# Soil Management to Conserve Water


Mario Lanthier
CropHealth Advising & Research
Kelowna, B.C. www.crophealth.com

# Two years ago…

ENVIRONMENT

## Concerns over drought fallout heat up

WENDY STUECK VANCOUVER

With no hint of rain in the forecast, there is growing concern about the economic, social and environmental toll of widespread drought in British Columbia.

In the city, lawns are turning brown and Vancouver's police force has stopped washing its patrol cars.

In the country, ranchers are calculating whether they will be able to buy enough feed to keep their cattle over the winter and, if not, how many animals they might have to sell.

On the water, fishing is not allowed, as the province has suspended angling in virtually all of the streams and rivers in the South Coast region – which runs from south of Toba Inlet on the coast to the Canada-U.S. border – because of warming water and low stream flows.

"It's at different levels throughout the province, but pretty much everywhere we are short on rain and really short on what we had for runoff to fill our reservoirs and dams," Kevin Boon, general manager of the B.C. Cattlemen's Association, said on Tuesday.

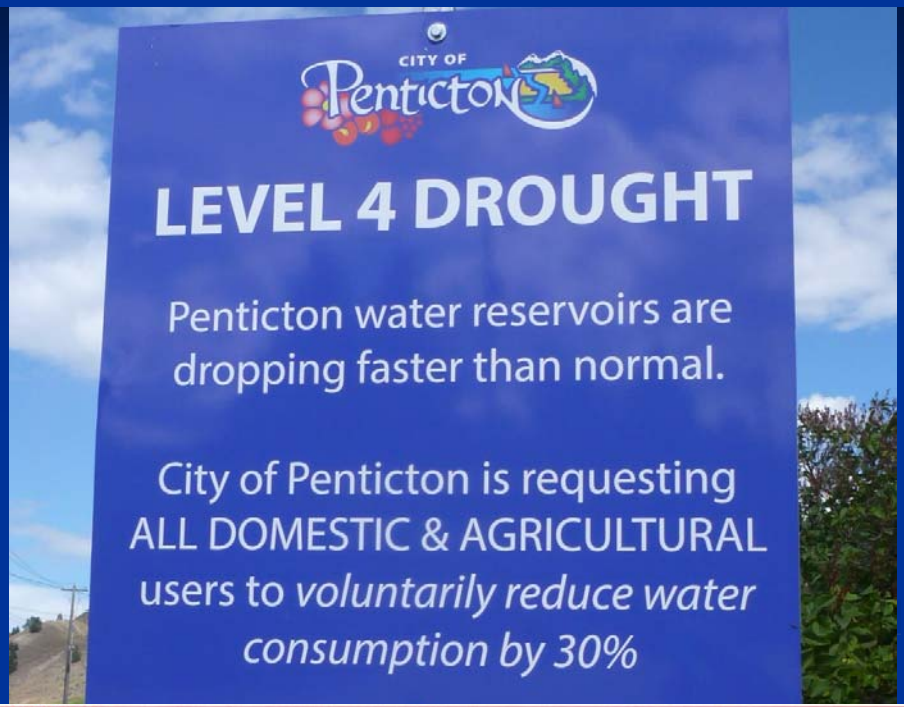
Because the rest of Western Canada is also dry, B.C. ranchers are finding it difficult to buy hay from greener pastures to the east.

A long stretch of hot and dry weather since May has put much of the province in drought conditions and is affecting activities ranging from agriculture to children's water parks.

It is driest on Vancouver Island and the South Coast, including the greater Vancouver region, which are at the fourth and highest level of the province's drought-rating system.

Drought, Page 4

Metro Vancouver moved up to the second-highest stage of its water shortage plan on Monday, which prohibits lawn sprinkling and car washing. In parts of the province, restrictions are in place on fishing and farmers fear they may have to sell their cattle. RAFAL GERSZAK FOR THE GLOBE AND MAIL




Property owners are divided on a plan to raise the level of the St. Mary Lake reservoir on Saltspring Island to increase storage capacity. — FLICKR FILES

## Water woes deepen on Saltspring

THE GLOBE AND MAIL
TUESDAY, JULY 28, 2015
Globe British Columbia

ENVIRONMENT

## Drought puts stress on businesses

Landscapers and pressure-washing companies have had to lay off staff and diversify services as water shortage drags on

VERITY STEVENSON VANCOUVER

Businesses dependent on water are making drastic changes in how they operate – from the services they offer to the staff they employ – as the economic impact of B.C.'s historic drought starts to bite.

Landscapers and pressure-washing companies have had to lay off staff and are looking to diversify their services, providing, as greenery in the typically lush coastal region turns golden brown.

In the normally hot and dry Interior, the drought level was increased a notch for the South Thompson, Similkameen, Kettle and Skagit regions on Monday. Level-four drought conditions mean further declines in streams, lakes and aquifer levels could lead to water shortages and that everyone is encouraged

vation efforts," the B.C. government said in a news release.

In Tsawwassen, landscaper Ray Anderson had his employees ripping concrete away from a building instead of their usual work.

"We had six people that were supposed to put in new lawns next week that are no longer doing it … we're just kind of focusing elsewhere," said Mr. Anderson, who owns Pacific

Though he hasn't had to lay anyone off yet, he has had to cut hours for some of his staff.

"It's about being creative with what you offer to customers," another landscaper, Tim Schofield of Mowology, said Monday. He said he is trying to supplement the more than 50 per cent of customers that are skipping the mowing of their lawns by offering to weed their gardens.

"Everybody's just stopped."

officer of the
Nursery Assoc
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Ms. Dyck sai
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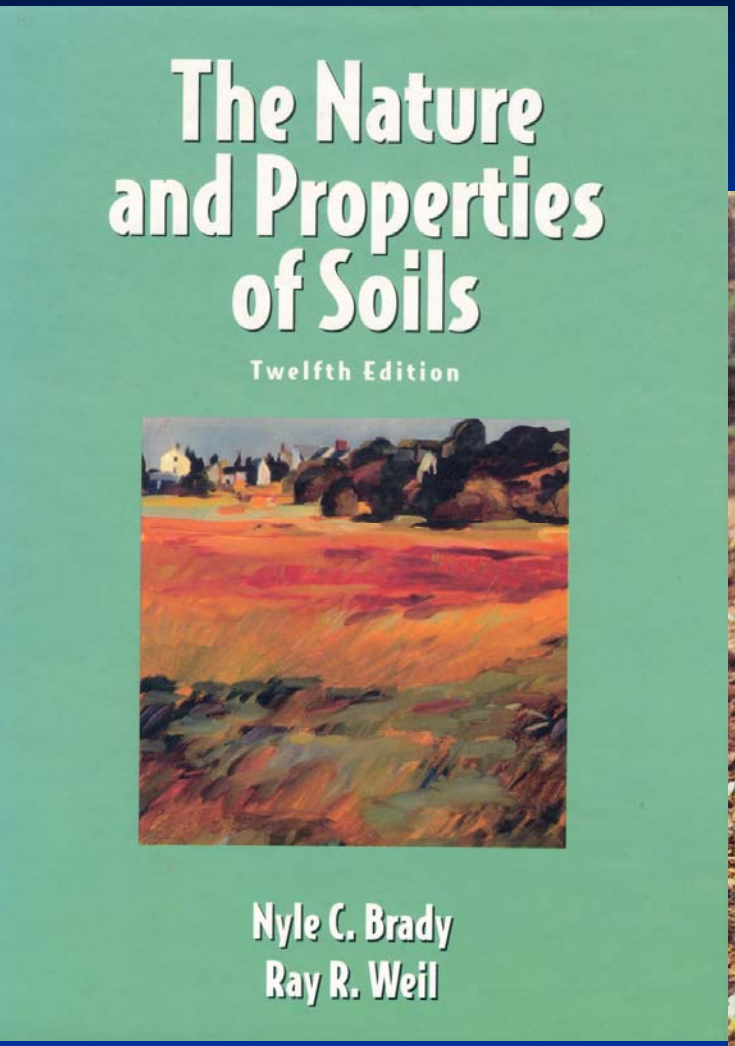
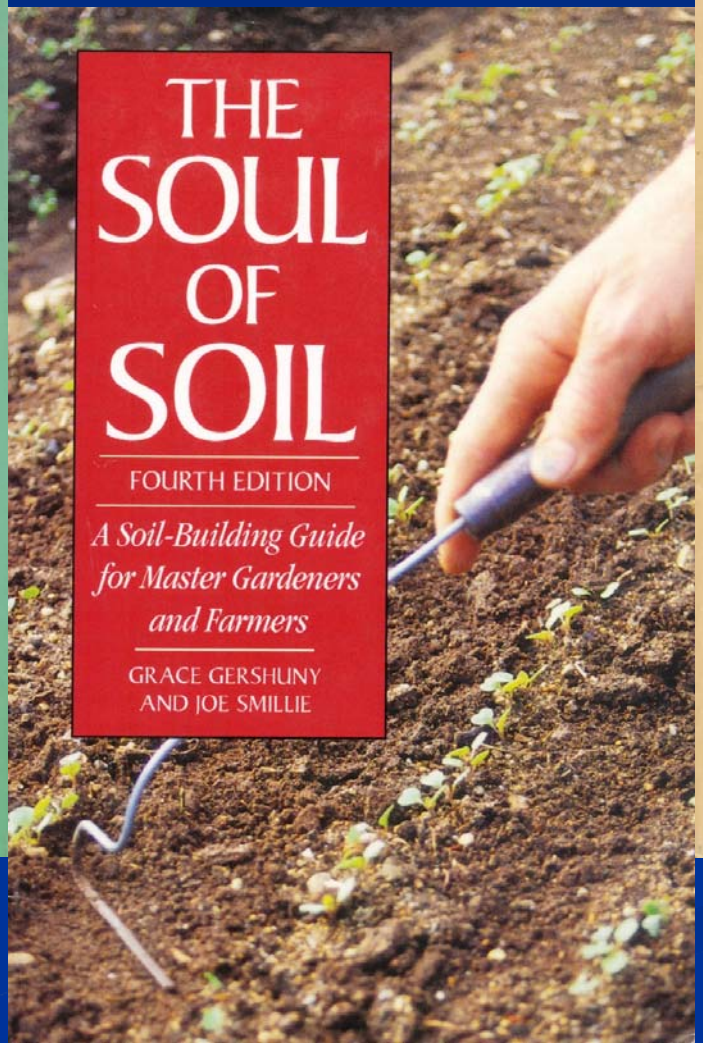
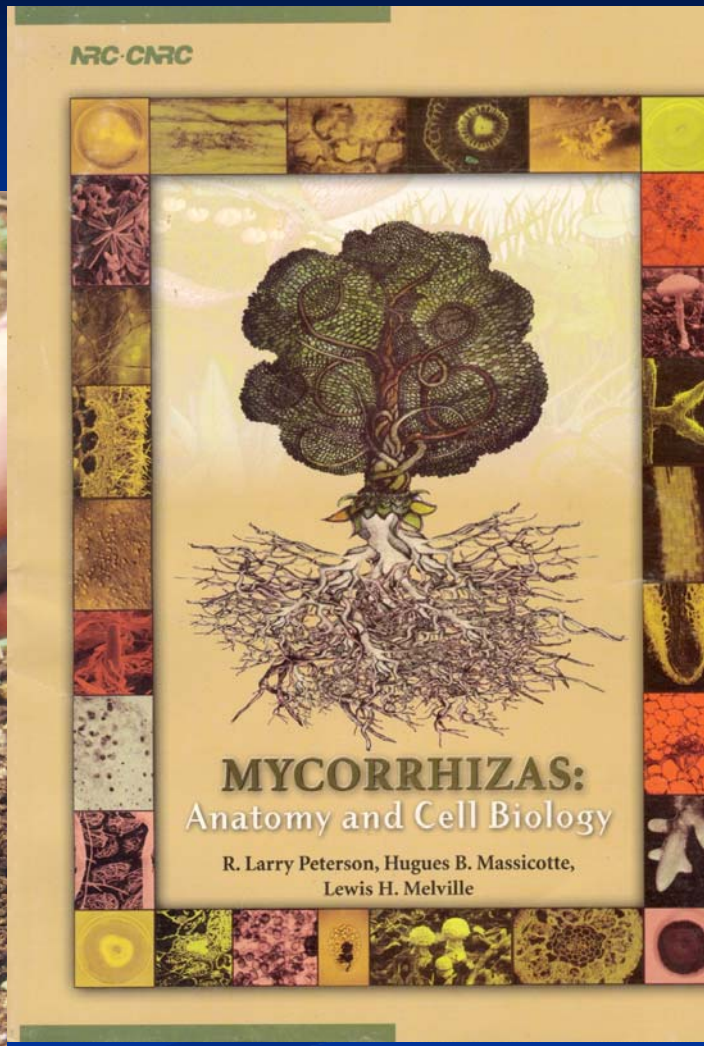
# This will be a technical talk



