Regeneration of Plants in Arid Ecosystems
Resulting from Patch Disturbance

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Regeneration of Plants in Arid Ecosystems Resulting from Patch Disturbance

by

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TABLE OF CONTENTS

PREFACE	xiii
ACKNOWLEDGMENTS	xv
CHAPTER 1. THE DESERT BIOME	1
1.1. The Negev Desert of Israel: location, rains and phytogeographic regions	1
1.1.1. SHRUBS AND ANNUALS	6
1.1.2. GEOPHYTES AND HEMICRYPTOPHYTES (PERENNIAL PLANTS)	7
1.1.3. ANNUAL PLANTS	9
1.1.4. PORCUPINES IN THE NEGEV DESERT AND THE KAROO DESERTS OF SOUTH AFRICA	10
1.1.5. THE INFLUENCE OF IBEX WALLOWS ON THE VEGETATION	11
1.2 Amounts and distribution of rain in the Negev Desert highlands	11
1.3. Rains and runoff water	12
1.3.1 RAIN AND WATER INFILTRATION IN THE SOIL	12
1.3.2. DESERT CRYPTOGAMIC CRUST, RUNOFF WATER AND SOIL EROSION	14
1.3.3. SLOPE ANGLE AND RUNOFF	15
1.3.4. DEPRESSIONS, MICRO-TOPOGRAPHY, RUNOFF, SEED ACCUMULATION AND SEED GERMINATION	15
1.4. Evaporation rates, relative humidity and dew	16
1.5. Seasonal temperatures	17
1.6. The temperature on the soil surface and in depressions as a regulator for post maturation and germination of seeds	17
1.7. Temperatures on the soil surface and in simulated porcupine diggings during the year	18
1.7.1. THE LOCATIONS OF THE MICRO SENSORS	18
1.7.2. TEMPERATURES DURING DAYS WITH RAIN	18
1.7.2.1. <i>Temperatures in the digging in comparison with the soil surface (locations 1 & 2) during a day with rain and one day later.</i>	19
1.7.2.2. <i>Temperatures in the diggings and in soil 10 cm below the soil surface (Locations 2 & 4)</i>	20
1.7.2.3. <i>Temperatures on soil surface and southern slope (Locations 1 & 3)</i>	20
1.7.3. TEMPERATURES ON A HOT DAY ("HAMSIN")	20
1.7.3.1. <i>Temperatures on the matrix in comparison with in the digging (Locations 1 & 2).</i>	20
1.7.3.2. <i>Temperatures in the diggings and in soil 10 cm below the soil surface (Locations 2 & 4)</i>	21

1.7.3.3. <i>Temperatures on soil surface and southern slope</i> <i>(Locations 1 & 3)</i>	21
1.7.4 . SOIL TEMPERATURES DURING THE HOT PERIOD OF THE YEAR	21
1.7.4.1. <i>Temperatures on the matrix in comparison with in the</i> <i>digging (Locations 1 & 2).</i>	21
1.7.4.2. <i>Temperatures in the diggings and in soil 10 cm below the</i> <i>soil surface (Locations 2 & 4)</i>	24
1.7.4.3. <i>Temperatures on the soil surface and southern slope</i> <i>(Locations 1 &3)</i>	24
1.7.5. SOIL TEMPERATURES DURING THE SHORTEST DAY	24
1.7.6. TEMPERATURES AT TIME OF FIRST EFFICIENT RAINFALL IN 1996/1997 SEASON	26
1.8. Evaporation rates, temperatures and minimum amounts of rain for germination	26
1.9. The dynamics of depression filling by soil particles in different habitats	29
1.10. Influence of the filling of the diggings by soil and organic matter on water and seed accumulation, seed germination and seedling establishment.	29
1.11. Depressions as wind traps for the accumulation of organic matter and seeds. The 'treasure' effect.....	31
1.12. Strategies of seed dispersal and the efficiency of the strategy of mucilaginous seeds of some common annuals of the Negev that adhere to the soil crust to delay collection by ants	32
1.13. Porcupine diggings and their influences on the vegetation in the Negev Desert highlands	36
1.14. Ibex wallows and their influences on the annual vegetation in the Negev Desert	37
1.15. Hazeva Research Area	38
1.16. Small animal disturbances	39
1.17. Ant disturbances	39
1.18. Isopods (<i>Hemilepistus reaumuri</i>) and porcupine diggings as a source of erodible soil	39
1.19. Footprints in muddy loess as long term depressions	40
1.20 Main habitats of the Central Negev and their influence on vegetation and porcupine activity	40
1.21. Inter-relations and ecological significance of diggings and open burrow systems	41
1.21.1. DIGGINGS.....	41
1.21.2. ECOLOGY AND OPEN BURROW SYSTEMS IN DESERTS AND ARID ENVIRONMENTS	43
 CHAPTER 2. DIGGINGS AND CONSUMPTION OF SUBTERRANEAN PLANT ORGANS.....	43
2.1 . The porcupine and its habitat	43

