.....	62
CHAPTER 6 - CROPPING SYSTEMS FOR MOISTURE ECONOMY.....	64
Types of Cropping System.....	64
Planting Practices.....	72
Integrated Cropping.....	75
CHAPTER 7 - HARDY AND DROUGHT-EVASIVE CEREAL CROPS.....	79
Small Grain Cereals.....	79
Coarse grained Cereal.....	90
CHAPTER 8 - EDIBLE LEGUMES FOR DROUGHT-PRONE REGIONS.....	98
CHAPTER 9 - VEGETABLES FOR DROUGHT-PRONE AREAS.....	106
CHAPTER 10 - DROUGHT-HARDY OIL-PRODUCING CROPS.....	112
CHAPTER 11- ROOT, TUBER AND FIBRE CROPS.....	120
Root and Tuber Crops.....	120
Fibre Crops.....	124
CHAPTER 12 - DECIDUOUS AND BERRY FRUITS.....	128
Deciduous Fruit.....	128
Berry Fruits.....	136
CHAPTER 13 - FAIRLY DROUGHT-TOLERANT CITRUS, SUBTROPICAL AND TROPICAL FRUITS.....	140

CHAPTER 14 - NUTS	151
CHAPTER 15 - MISCELLANEOUS CROPS	155
CHAPTER 16 - WATER STORAGE ON FARMS	167
Types of Reservoir	167
Curbing Seepage Loss	173
CHAPTER 17 - CURBING EVAPORATIVE LOSS OF STORED WATER	176
Methods	177
CHAPTER 18 - WATER HARVESTING	186
CHAPTER 19 - IRRIGATION SCHEDULING	199
Crop Monitoring	200
Monitoring Soil Moisture	201
Weather Monitoring	205
CHAPTER 20 - IRRIGATION SYSTEMS AND EFFICIENCY	208
Irrigation Systems	208
Irrigation Efficiency	216
CHAPTER 21 - IRRIGATION METHODS	221
Mechanized Systems	230
CHAPTER 22 - TAPPING AUXILIARY GROUNDWATER	235
CHAPTER 23 - SALINITY	242
Introduction	242
Methods of Irrigating with Saline Water	248
Summary	250
CHAPTER 24 - FORAGE GRASSES FOR DROUGHT-PRONE AREAS	252
CHAPTER 25 - FORAGE LEGUMES FOR DROUGHTY AREAS	275
CHAPTER 26 - RANGELAND MANAGEMENT FOR GREATER STABILITY	288
CHAPTER 27 - LIVESTOCK MANAGEMENT DURING DROUGHT	302
Phase I - Predrought Management	302
Phase II - Short Drought, and the Early Stage of Long Drought	304
Phase III - Progressive Drought	306
Fodder Banks	319
Stock Watering	322
Other Useful Animals for Drought-prone Areas	326
CHAPTER 28 - SOME USEFUL HARDY TREES	328
CHAPTER 29 - SOME CARDINAL PRINCIPLES OF DROUGHT MANAGEMENT ON FARMLAND	339
CHAPTER 30 - SUMMARY:	
SOME KEY DROUGHT MANAGEMENT STRATEGIES AND TACTICS	341
Water	341
Soil	342
Crops	343
Irrigation (see also Water)	344
Grazing Management	345
Livestock	346
SELECTED BIBLIOGRAPHY	348
INDEX	354