# A street tree is loosing its leaves in August…

# The leaves show symptoms of water stress

# Newly-planted junipers showing wilt

# Severe water stress leads to dieback

# Question # 1
# Managing plants under drought

**Which of the following practice is the <u>least</u> useful for plants during drought ?**

A. Water deeply and less often

B. Provide fertilizer to stimulate new growth

C. Scout for insects and diseases

D. Consider replacing with drought tolerant plants

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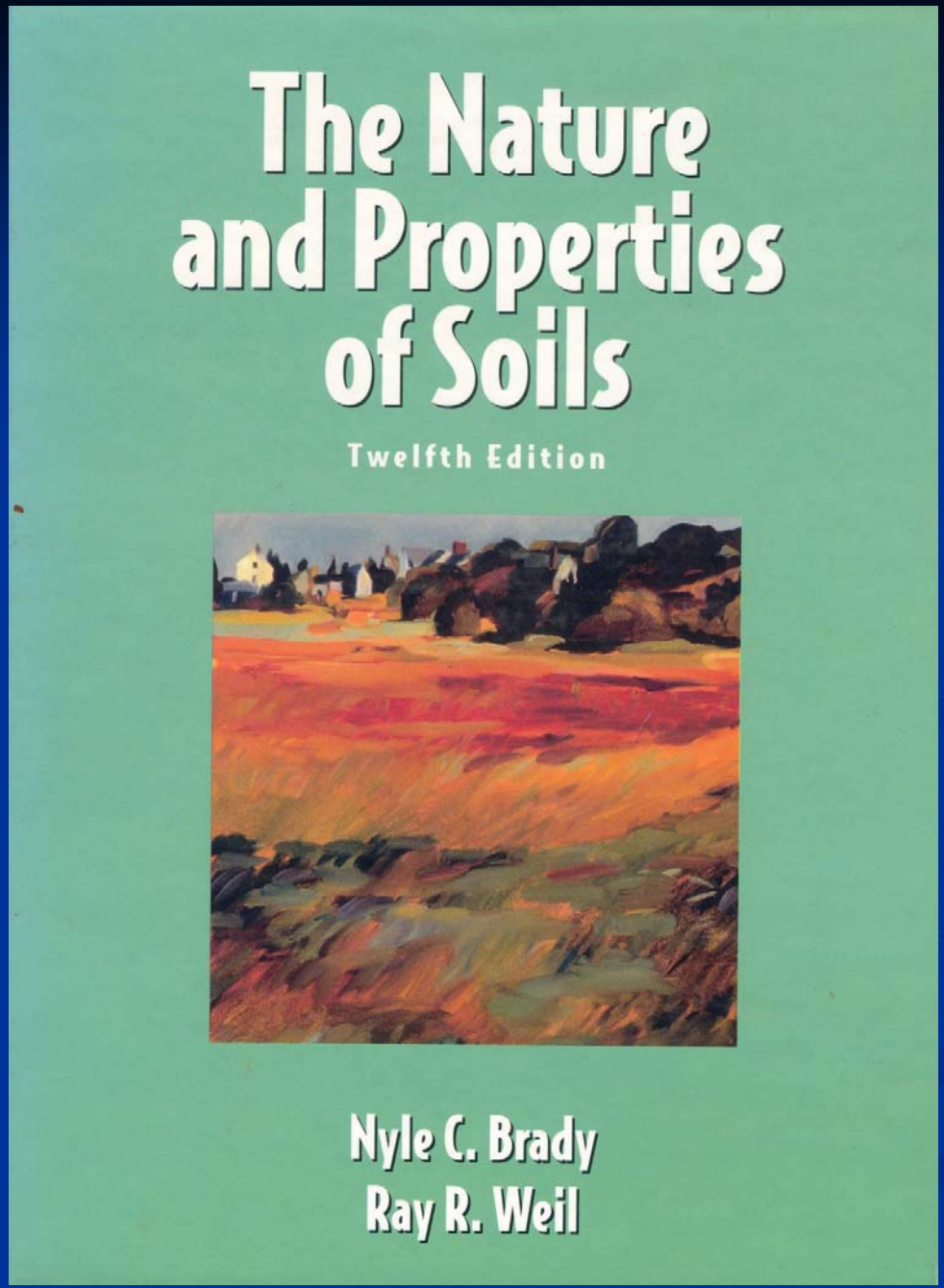
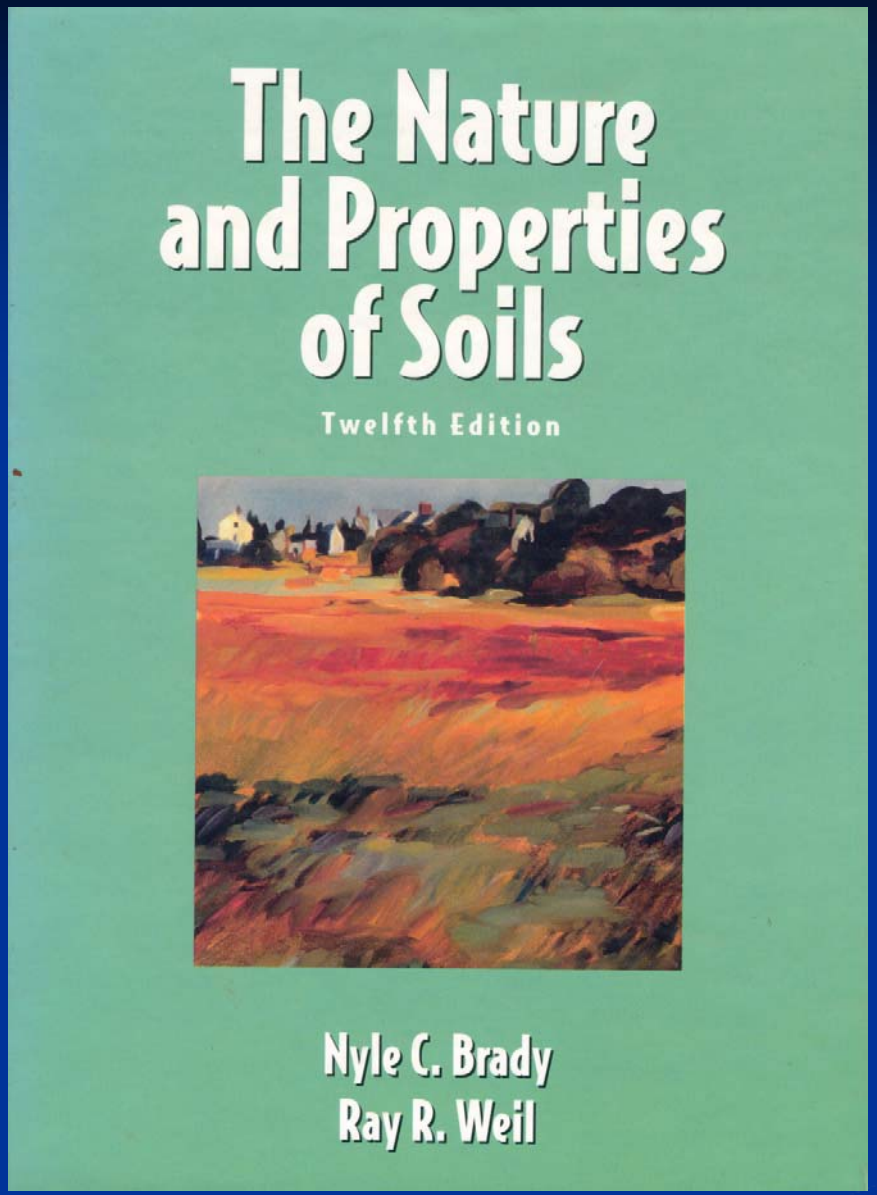


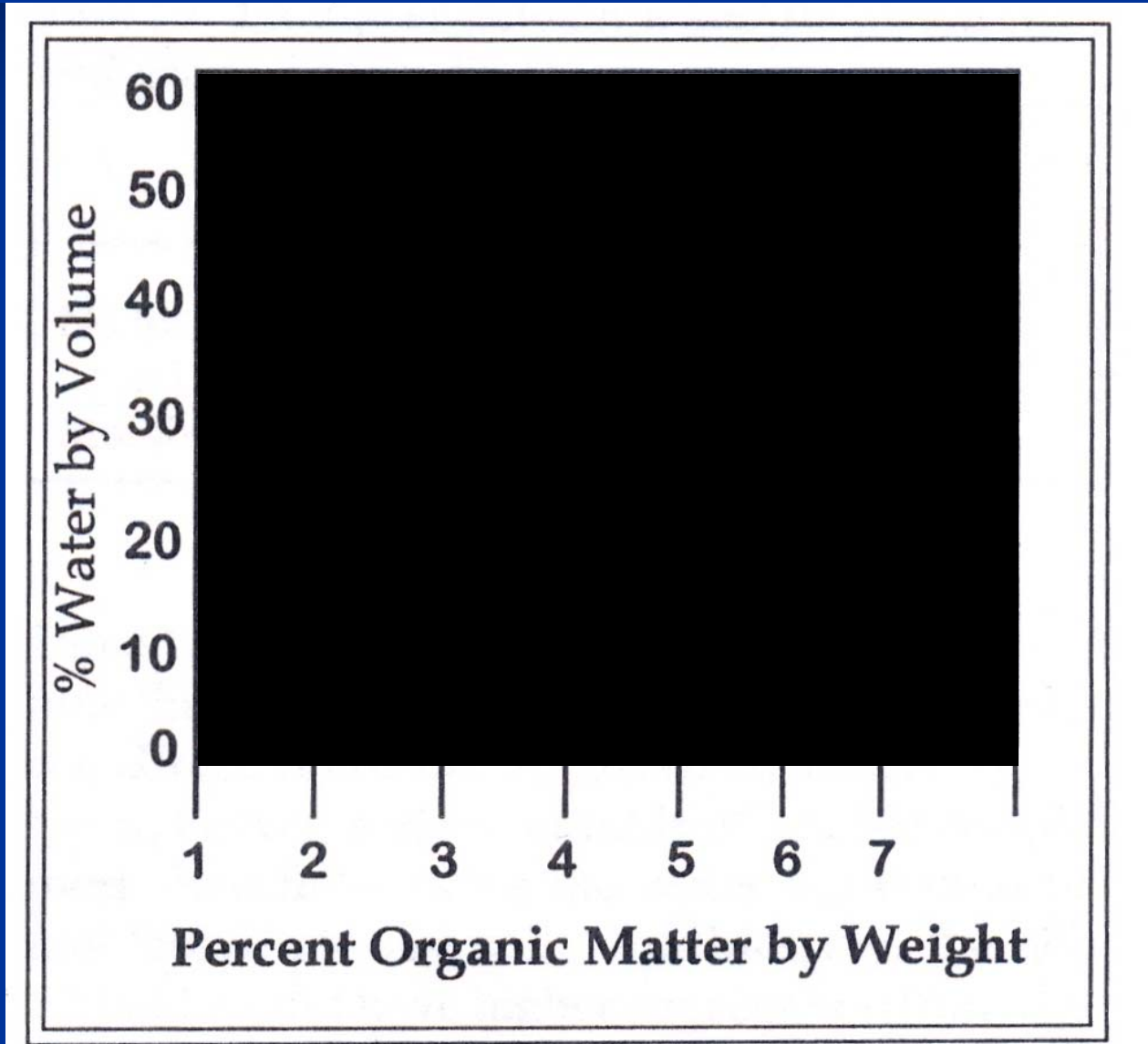

University textbook

12th Edition
1999




Organic matter indirectly affects the amount of water available to plants through its influence on soil structure and total pore space.

# Up to a point, the more organic matter, the more water is available for the plant



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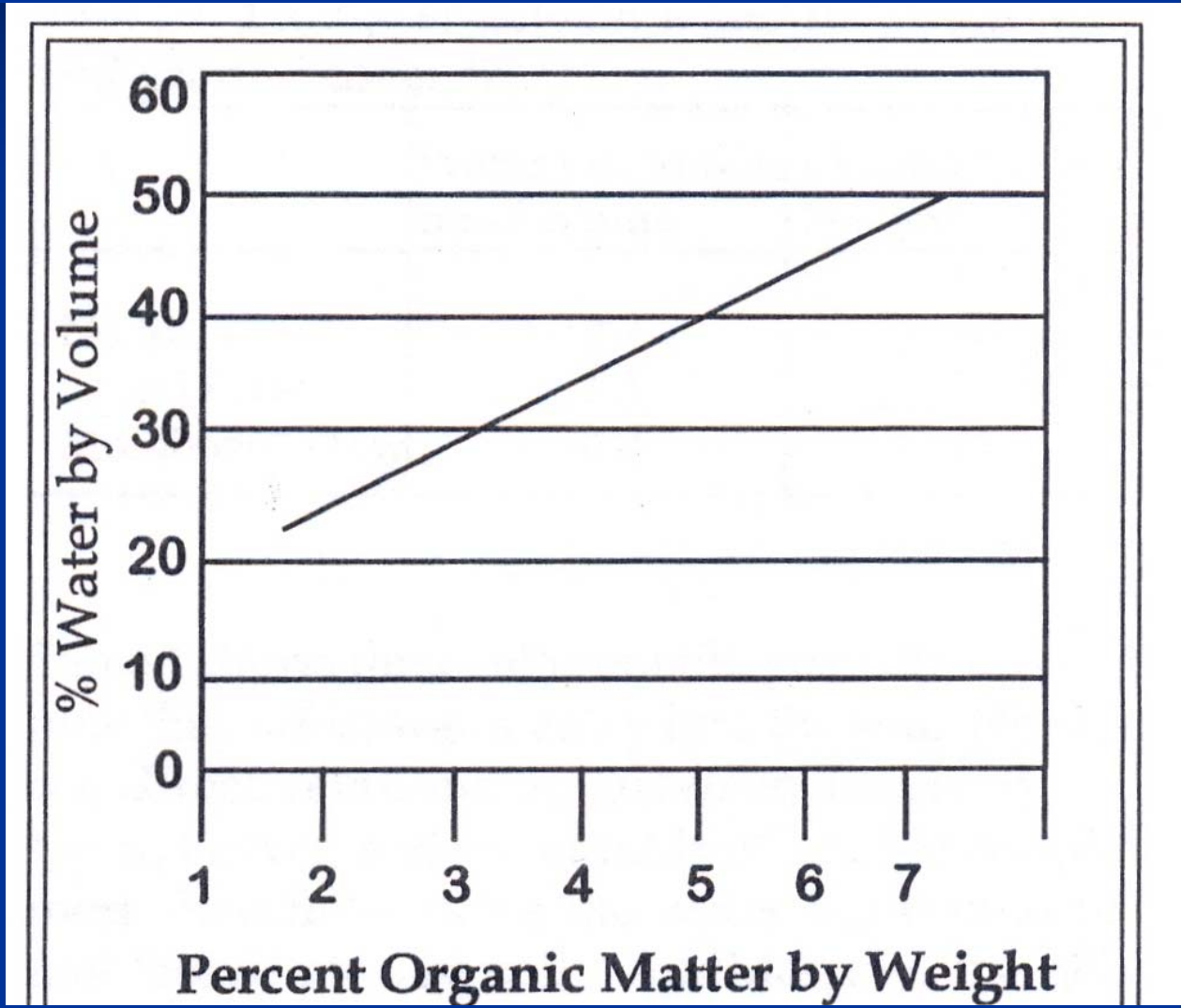



Chart from Hudson BE. 1994. Journal of Soil and Water Conservation. 49(2); 189-194.

# « Drought Resistant Soil » Available on the web

1-800-346-9140
ATTRA
Appropriate Technology Transfer for Rural Areas

**DROUGHT RESISTANT SOIL**

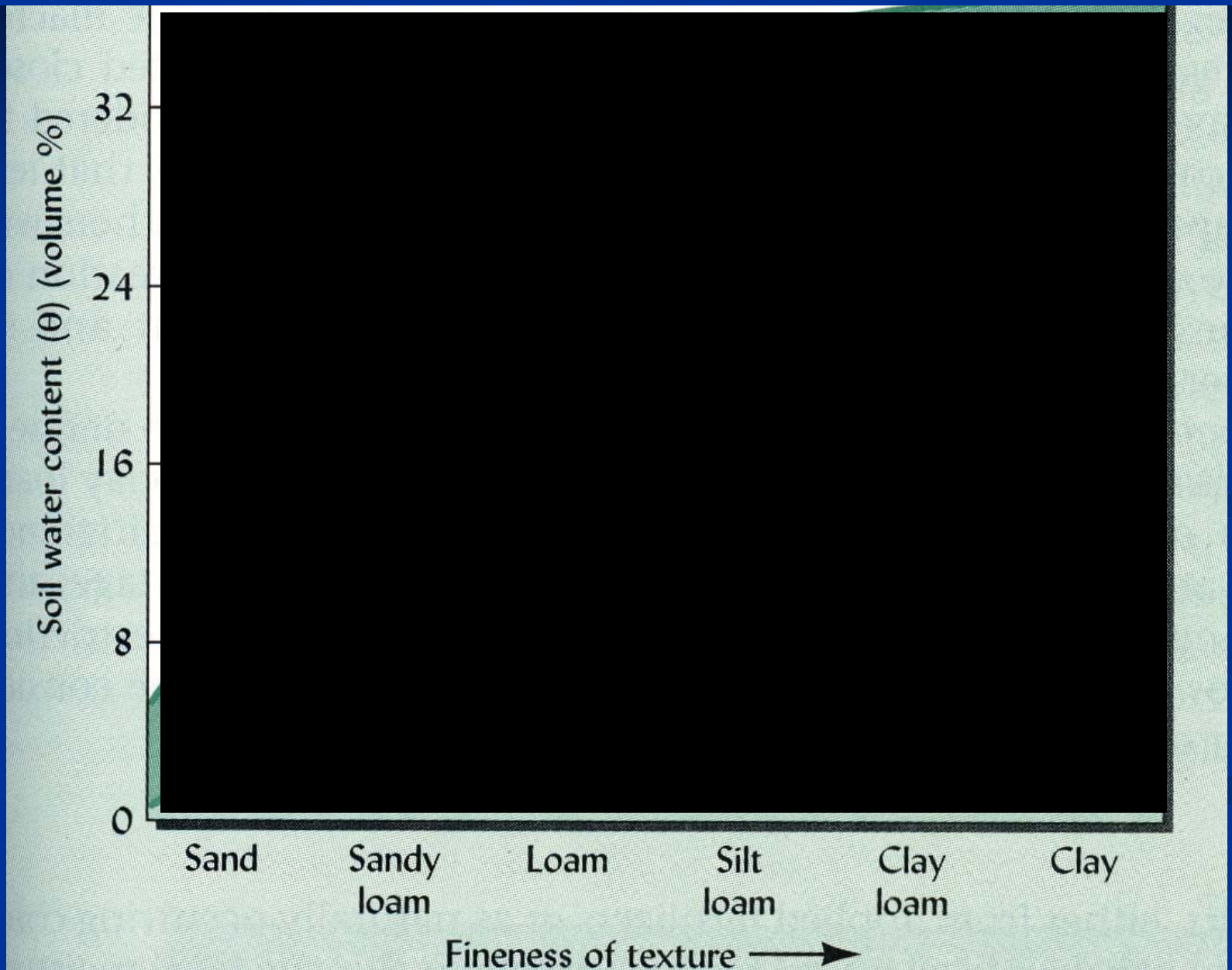
Agronomy Technical Note

Arkansas soil scientists report that for every 1% of organic matter content, the soil can hold 16,500 gallons of plant-available water per acre of soil down to one foot deep (5). That is roughly 1.5 quarts of water per cubic-foot of soil for each percent of organic matter.

1.5 US quarts = 1.4 litres

(5) From Scott et al. 1986. Arkansas Water Resources Research Center. Publication Number 125.