2.2. The influences of porcupine activity on species of geophytes and hemicryptophytes	43
2.2.1. PLANTS THAT ARE DESTROYED BY PORCUPINE CONSUMPTION AND RENEWED BY SEED GERMINATION IN THE PORCUPINE DIGGING (GROUP 1).....	52
2.2.1.1. <i>Colchicum tunicatum</i>	52
2.2.1.2. <i>Bellevialia desertorum</i>	61
2.2.1.3. <i>Erodium crassifolium</i>	65
2.2.2. PLANT SPECIES PARTIALLY CONSUMED THAT ARE RENEWED VEGETATIVELY IN THE PORCUPINE DIGGING (GROUP 2)	68
2.2.2.1. <i>Bellevialia eigii</i>	69
2.2.2.2. <i>Tulipa systola</i>	72
2.2.2.3. <i>Malabaila secacul</i>	75
2.2.2.4. <i>Scorzonera papposa</i>	78
2.2.2.5. <i>Leontice leontopetalum</i>	80
2.2.3. PLANTS OCCASIONALLY TOTALLY CONSUMED AND RENEWED BY SEED GERMINATION IN PORCUPINE DIGGINGS (GROUP 3).....	80
2.2.3.1. <i>Tulipa polychroma</i>	80
2.2.3.2. <i>Allium rothii</i>	81
2.2.3.3. <i>Gynandriris sisyrinchium</i>	82
2.2.4. PLANTS OCCASIONALLY PARTIALLY CONSUMED AND RENEWED IN DIGGINGS (GROUP 4).	83
2.2.4.1. <i>Urginea undulata</i>	83
2.2.4.2. <i>Asphodelus ramosus</i>	83
2.2.4.3. <i>Anemone coronaria</i>	83
2.2.5. PLANT SPECIES RARELY CONSUMED AND VERY FEW OF THEM FOUND IN PORCUPINE DIGGINGS (GROUP 5)	84
2.2.5.1. <i>Scilla hanburyi</i>	84
2.2.5.2. <i>Narcissus tazetta</i>	84
2.2.5.3. <i>Sternbergia clusiana</i>	87
2.2.5.4. <i>Colchicum richii</i>	90
2.2.6. PLANT SPECIES FOUND IN PORCUPINE DIGGINGS BUT NOT YET OBSERVED AS BEING CONSUMED BY PORCUPINES	91
2.2.6.1. <i>Ixiolirion tataricum</i>	91
2.2.6.2. <i>Eryngium creticum</i>	93
2.2.6.3. <i>Ranunculus asiaticus</i>	93
2.2.6.4. <i>Crocus damascenus</i>	93
2.2.6.5. <i>Iris regis-uzziae</i>	93
2.2.6.6. <i>Allium pallens</i>	94
2.2.6.7. <i>Ornithogalum trichophyllum</i>	94
2.2.6.8. <i>Ornithogalum narbonense</i>	95
2.2.6.9. <i>Leopoldia longipes</i>	95