# Soil texture is important for available water



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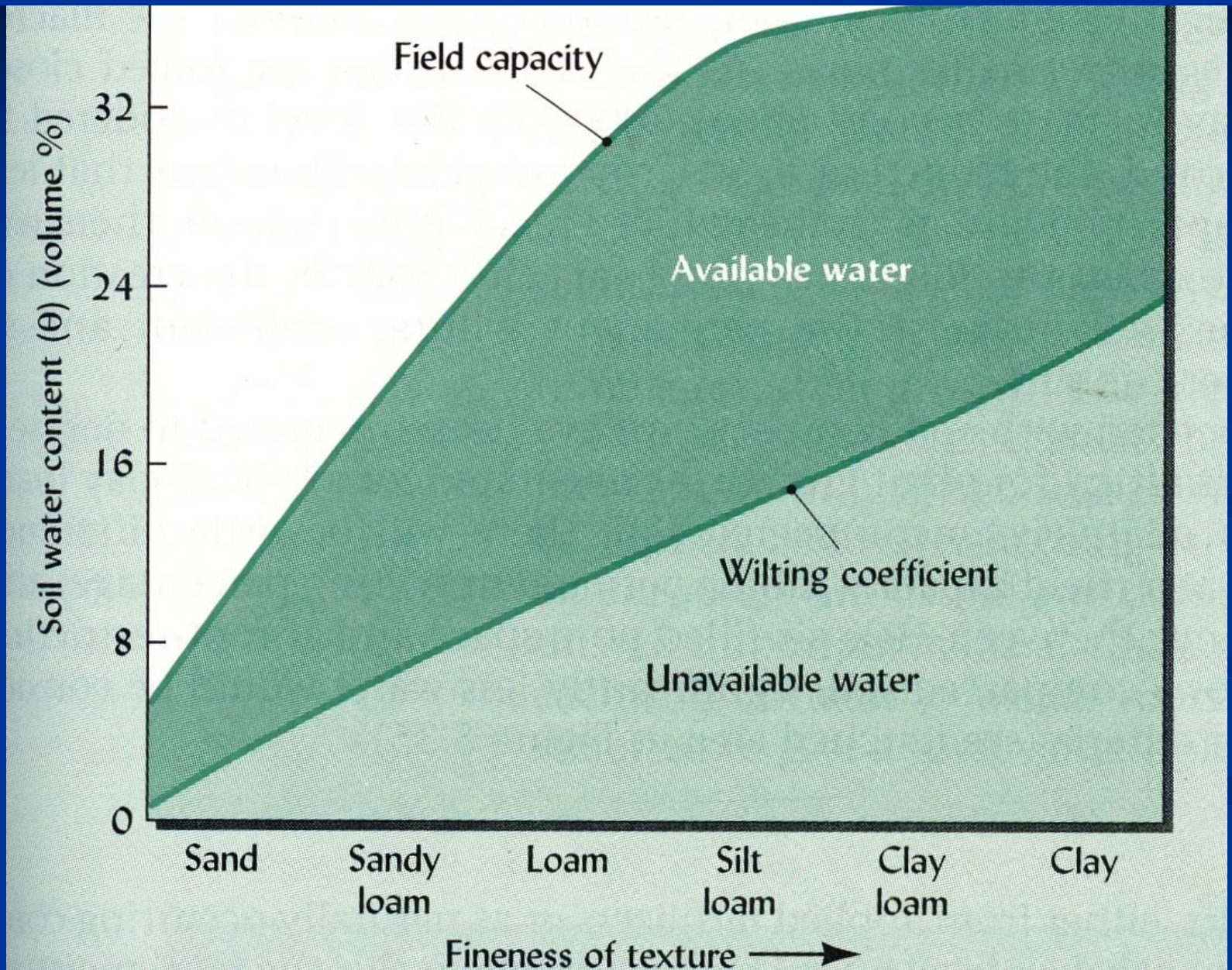

# Question # 2
# Soil water available to plants

# What is the most accurate definition for “plant available water” in the soil ?

A. Water remaining after free drainage has ceased

B. Water content at which the plant cannot regain turgidity

C. Water available to the plant between field capacity and wilt

D. Water held in small pores of the soil

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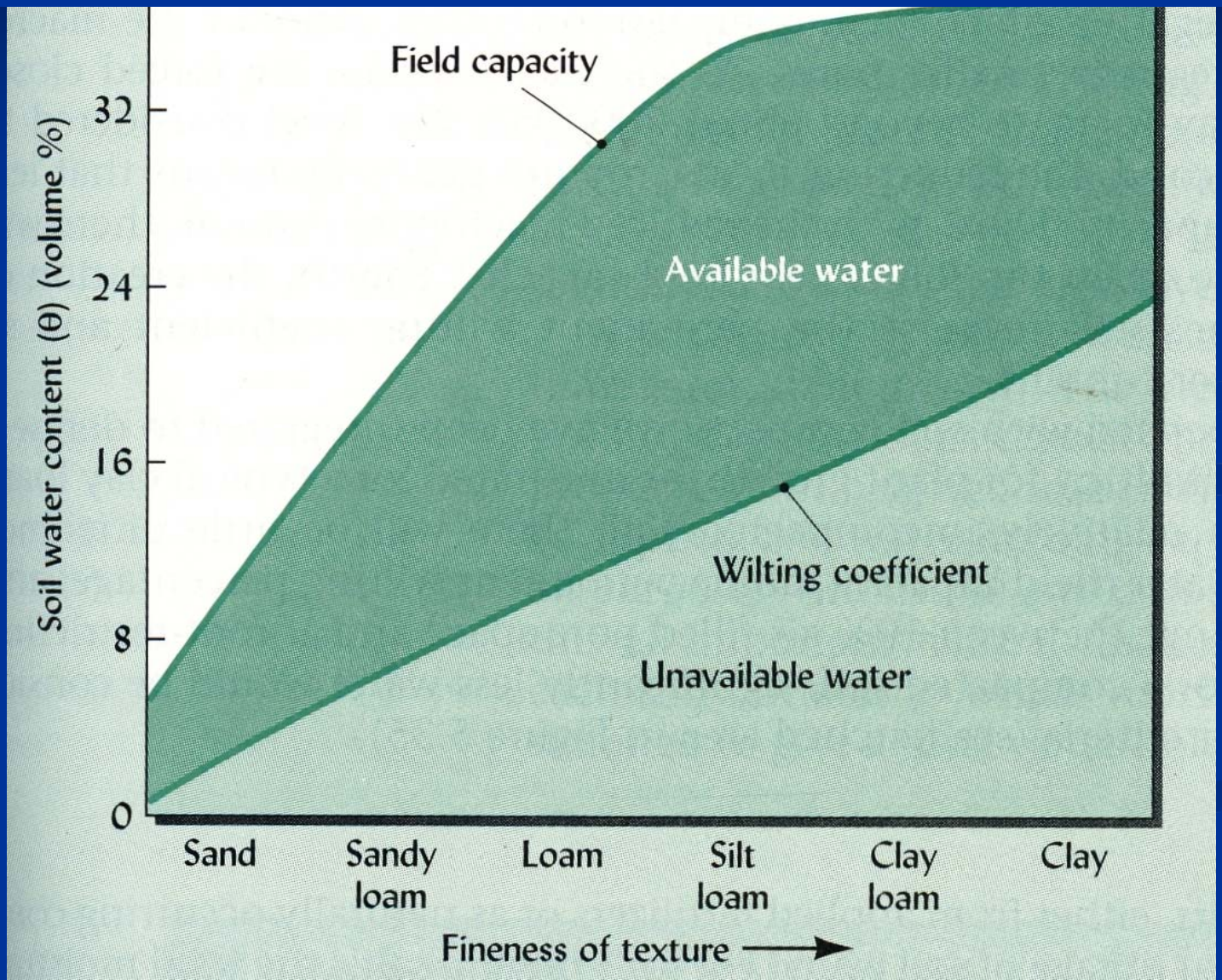
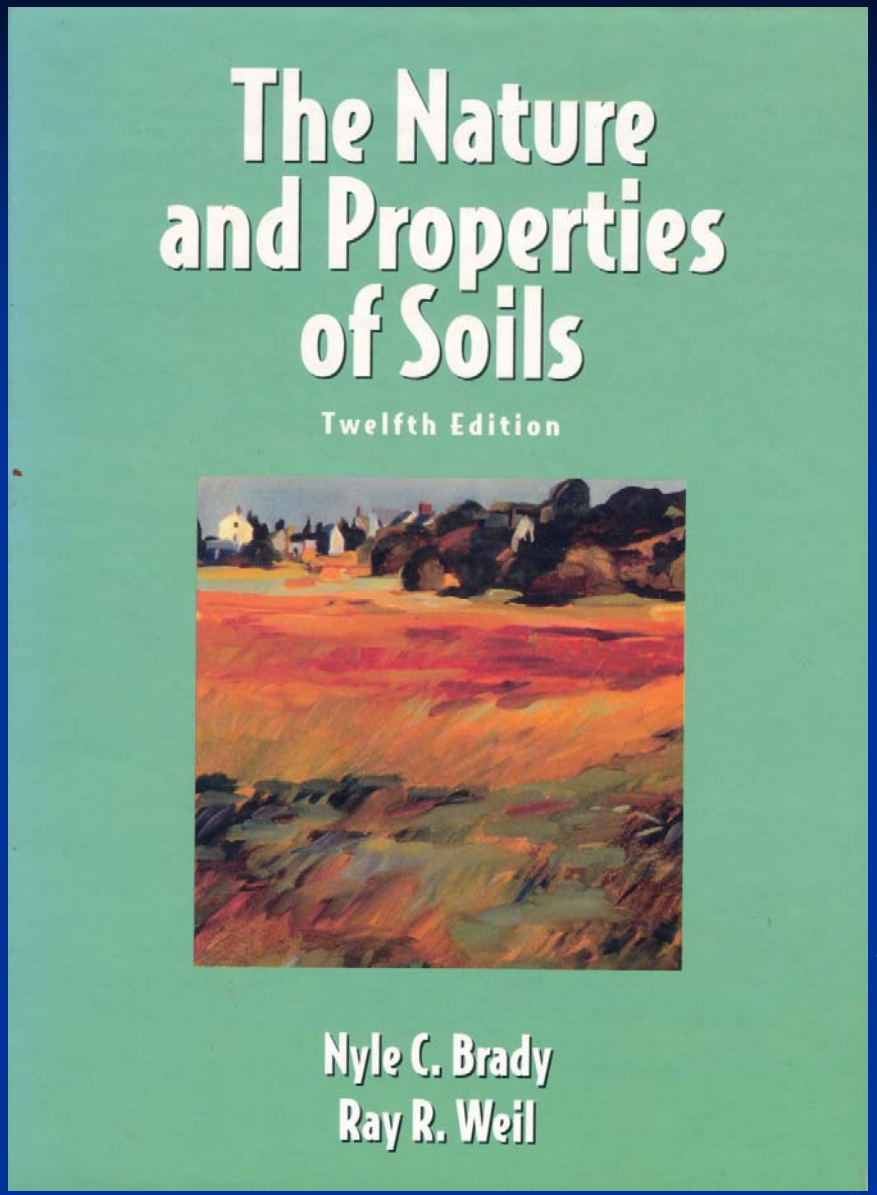
# « Plant available water » is the water found between field capacity and permanent wilting

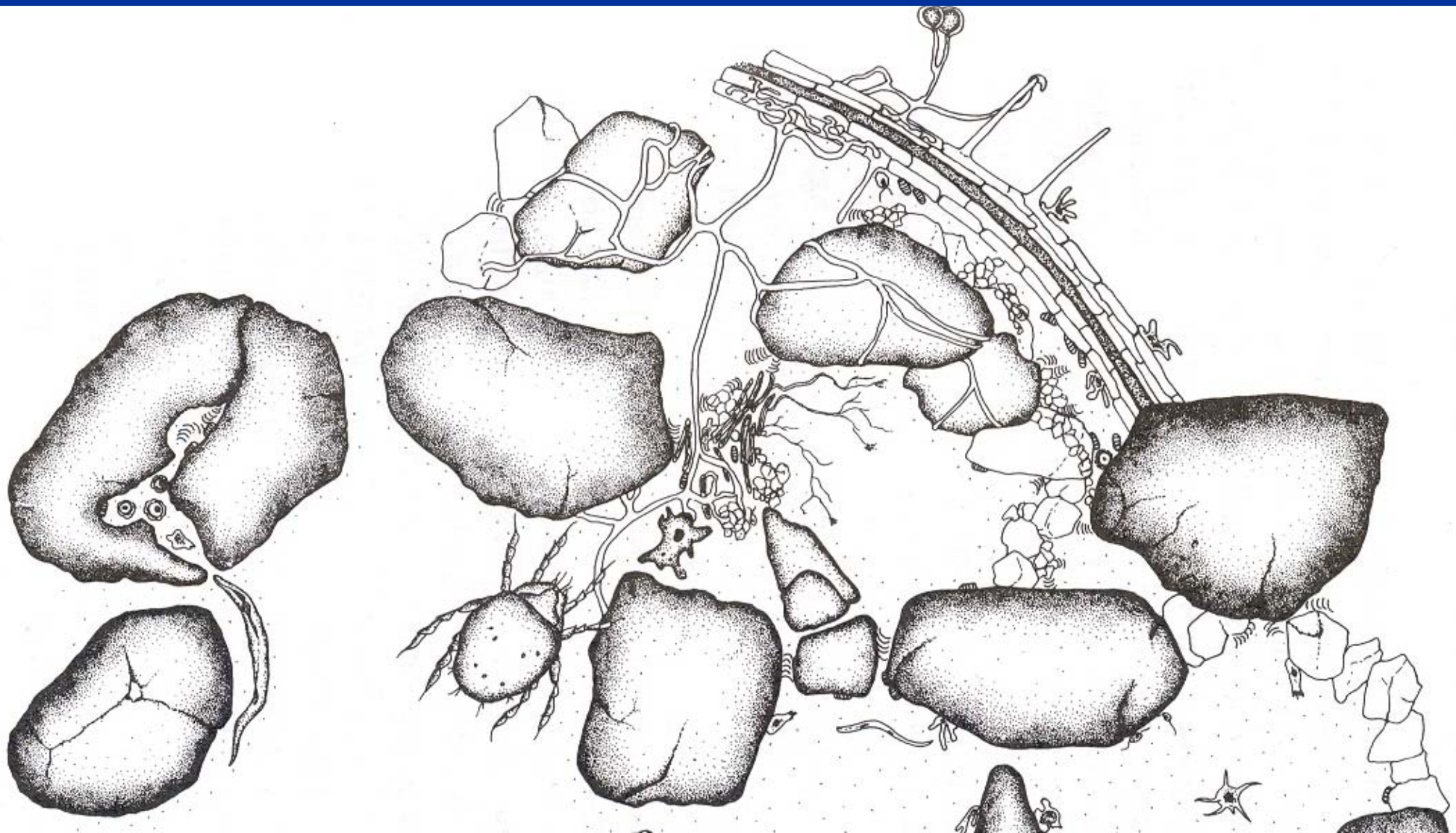




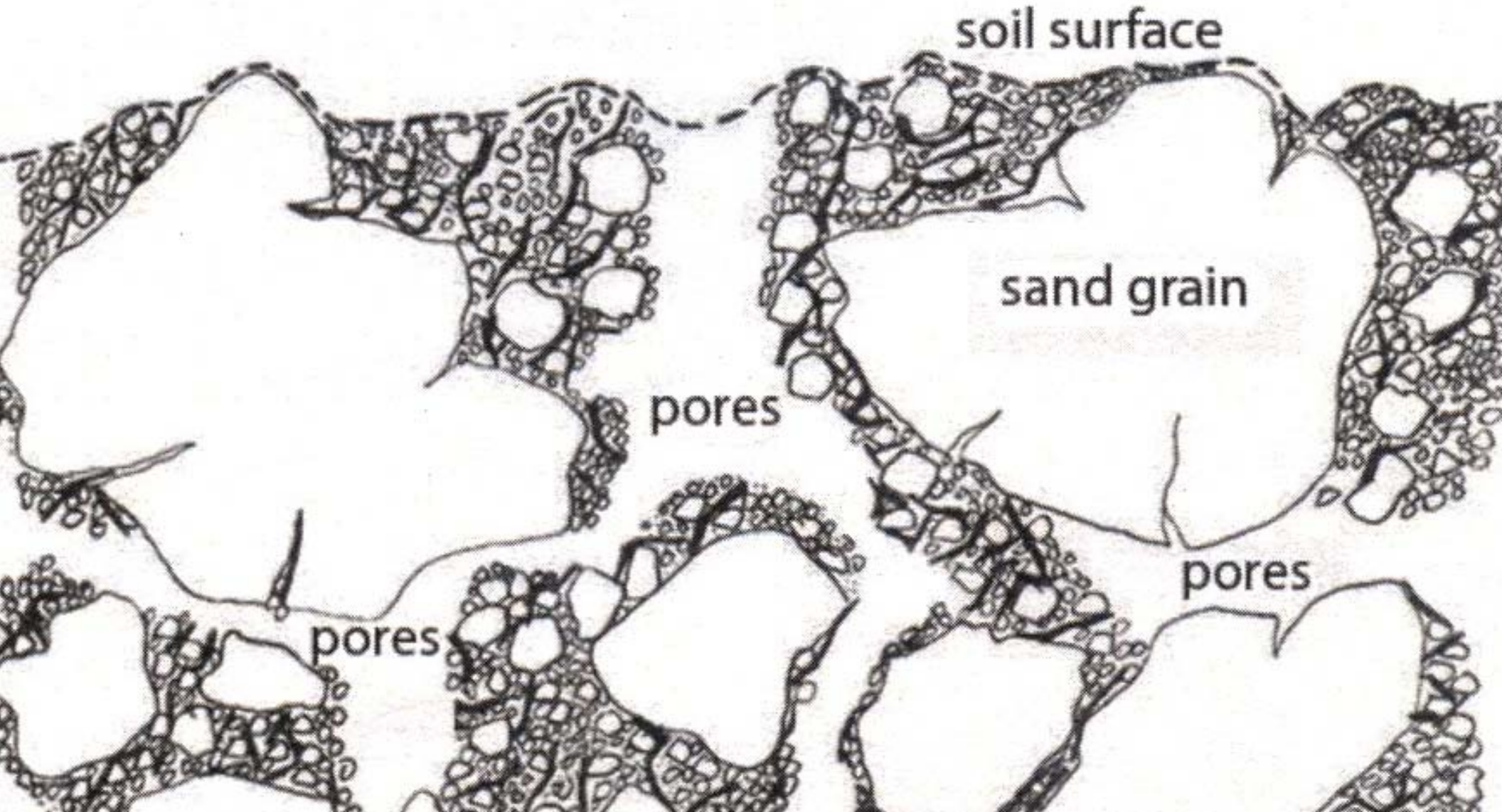

The formation and maintenance of a high degree of aggregation is one of the most difficult task of soil management, yet it is also one of the most important, since it is a potent means of influencing ecosystem function.

# Aggregation of soil particles by fungi hyphae

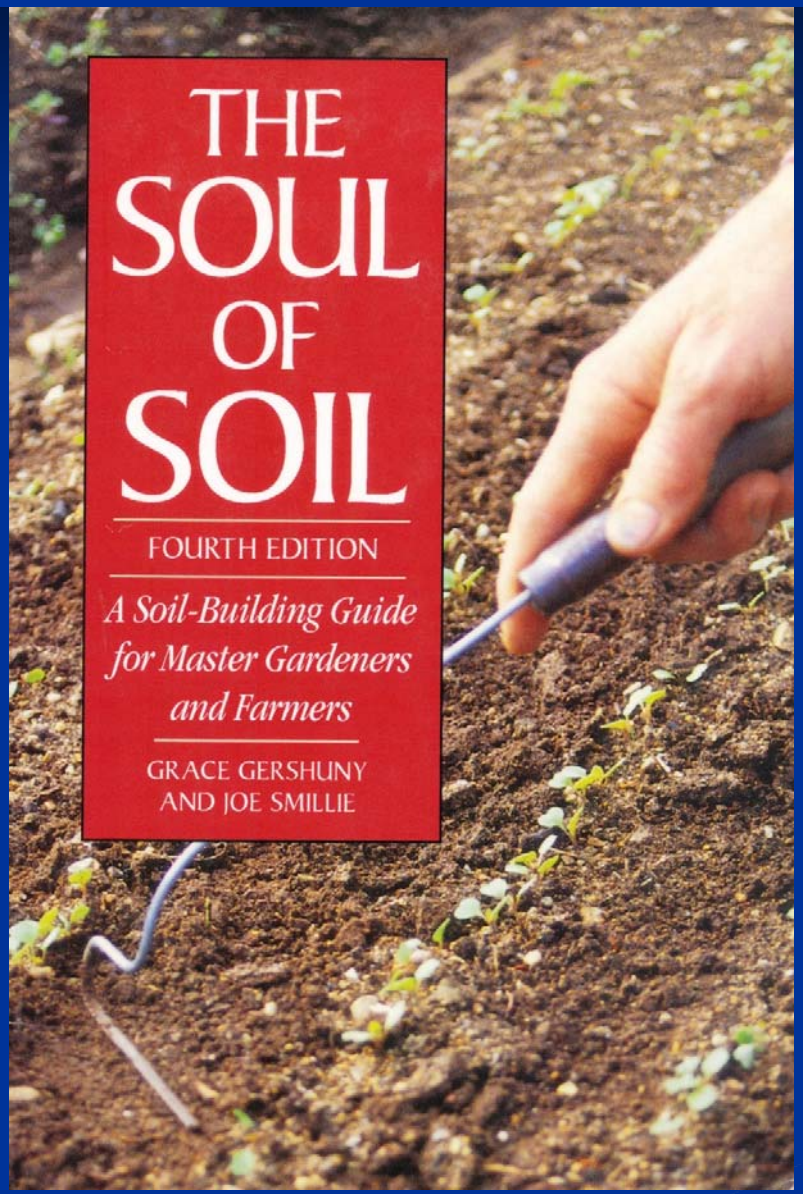
# Soil aggregation relates to soil structure. It is the arrangement of soil particles.

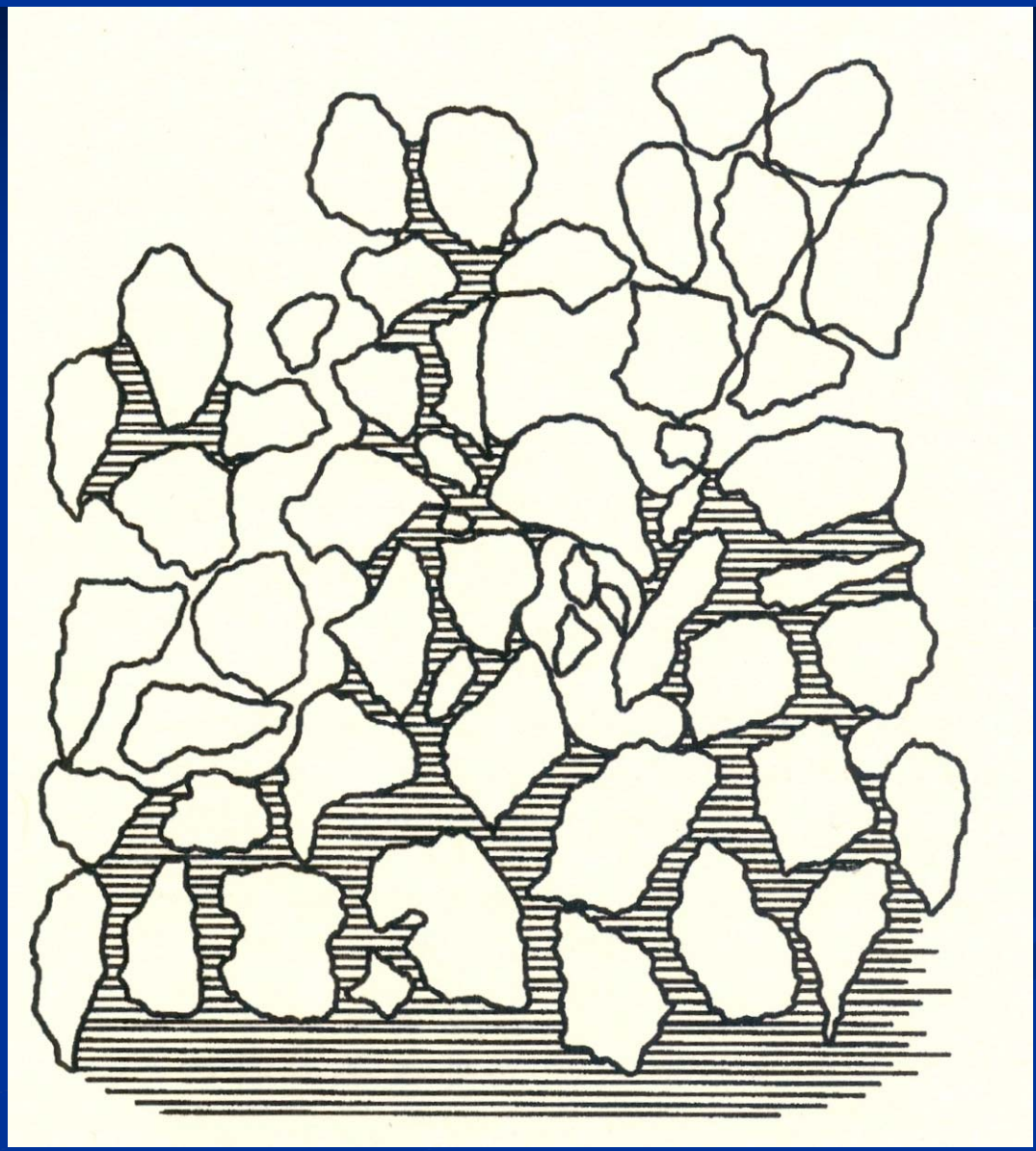


The soil structure creates openings called pores. It is space for soil microbes, nutrients and water.



# Water is “pulled upward” by the soil aggregates



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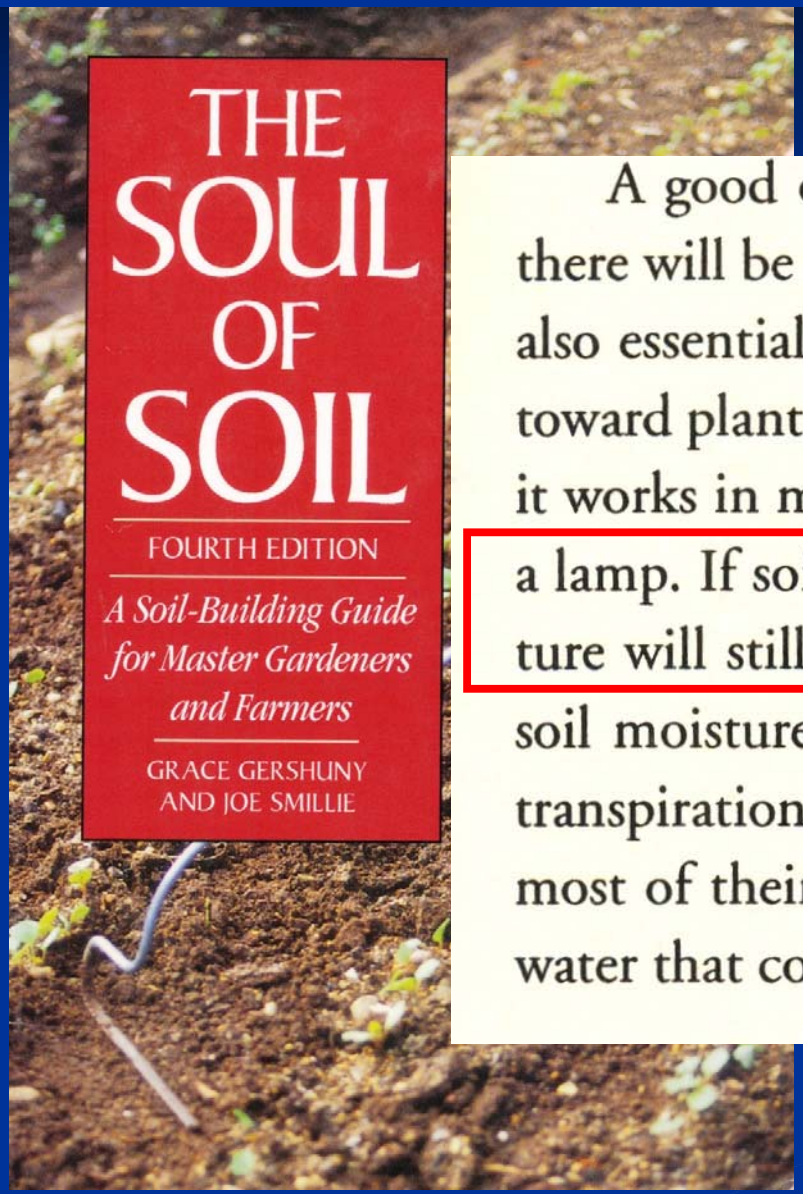
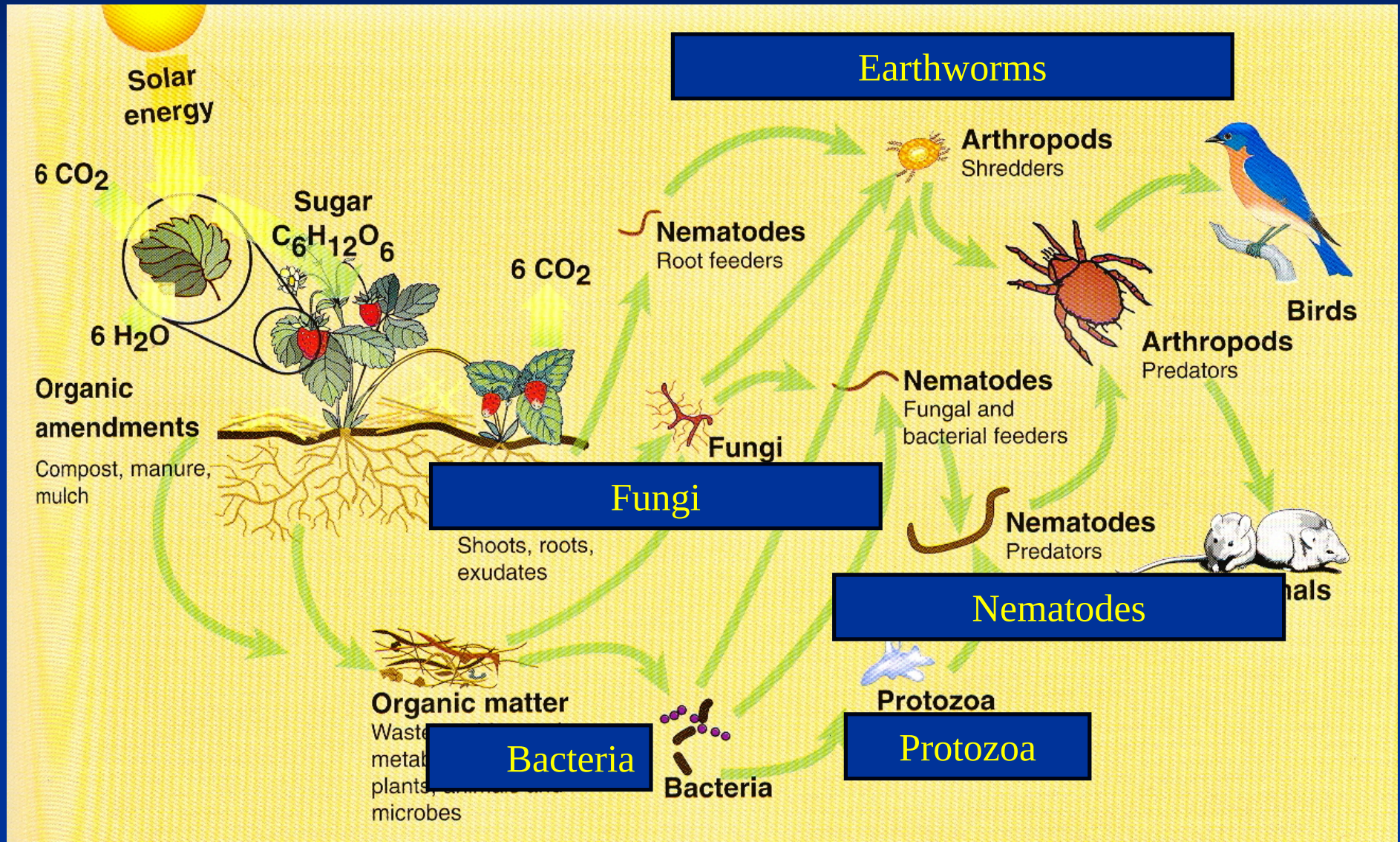



A good crumb structure implies that soil is well aerated, since there will be plenty of pore spaces between the granules. Structure is also essential to the ability of soil to conduct soil moisture upward toward plant roots. This feature is referred to as capillary action, and it works in much the same way that oil is taken up into the wick of a lamp. If soil structure is good, the surface may dry out, but moisture will still reach the root zone from deeper soil levels. Adequate soil moisture is crucial not only to replenish what is lost through transpiration from plant leaves, but also because plant roots take up most of their nutrients when they are dissolved in the thin film of water that coats soil particles.