2.2.7. SEASONS IN WHICH THE SUBTERRANEAN ORGANS OF DIFFERENT GEOPHYTES AND HEMICRYPTOPHYTES ARE CONSUMED AND REAPPEAR IN THE DIGGINGS	95
2.2.7.1. <i>Group 1</i>	96
2.2.7.2. <i>Group 2</i>	97
2.2.7.3. <i>Group 3</i>	97
2.2.7.4. <i>Groups 4 and 5</i>	97
2.2.8. HABITAT AND SITE DISTRIBUTION OF GEOPHYTES	97
2.2.9. STRATEGIES OF CONSUMPTION: THE PERCENTAGE OF PORCUPINE DIGGINGS AND PLANT CONSUMPTION IN PATCHES OF DIFFERENT SPECIES OF GEOPHYTES AND HEMICRYPTOPHYTES	98
2.2.10. THE DYNAMICS OF FILLING-IN OF DIGGINGS	99
2.2.10.1. <i>Long term filling-in</i>	100
2.2.10.2. <i>Intermediate term filling-in</i>	100
2.2.10.3. <i>Short term filling-in</i>	101
2.2.11. DIGGINGS, FILLING-IN AND THEIR INFLUENCE ON THE VEGETATION	101
2.3. Porcupines and the damage they cause to agricultural crops in desert areas	102
2.4. The digging of the African porcupine in deserts	102
2.5. Gazelles dig for geophytes	102
2.6 . Ibex wallows	104
2.7. Sand partridges and geophyte consumption	104
2.8. Subterranean herbivorous rodent activity and its influence on geophytes	104
2.9 The ecological interrelations between porcupine consumption strategies and the survival of geophytes and hemicryptophytes in the Negev Desert highlands	105
 CHAPTER 3. ANNUALS IN PORCUPINE DIGGINGS AND IBEX WALLOWS IN THE NEGEV DESERT HIGHLANDS	107
3.1. The annual plant species and their occurrence	107
3.2. Annuals and perennials in the Negev Desert environment	109
3.2.1. PERENNIALS AND THE NEGEV DESERT ENVIRONMENT	109
3.2.2. LIFE FORM DIVERSITY AND RAIN AMOUNTS	109
3.2.3. ANNUALS OCCURRING IN SMALL DEPRESSIONS	109
3.3. Depressions as micro-habitats in a desert biome	110
3.3.1. DEPRESSIONS AS SEED TRAPS	110
3.3.1.1. <i>The shape, depth and direction of digging</i>	113
3.3.1.2. <i>Distances between diggings and patches</i>	114
3.3.1.3. <i>The structure of the bottom of the digging, plant remnants and orientation</i>	114
3.3.1.4. <i>Influence of the topography and the plant or stone cover near the digging</i>	114
3.3.1.5. <i>Protected aerial and soil seed banks located in the diggings</i>	114
3.3.2. THE WATER CONTENT IN DIGGINGS AND THE OCCURRENCE OF ANNUALS	117

3.3.3. TOPOGRAPHY, LOCATIONS AND SEEDLING NUMBERS	119
3.3.3.1. <i>General events</i>	119
3.3.3.2 <i>Particular plant species diversity in diggings in comparison with the matrix</i>	119
3.3.4. DIGGINGS AS FAVOURABLE MICRO-HABITATS FOR ANNUALS	120
3.4. Digging depth, shape, topography, location and habitat, the species that are consumed and the emergence of annuals	122
3.5. The succession of annual plants in porcupine diggings - a system of disturbance and the stages of recovery	124
3.5.1. CHANGES IN ANNUAL PLANT NUMBERS PER UNIT AREA IN THE DIGGINGS	125
3.5.2 CHANGES IN PLANT BIOMASS	128
3.5.3. PLANT COMPETITION AND CHANGES IN SEED YIELD	129
3.5.4. CHANGES IN SPECIES DIVERSITY	129
3.5.5. CHANGES IN PLANT SPECIES DOMINANCE	129
3.6. Density of annuals and species diversity in porcupine diggings along a watershed according to runoff water gradients	130
3.7. The influences of four artificial digging densities and slope directions on annual plant density in three growing seasons	137
3.7.1. ESTIMATE OF SEED NUMBERS IN A DIGGING	137
3.7.2. PLANT DENSITY	138
3.7.3. PLANT BIOMASS	139
3.7.4. EFFECT ON BIOMASS OF SLOPE DIRECTION AND POSITION OF DIGGING IN A PATCH	139
3.7.5. SLOPE DIRECTION AND FREQUENCY OF OCCURRENCE OF ANNUAL PLANT SPECIES IN DIGGINGS AND ON THE MATRIX IN DIFFERENT YEARS	140
3.7.5.1. <i>On Loess soil</i>	140
3.7.5.2. <i>On stabilized sand</i>	141
3.8. The influence of depressions made by ibex on the annual vegetation along cliffs of the Zin valley in the Negev Desert highlands.	143
3.9. Footprints in muddy soil as favourable micro-habitats for annuals in deserts	152
3.10. Environmental influences on life cycles and survival strategies of annual plant species	156
3.10.1. FLOWERING STRATEGIES OF SOME WINTER ANNUALS	156
3.10.1.1. <i>Daylength, flowering time and life span of facultative long-day plants for flowering</i>	156
3.10.1.2. <i>Soil water content and life span of day-neutral plants for flowering</i>	157
3.10.2. PHENOTYPIC PLASTICITY EFFECTS ON GERMINATION DURING SEED DEVELOPMENT AND MATURATION	157
3.10.2.1. <i>Daylength influences</i>	157
3.10.2.2. <i>Position effect</i>	158

3.10.3. SEED POST MATURATION TEMPERATURES ON THE SOIL SURFACE OR IN DEPRESSIONS, AND THE REGULATION OF GERMINATION DURING THE HOT AND DRY SUMMERS	166
3.10.4. SEED DISPERSAL STRATEGIES AND MASSIVE SEED CONSUMPTION IN DESERTS	169
3.10.4.1. Subterranean synaptospermic protected inflorescences or propagules and germination in situ.	174
3.10.4.2. Serotinous seed dispersal strategy.....	175
3.10.4.3. Dispersal of free mucilaginous seeds and single seed protection in lignified beak	179
3.10.4.4. Mucilaginous seeds that float into depressions	180
3.10.4.5. Aerial seed bank with serotiny protection strategy followed by soil seed bank with escape strategy.....	185
3.10.4.6. The decrease in the "treasure effect" by local protected seed banks in depressions	186
3.10.4.7. Synaptospermic seed protection strategies by lignified dispersal units or inflorescences on lignified dry plants	186
3.10.4.8. 'Escape' seed dispersal strategies and mechanisms of plant species producing large numbers of dust-like seeds.....	187
3.10.4.9. 'Escape' seed dispersal of plant species producing tiny mucilaginous seeds that are dispersed by wind.	190
3.10.5. SEED GERMINATION, DIGGINGS AND DEPRESSIONS AS MICRO SITES	190
3.10.5.1. Water and germination.....	191
3.10.5.2. Temperatures and germination of annuals in depressions.....	191
3.10.5.3. The temperatures during the season with rain and the germination of annuals in the Negev Desert highlands.....	192
3.10.5.4. Light, seed cover-over and germination.....	192
3.10.5.5. Light inhibition of germination and regulation of the germination by the time of the beginning of seed wetting by rain that engenders germination.....	193
3.10.5.6. Slow germinating seeds	194
3.10.5.7. Fast germinating seeds.....	194
3.10.5.8. Intermediate time of seed germination	194
3.10.6. SEEDLING DROUGHT TOLERANCE	195
3.11. Biopedturbation in deserts.....	196

CHAPTER 4. EFFECTS OF HUMAN MADE DISTURBANCES AND AGRICULTURE ON FLOOD AND RUNOFF WATER IN THE NEGEV	199
4.1. Influences of human-made disturbances in the soil on annuals in the Negev Desert	199
4.2. Human made pits and mounds, and desert plant communities	199
4.2.1. THE SOIL WATER CONTENT OF THE PITS, MOUNDS AND MATRIX.....	201
4.2.2. PLANT DENSITY	201