# Aggregation by microbial activity

# Soil organisms involved in aggregation

Picture « Fruit crop ecology and management », 2002, Michigan State University



# Question # 3
# Soil aggregation and microbial activity

**Which of the following soil organism is most responsible to form large aggregates ?**

A. Bacteria

B. Fungi

C. Protozoa

D. Earthworms

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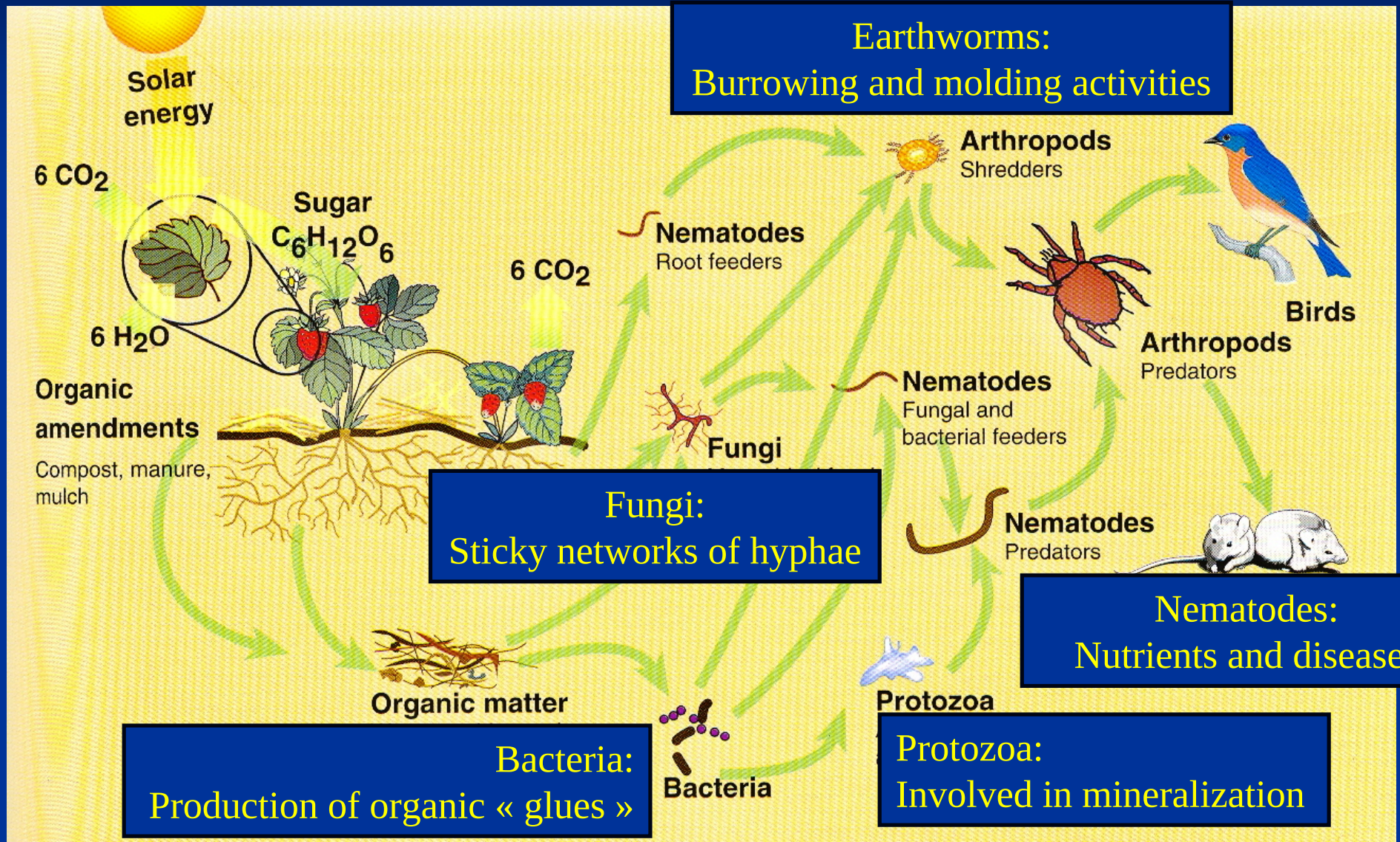


Wood pieces
from a mulch bed

The white threads
are fungi hyphae.

The fungi is
“gluing”
wood pieces
together

# The gooey protein is called glomalin.

## Gooey protein may hold soil together

By Melissa Hansen

There may be some truth to the old farmer lore that good soil can be determined by feel. A new fungal protein discovered in soil may be the "glue" that holds good soil together.

***A protein produced by soil-dwelling fungi gives improves the structure of soil.***

The protein, named glomalin, is secreted by certain soil-dwelling fungi through hairlike, hyphae filaments. The fungi are found worldwide, living in a beneficial relationship on the roots of many plants. Glomalin sloughs off of the hyphae and finds its way into the soil.

Glomalin was discovered and named by Sara Wright, a soil microbiologist with the U.S. Department of Agriculture Agricultural Research Service in Beltsville, Maryland. She gave glomalin its name because the gooey substance is secreted by a group of soil fungi called glomales.

"It coats soil particles and may be what holds them together in the stable structures we call aggregates," said Wright. "Farmers and gardeners know them as the small grains of soil that sift through their hands and suggest to them that the soil has good structure."

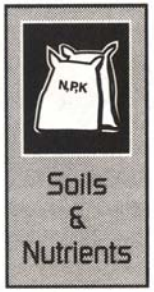
Organic tree fruit grower Bruce Spencer of Malaga, Washington, agrees that healthy soil has a certain feel and smell about it.

He has found that soil located in strips where herbicides have been used is very powdery and fine, he said. "It has a sour smell or no smell at all."

Spencer, who grows apples, cherries, peaches, apricots, and nectarines, described healthy soil as crumbly in texture. "It has a sweet, nutty, cereal-grain type of smell," he said.

Wright found that higher glomalin levels improve soil structure, easing the passage of air and water through soil and thereby aiding plant yields. The glomalin level in soil is an objective measure that can be used to choose the best farming practices.

She found that glomalin was as high as two percent of the total weight of a soil aggregate in eastern U.S. soils. Levels were dramatically lower, although still abundant, in soils from the West and Midwest. She has also measured glomalin in soil samples sent from cooperators throughout the world.




"It may be that the higher glomalin levels explain why eastern soils have stronger structural stability than western soils," said Wright.

Knowing about glomalin can give farmers reason to alter tillage practices to raise or maintain glomalin levels. Tillage has been found to lower glomalin levels. ◆

Good Fruit Grower, May 1, 1998

# Article in Canadian Journal of Soil Science, 2004

## Arbuscular mycorrhizae, glomalin, and soil aggregation

Matthias C. Rillig

*Microbial Ecology Program, Division of Biological Sciences, University of Montana, Missoula, MT 59812, USA (e-mail: matthias@mso.umt.edu).* *Received 8 January 2004, accepted 9 March 2004.*

Rillig, M. C. 2004. **Arbuscular mycorrhizae, glomalin, and soil aggregation**. Can. J. Soil Sci. **84**: 355–363. Arbuscular mycorrhizae are important factors of soil quality through their effects on host plant physiology, soil ecological interactions, and their contributions to maintaining soil structure. The symbiosis is faced with numerous challenges in agroecosystems; in order to inform sustainable management strategies it is hence a high priority to work towards mechanistic understanding of arbuscular mycorrhizae contributions to soil quality. This review focuses on glomalin-related soil protein (GRSP), operationally defined soil C pools that have been linked to arbuscular mycorrhizal fungi (AMF). In discussing this protein pool, we propose a new terminology used to describe fractions of soil proteins and glomalin. GRSP concentrations in soil are positively correlated with aggregate water stability. GRSP has relatively slow turnover in soil, contributing to lasting effects on aggregation. Controls on production of GRSP at the phenomenological and mechanistic level are evaluated. While there are significant gaps in our knowledge about GRSP and glomalin (particularly at the biochemical level), it is concluded that research on GRSP holds great promise for furthering our knowledge of soil structure and quality, for informing suitable management, and as a foundation for novel biotechnological applications in agriculture and beyond.

**Key words**: Glomalin, GRSP, soil structure, land use, restoration, soil protein, sustainability, arbuscular mycorrhizae

Rillig, M. C. 2004. **Les mycorhizes à arbuscules, la glomaline et l'agrégation du sol**. Can. J. Soil Sci. **84**: 355–363. Les mycorhizes à arbuscules (MA) jouent un rôle important dans la qualité du sol en agissant sur la physiologie de la plante hôte, sur les interactions écologiques du sol et sur la préservation de la structure du sol. Les écosystèmes agricoles exercent maintes contraintes sur la symbiose. Pour implanter des stratégies agricoles durables, il importe donc de bien comprendre la mécanique des apports des MA à la qualité du sol. Cet article examine les protéines du sol associées à la glomaline (PSAG), réservoirs de C du sol présentant des liens avec les champignons à MA. Dans l'étude de ce réservoir protéique, l'auteur recourt à une nouvelle ter-

# Article in scientific journal “Vadose Zone Journal”

Published online May 17, 2007

Special Section: Soil Biophysics
Vadose Zone Journal

## Mycorrhizal Fungi: Highways for Water and Nutrients in Arid Soils

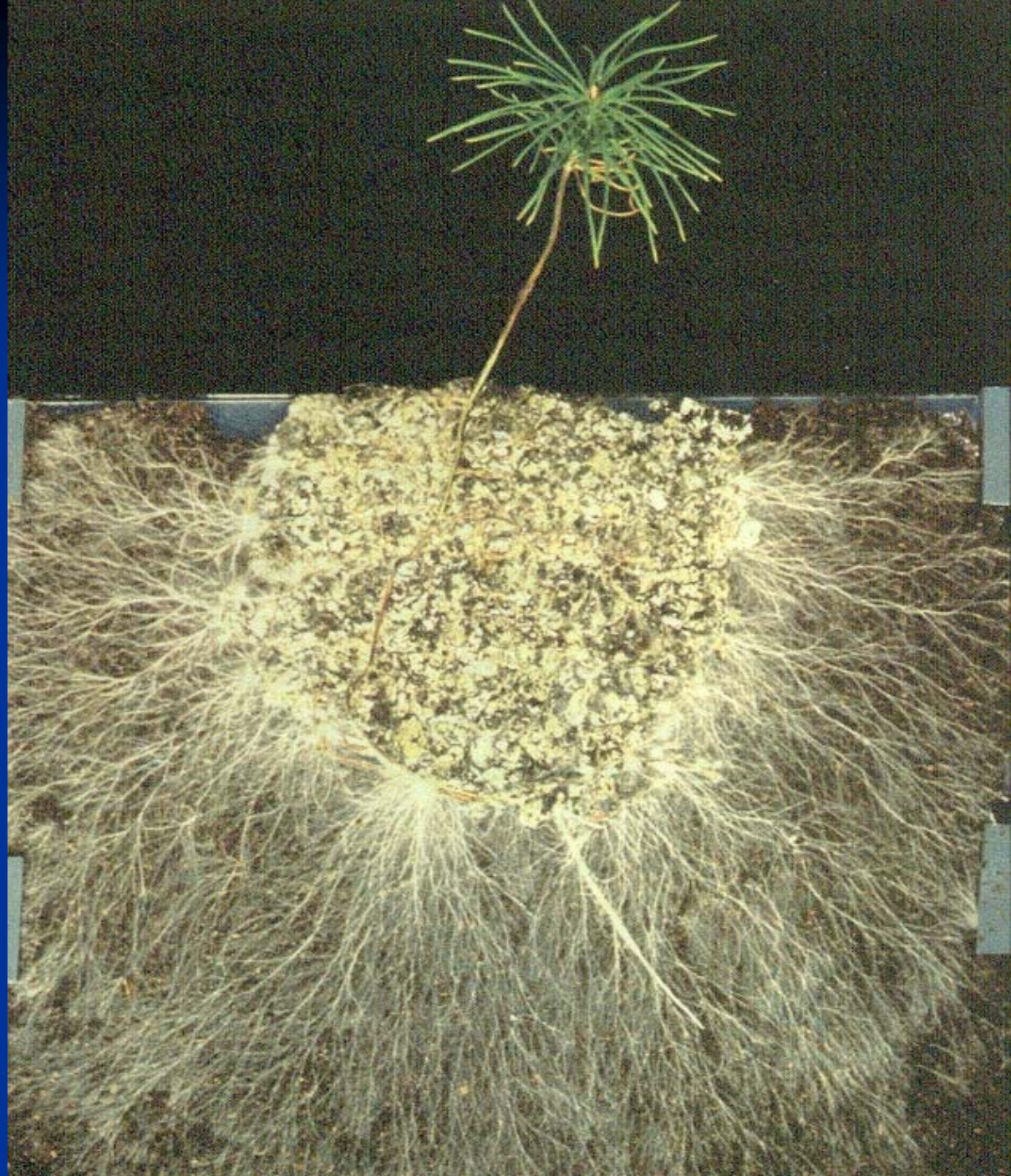
Michael F. Allen*

Mycorrhizal fungi are well known for increasing nutrient uptake but their effects on soil physical structure and water flow are less well understood. Here I explore what we know about the physical structure of mycorrhizal external mycelia and examine how that physical structure affects plant water uptake and reverse hydraulic lift in unsaturated soils. Mycorrhizal fungi are structured such that there are linear cytoplasmic units that can extend for a meter or more. Cell membranes may be only located in hyphal tips within the plant and externally several centimeters to meters distant from the plant root. Individual hyphae form a linear surface that goes across soil pores increasing the tortuosity factor (Γ) of the pathway for water flow, thereby increasing conductivity. But hyphae are small in diameter, providing only a small surface area for that transport. Little about the reverse flows (hydraulic redistribution from plant to fungus) is known other than that they occur and could play a critical role in sustaining hyphae through drought. The ultimate importance of mycorrhizae in plant–water relations depends on the drying patterns, the soil pore structure, and the number of hyphal connections extending from the root into the soil. New technologies are needed to adequately parameterize models of water horizontal flow patterns to: (i) observe and monitor the growth of roots and mycorrhizal fungi in situ; and (ii) describe the localized environment at high temporal and spatial resolution.

Abbreviations: AM, arbuscular mycorrhizae; EM, ectomycorrhizae.

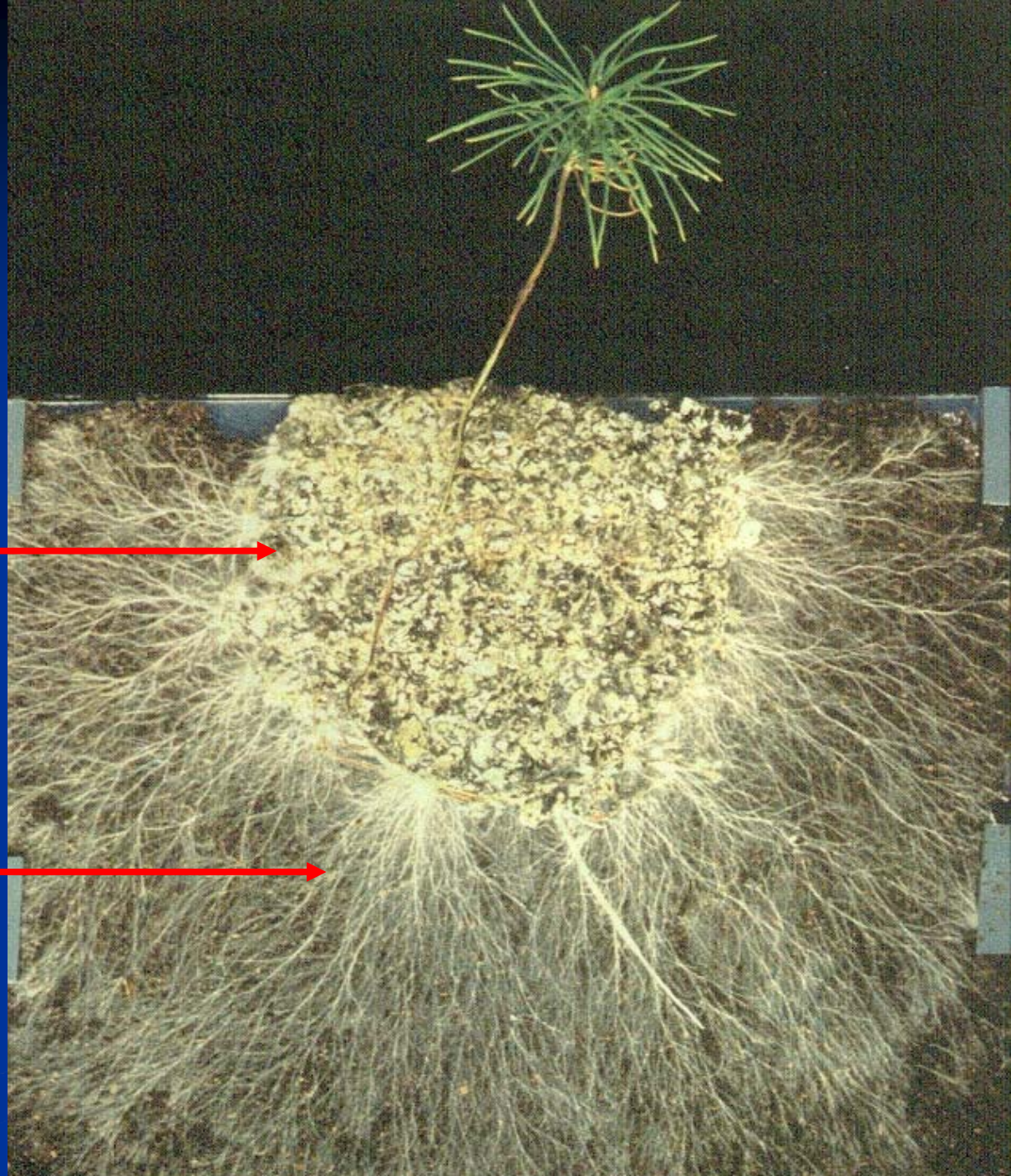
Mycelial network of ectomycorrhiza *Suillus b.* in association with *Pinus sylvestris*

Photo from J.R. Leake,
University of Sheffield, UK
Published in
Canadian Journal of Botany
2004



Roots of the plant

Hyphae of the fungus



# The “match stick” effect

# Golden chanterelles, ecto-mycorrhizal association in forests of Douglas-fir and hemlock on the West Coast

Photo by T.F. Lockwood
US Department Agriculture
2003

# Question # 4
# Mycorrhiza in nature

**In nature, what percentage of plants are colonized by mycorrhizal fungi ?**

A. About 10% of all plants

B. About 50% of all plants

C. About 95% of all plants

D. 100% of all mature plants but 0% of young plants

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# Mycorrhizal Associations

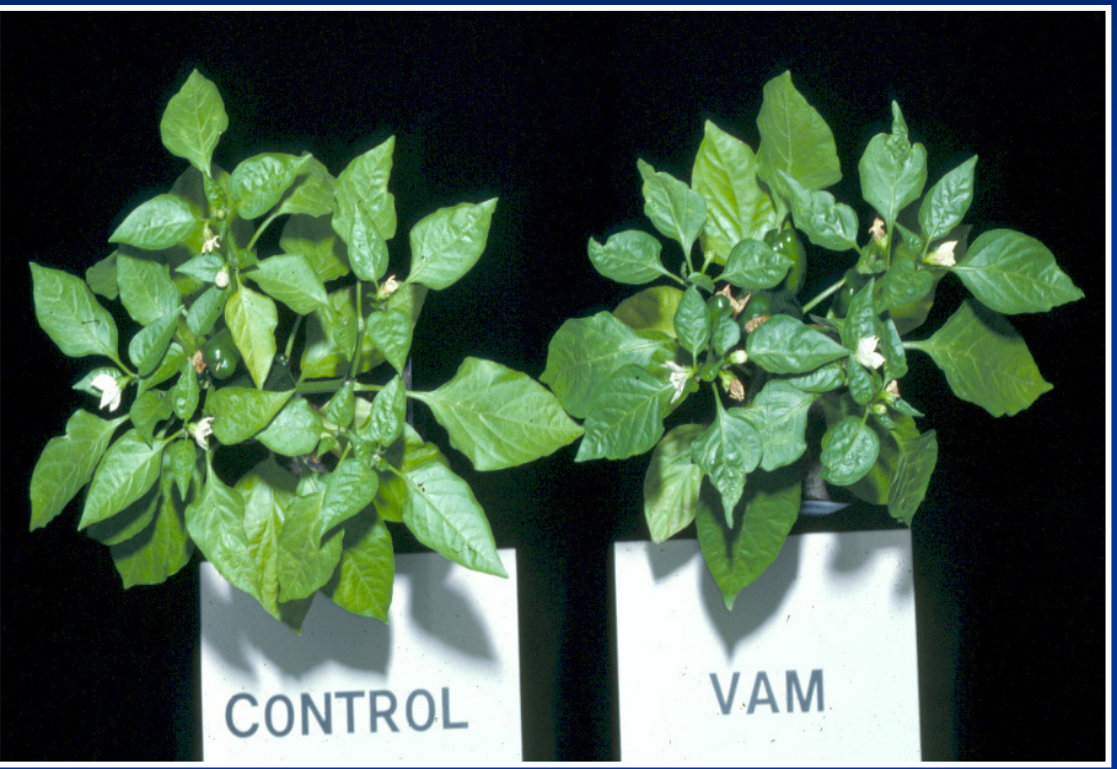
D.H. Marx, Plant Health Care Inc., 1997

- No mycorrhizal association
  - Early-successsion plants
  - Lamb's quarter, buckwheat, broccoli, spinach, beet
- Endo-mycorrhizal fungi
  - VAM, Ericaceous (rhododendron), Orchidaceous
  - Very common, occurs on 85% of green plants
  - Turf grass, vegetables, most shrubs, most trees
- Ecto-mycorrhizal fungi
  - On about 10% of plants, mostly late succession plants
  - Fir, spruce, pine, birch, beech, oak, linden, willow

# Mycorrhizal fungi and water stress

Pepper plants (*Capsicum a.*) under different water regimes

Pictures from F.T. Davies, Texas A&M University, ICOM 2003




Adequate water

# Mycorrhizal fungi and water stress

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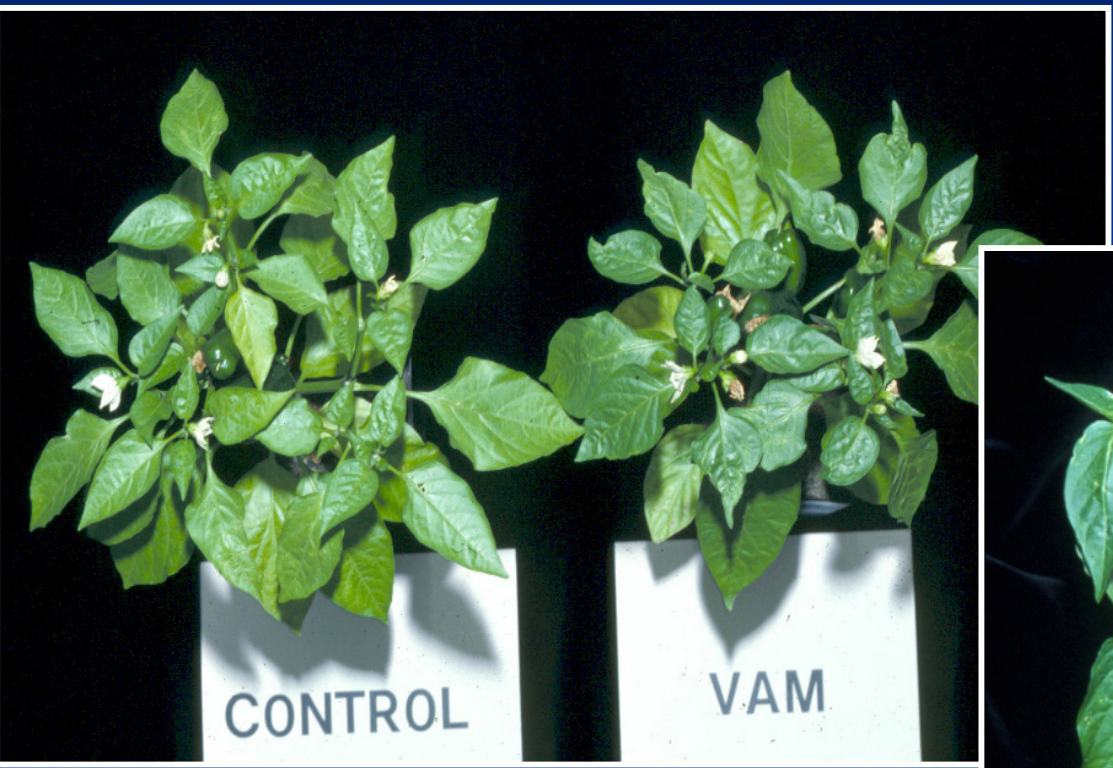



Adequate water

20-day water stress

# Article in the scientific journal “Mycorrhiza”

Mycorrhiza. 2011 Nov;21(8):703-19. Epub 2011 Apr 7.

## Effect of controlled inoculation with specific mycorrhizal fungi from the urban environmen growth and physiology of containerized shade species growing under different water regimes

Fini A, Frangi P, Amoroso G, Piatti R, Faoro M, Bellasio C, Ferrini F.

Department of Plant, Soil and Environmental Science, University of Florence, Vi 50019 Sesto Fiorentino-FI, Italy. alessio.fini@unifi.it

**Abstract**

The aim of this work was to evaluate the effects of selected mycorrhiza obtained i environment on growth, leaf gas exchange, and drought tolerance of containerized plants growing in the nursery. Two-year-old uniform Acer campestre L., Tilia cordata Mill., and Quercus robur L. were inoculated with a mixture of infected roots and mycelium of selected arbuscular (maple, linden) and/or ectomycorrhiza (linden, oak) fungi and grown in well-watered or water shortage conditions. Plant biomass and leaf area were measured 1 and 2 years after inoculation. Leaf gas exchange, chlorophyll fluorescence, and water relations were measured during the first and second growing seasons after inoculation. Our data suggest that the mycelium-based inoculum used in this experiment was able to colonize the roots of the tree species growing in the nursery. Plant biomass was affected by water shortage, but not by inoculation. Leaf area was affected by water regime and, in oak and linden, by inoculation. Leaf gas exchange was affected by inoculation and water stress. V(cmax) and J(max) were increased by inoculation and decreased by water shortage in all species. F(v)/F(m) was also generally higher in inoculated plants than in control. Changes in PSII photochemistry and photosynthesis may be related to the capacity of inoculated plants to maintain less negative leaf water potential under drought conditions. The overall data suggest that inoculated plants were better able to maintain physiological activity during water stress in comparison to non-inoculated plants.

“The overall data suggest that inoculated plants were better able to maintain physiological activity during water stress in comparison to non-inoculated plants.”

# Mycorrhizal fungi applied at the time of planting

# Best use: Apply directly over the roots

# It also works for lawns

USGA Green Section Record – November/December
(Reprinted with permission from author)

## MYCORRHIZAL FUNGI BENEFIT PUTTING GREENS

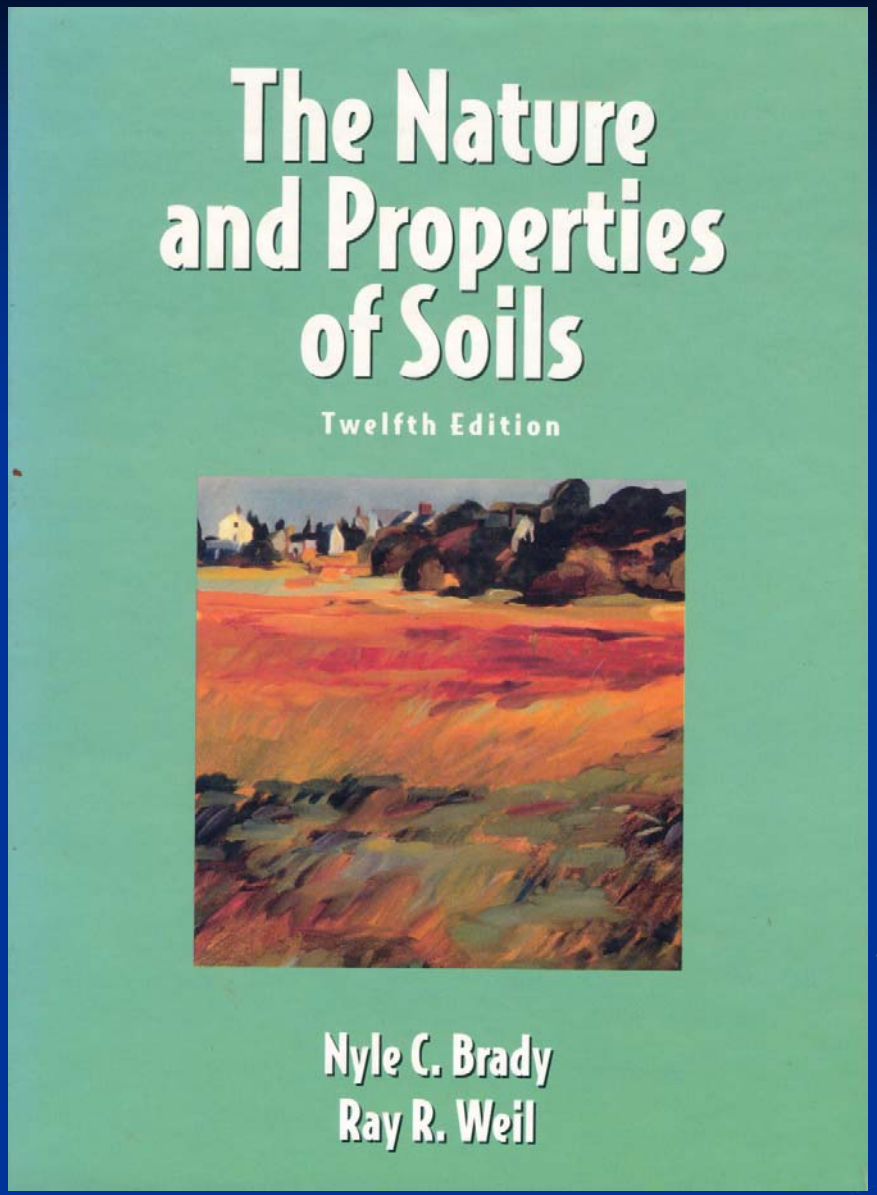
**by R. Koske[1], J.N. GEMMA[2], and N. JACKSON[1] Department of Botany[1] and Department of Plant Sciences[2], University of Rhode Island, Kingston, Rhode Island**

ENDOPHYTIC microorganisms occur in most species of plants as inhabitants of above- or below-ground organs. Their presence in the tissues either elicits no apparent effect in the normal functioning of the infected plants, or the endophytic may confer various benefits to the host. Grasses are no exception and present intriguing examples of these associations that can have application in turf management.

Fungi are the most frequently encountered partners with grasses, and several species that colonize leaves and stems are now known to confer protection from

"In both field mini-plots and greenhouse trials in pots, mycorrhizal turf of Penncross survived drought conditions far better than did non-mycorrhizal turf.

After a five-day drought, mycorrhizal turf in the field study showed 39% less water stress than did control turf, and after eight days, the difference was 60%."