4.2.3. PLANT SPECIES DIVERSITY	202
4.2.4. PLANT BIOMASS	202
4.2.5. PROPAGULE SIZE AND PLANT APPEARANCE	204
4.2.6. CHANGES IN NUMBER OF PLANT SPECIES OVER SEVERAL YEARS	204
4.2.6.1. <i>The amount of seasonal rain and number of plant species in pits, mounds and matrix</i>	206
4.2.6.2. <i>Plant density affected by colonization during the previous year</i>	206
4.2.6.3. <i>Seed dispersal strategies and plant occurrence</i>	206
4.2.7. CONCLUSION	206
4.3. From small depressions to runoff agriculture using flood and runoff water in the Negev	206
4.3.1. PREHISTORIC BACKGROUND	207
4.3.2. ANCIENT TERRACES IN WADIS USING FLOOD WATER FOR AGRICULTURE	208
4.3.3. FLOOD AND RUNOFF AGRICULTURE	209
4.3.4. RUNOFF WATER AGRICULTURE IN MACRO-CATCHMENTS IN ANCIENT NABATEAN FAMILY FARMS IN WIDE VALLEYS	209
4.3.5. RUNOFF AGRICULTURE ON MODERATE LOESSIAL HILL SLOPES IN MICRO-CATCHMENTS (NEGARIN)	210
4.3.6. FLOOD WATER AGRICULTURE IN VALLEYS ALONG WADI BANKS USING BY-PASS CHANNELS FROM THE WADI	213
4.3.7. CONCLUSION	213
REFERENCES	217
PLANT INDEX	233
SUBJECT INDEX	237
ANIMALS AND INSECT INDEX	243

REGENERATION OF PLANTS IN ARID ECOSYSTEMS RESULTING FROM PATCH DISTURBANCE

Yitzhak Gutterman

PREFACE

At the beginning of this study in the Negev Desert highlands, the impression was that the massive consumption of geophytes and hemicryptophytes by porcupines may destroy some of the most preferred plant species that porcupines totally consume, such as *Colchicum tunicatum*, *Bellevalia desertorum* and *Erodium crassifolium*. After about 23 years of field studies it was found that porcupines consume only 20 to 25% of the patches of these plant species per year. The diggings that remain are favourable habitats for the renewal, and even increase in numbers, of these plant species from seed germination and then also by vegetative propagation, as in *Colchicum tunicatum*.

Another consumption strategy increases the number of plants that are partially consumed. As much as 90 to 100% of such plant species in a patch may be partially consumed but all of them are renewed during the following season with rain from the plant parts that remain below the bottom of the digging. Examples of such plants are *Bellevalia eigii* and *Scorzonera papposa*, and up to seven plants may occur in one digging.

By digging for subterranean storage organs of geophytes or hemicryptophytes to consume, porcupines create diggings and depressions that may last for many years, even for more than 25 years in some habitats. These become favourable microhabitats for geophytes and hemicryptophytes. Annual plant species also occur in great numbers in such diggings and produce far more biomass and seeds than the annuals on the matrix in such deserts. Many other animals and insects cause depressions in which annuals also settle.

On desert soils covered with soil crusts, the water infiltration rate into the soil is reduced. When the rain intensity is higher than the water infiltration rate into the soil, runoff water starts to flow along the soil surface. Even a small rainfall of about 7 mm may cause runoff water along hill slopes. If there are depressions on the soil surface runoff water may fill them up.

The result of rain infiltration into the soil after such a rainfall is the equivalent of only a few mm on the matrix whereas in 25 cm deep depressions the equivalent of 250 mm of rain accumulates. The more arid the region, under the more extreme desert conditions, the smaller the annual rainfall and the more pronounced the influences on the vegetation of this very large difference in water distribution.

The phenomenon of runoff water in deserts was used for the runoff agriculture for hundreds of years. Runoff water of one flood that accumulates and covers an area with a 30 cm deep layer of water may wet the deep soil to a depth of 3 m. This may keep a tree alive for 1.5 years without an additional water supply.

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The Author