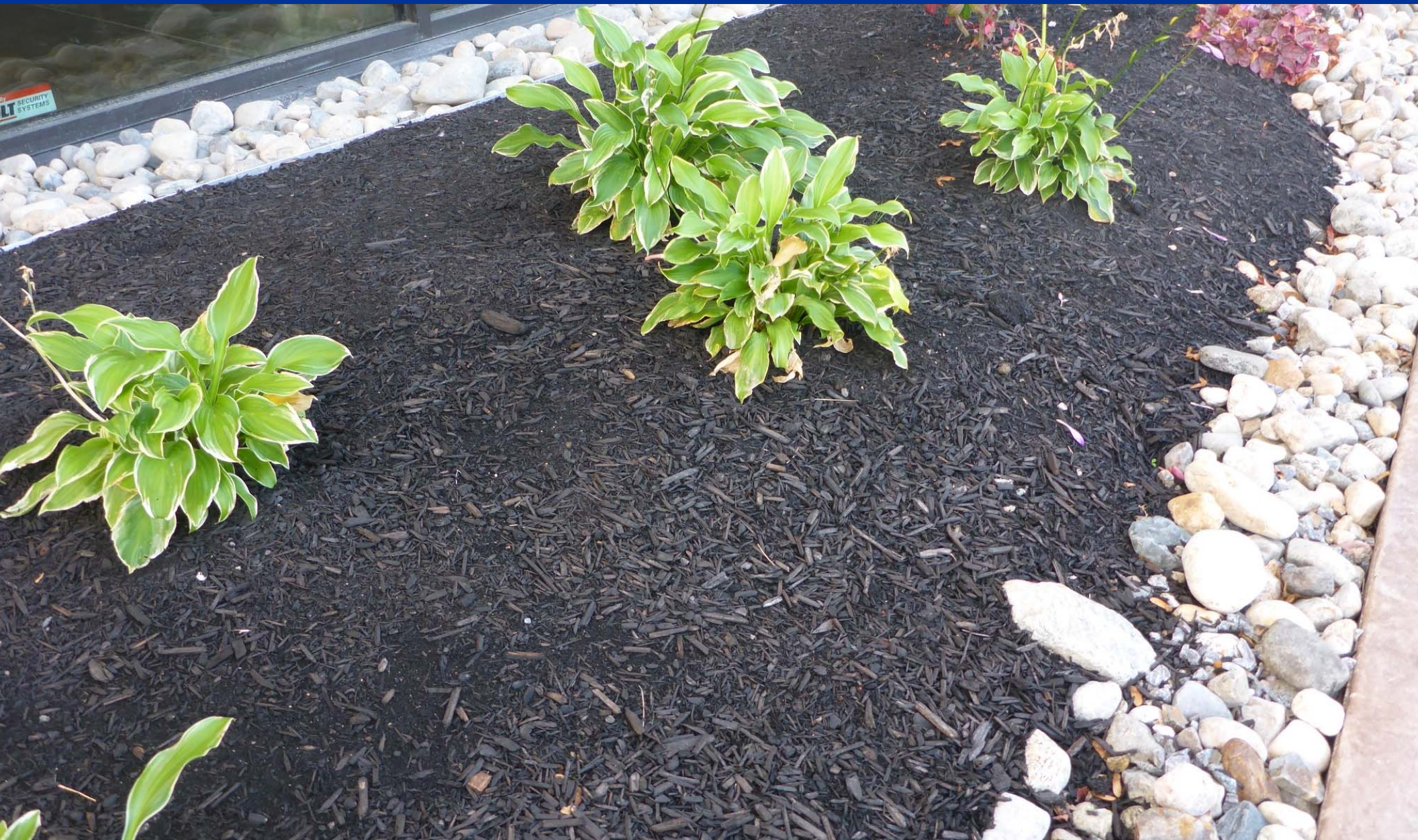



The formation and maintenance of a high degree of aggregation is one of the most difficult task of soil management, yet it is also one of the most important, since it is a potent means of influencing ecosystem function.

“Organic matter is the major agent stimulating the formation of crumb-type aggregates.”

# Using cover crops to supply organic matter

# Using mulches to supply organic matter

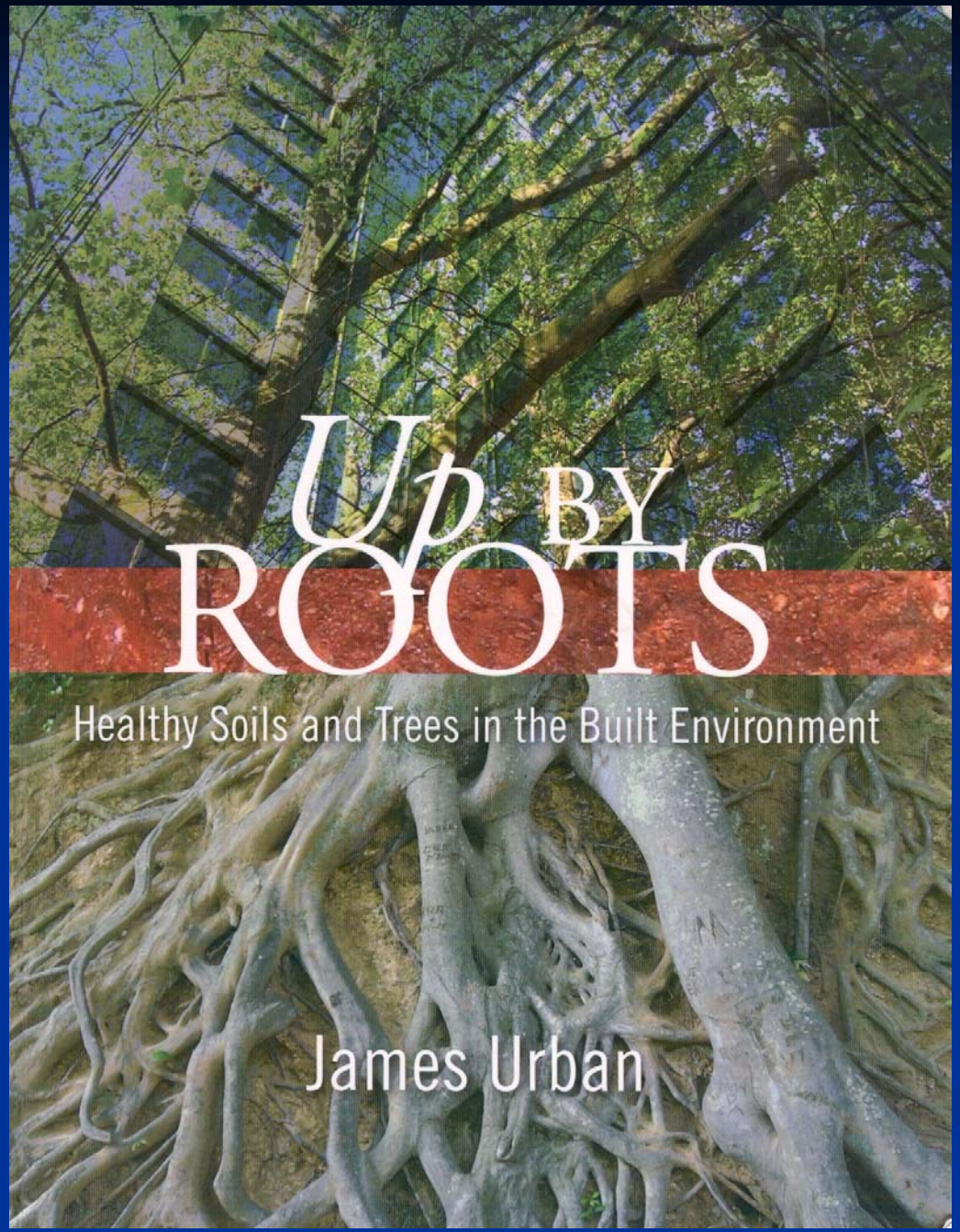


# Using compost to supply organic matter

# Good compost is the colour of dark chocolate

# The compost should be coarser rather than finer

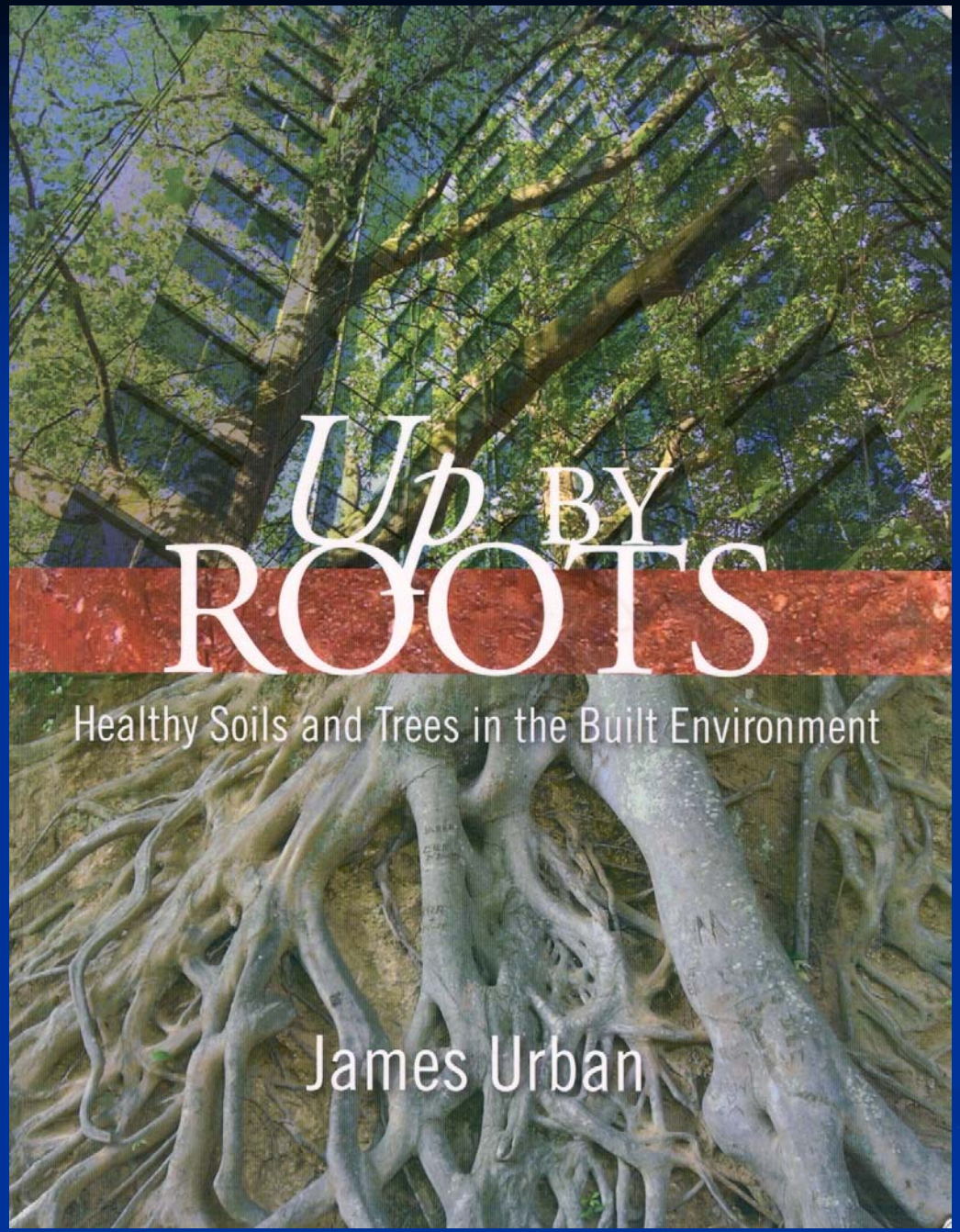
# Using compost at the time of planting…




# “Up By Roots”

2008
Jame Urban

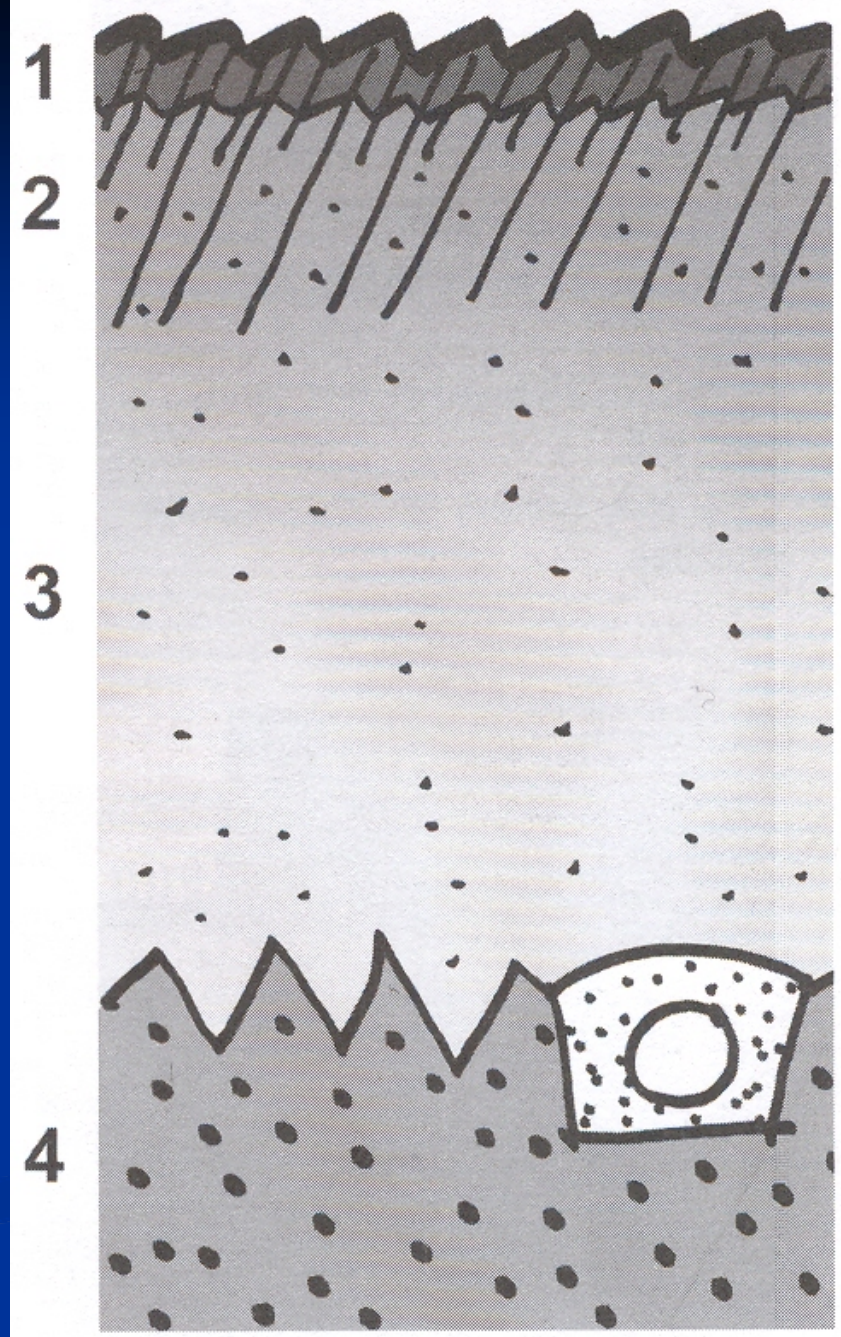
Available at
www.isa-arbor.com/webstore




"City soil is not the same
as farm soil.

It does not
grow a food crop,
it may contain
fill soil trucked from afar,
compaction cannot
be fixed easily
and
it offers limited root space."

Drawing from “Up By Roots”.
James Urban. 2008




4 is “C horizon”
Subsoil, usually native soil
Scarify to ensure water drainage

3 is “B horizon”

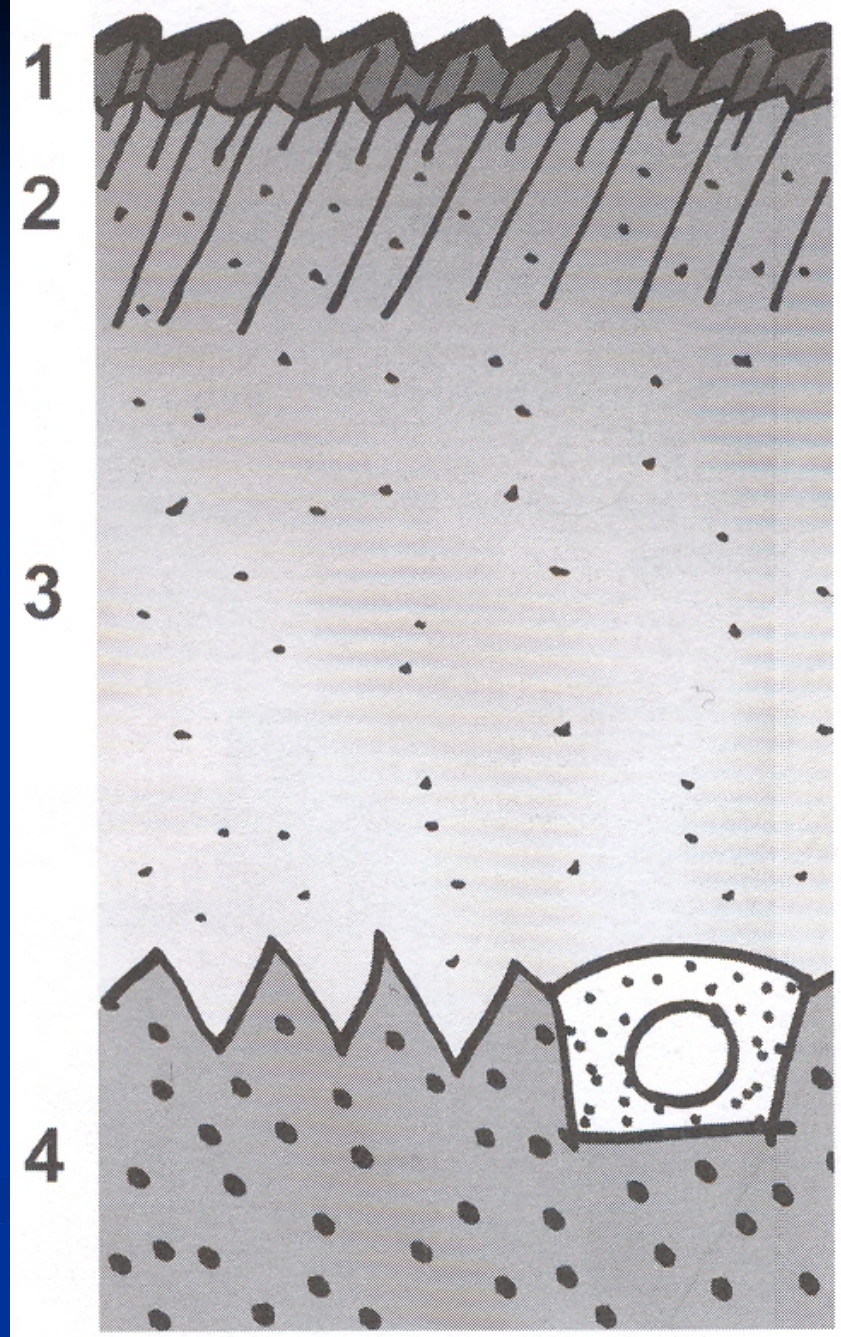
Important for good water drainage

Mix compost 10 to 15% by volume

4 is “C horizon”

Subsoil, usually native soil

Scarify to ensure water drainage



2 is “A horizon”

Where the plant roots will grow

Mix (…) compost in the top 15-cm

3 is “B horizon”

Important for good water drainage

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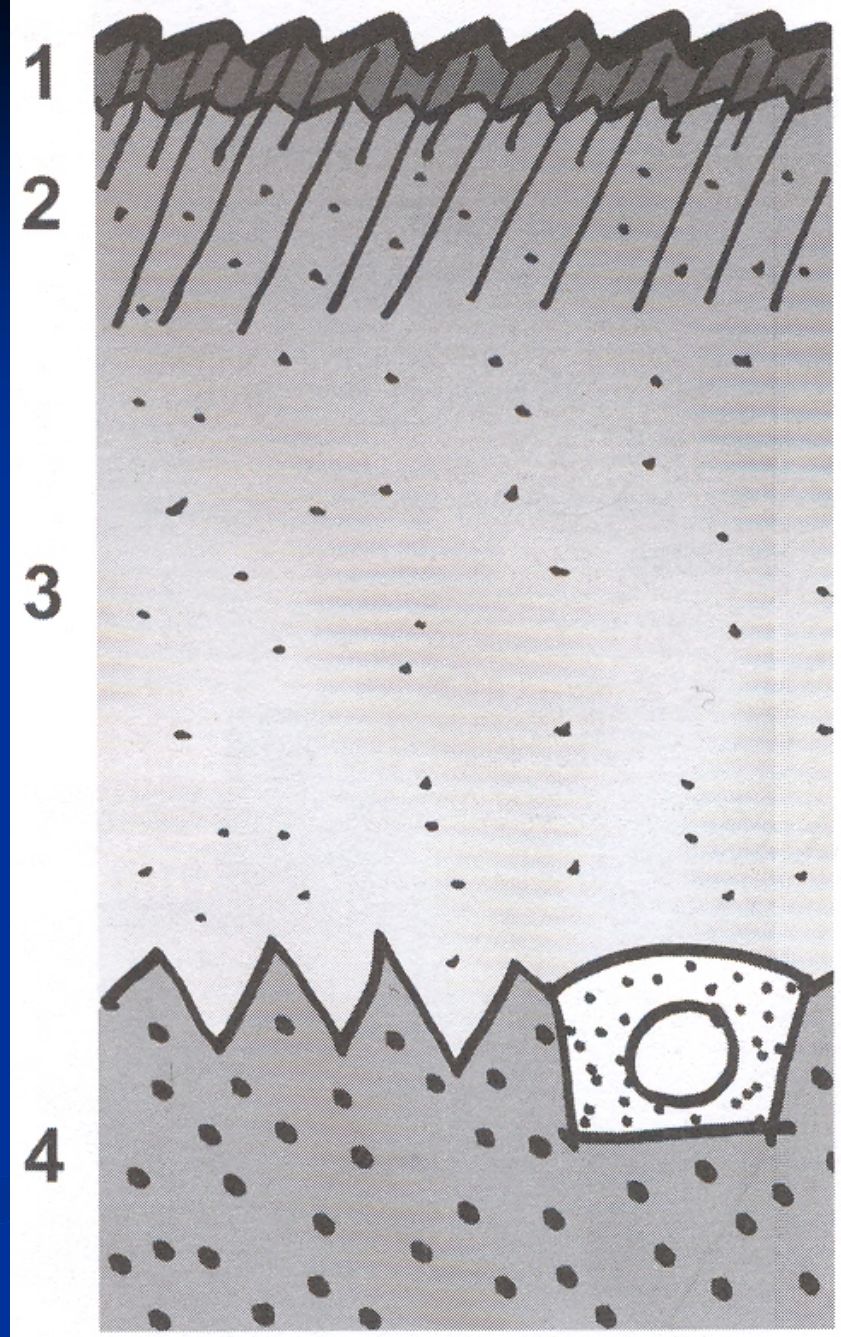

1 is “O horizon”

Surface: 5 to 7.5 cm of mulch

Replenish every 2 to 3 years

2 is “A horizon”

Where the plant roots will grow

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3 is “B horizon”

Important for good water drainage

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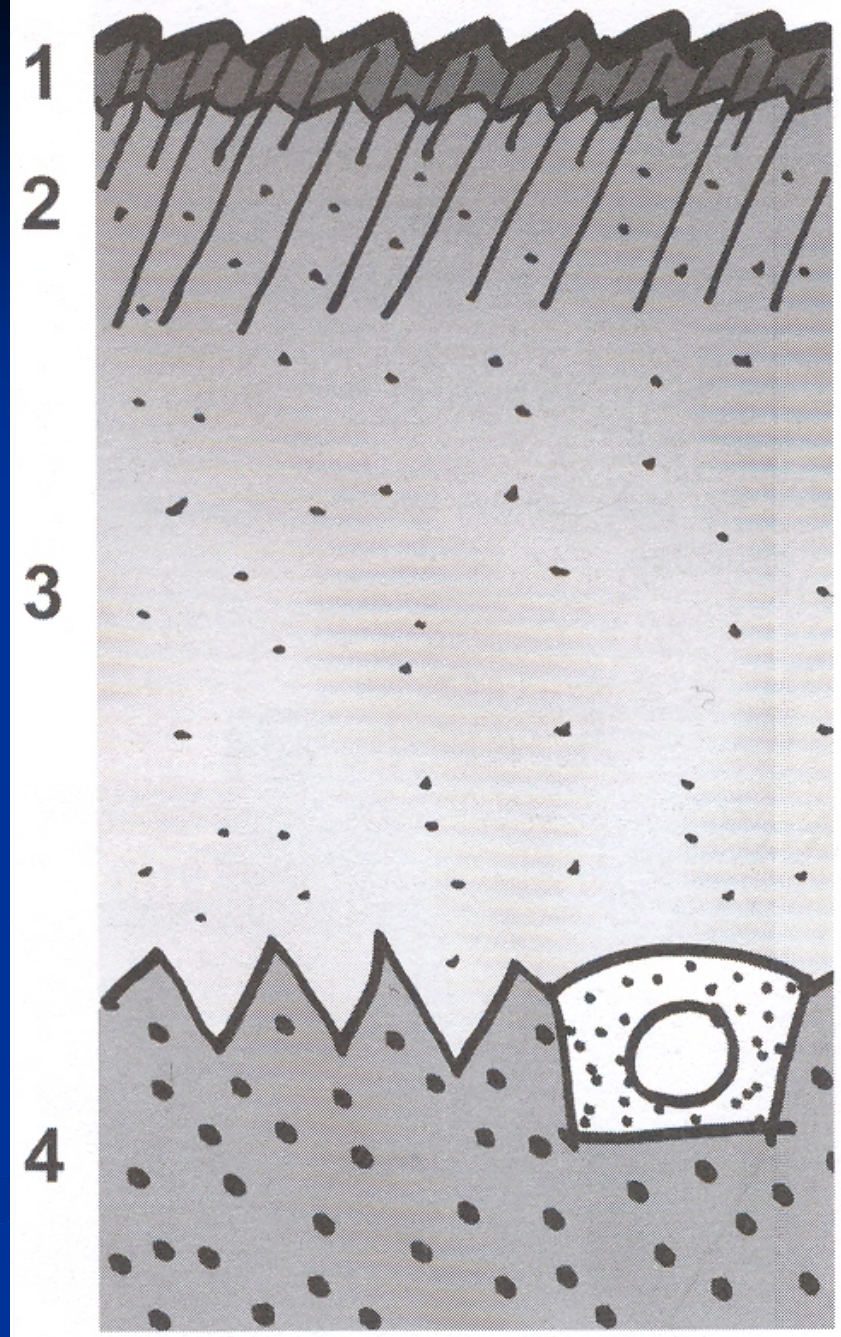

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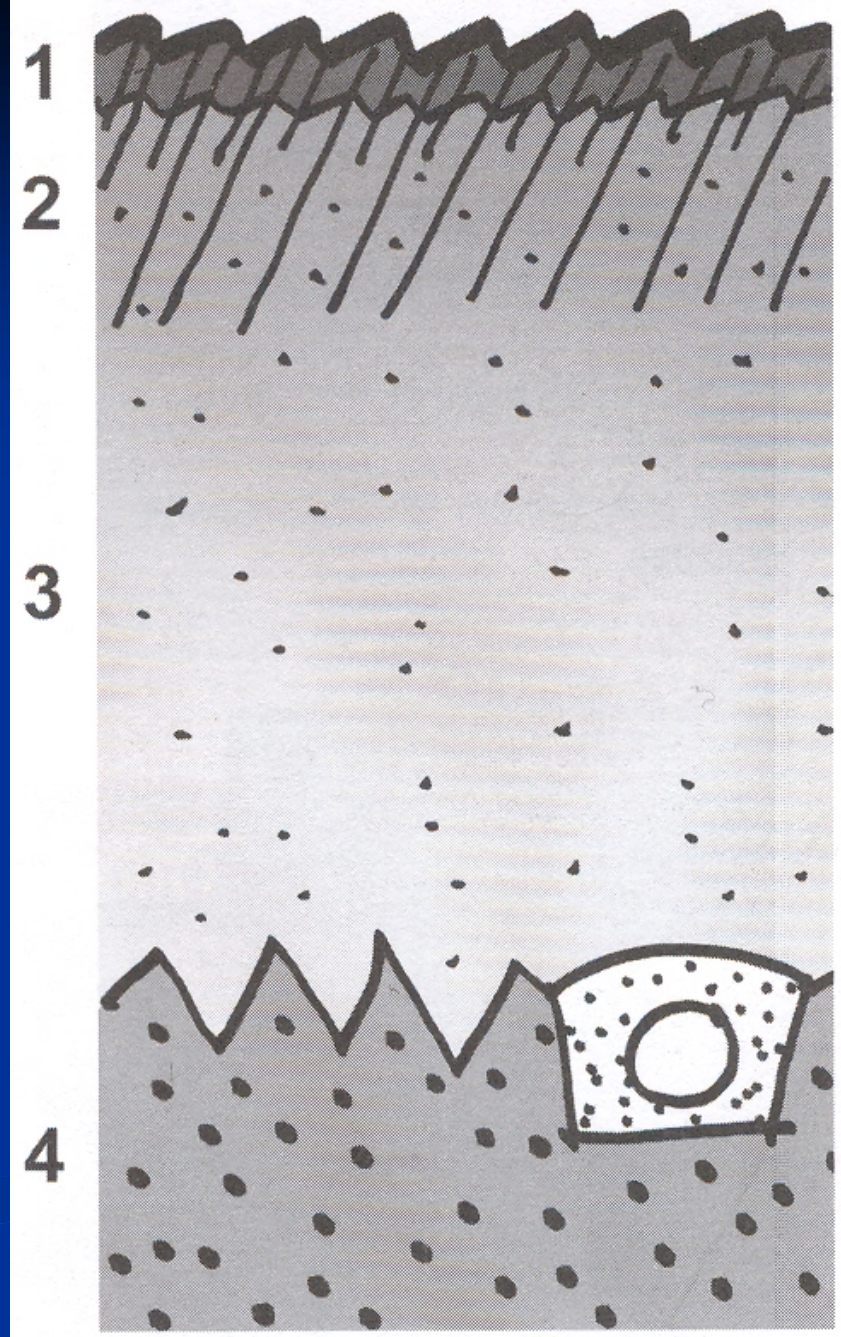

# Question # 5
# James Urban and amending the planting site

# How much compost is recommended for the A horizon (where the roots are growing) ?

A. Do not mix compost in the A horizon

B. 1.5 to 2.0 cm of compost in the top 15-cm of soil

C. 5 to 7.5 cm of compost in the top 15-cm of soil

D. 10-cm of compost in the top 15-cm of soil

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3 is “B horizon”

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4 is “C horizon”

Subsoil, usually native soil

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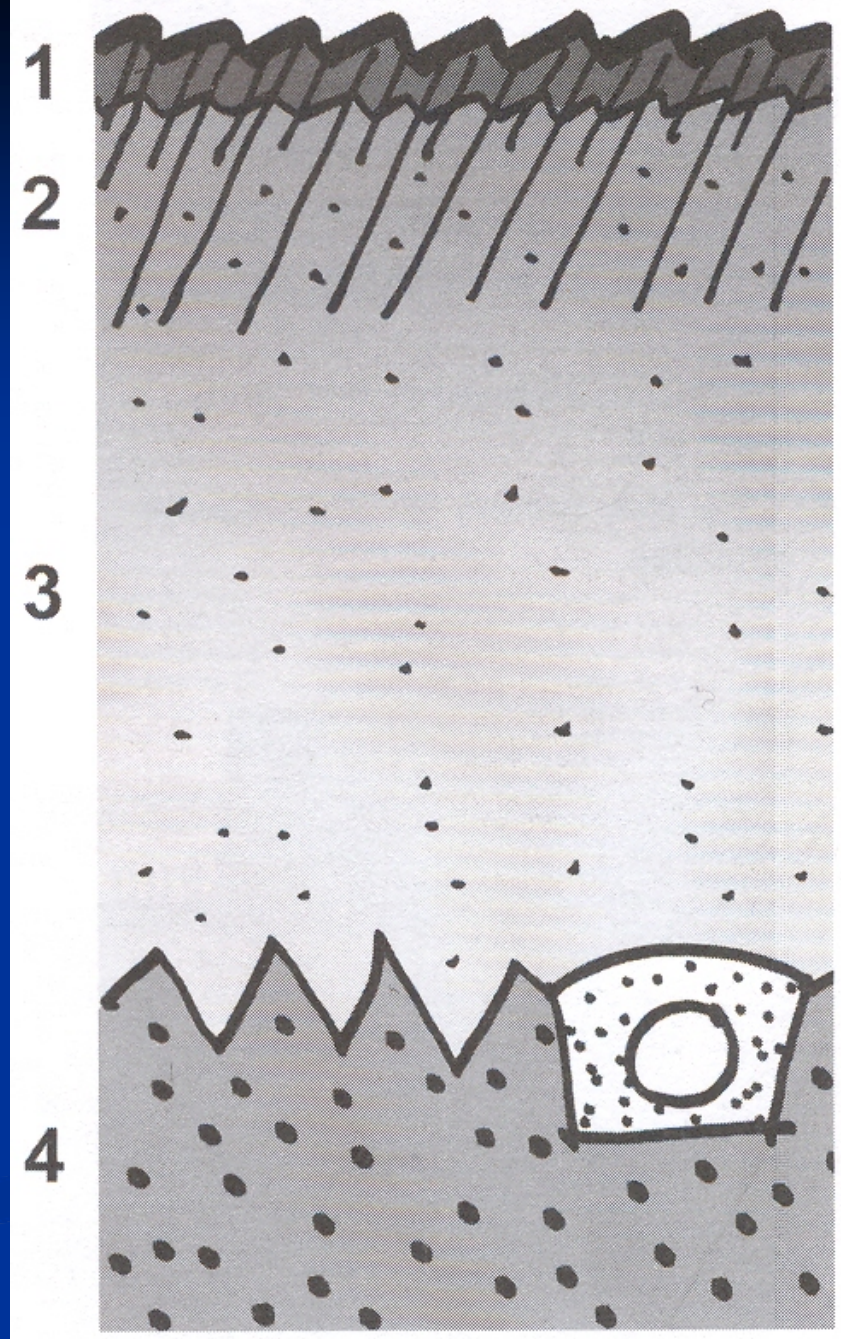


# Using compost as mulch

## Aim to mimic the forest floor

On surface: 5 cm of quality compost

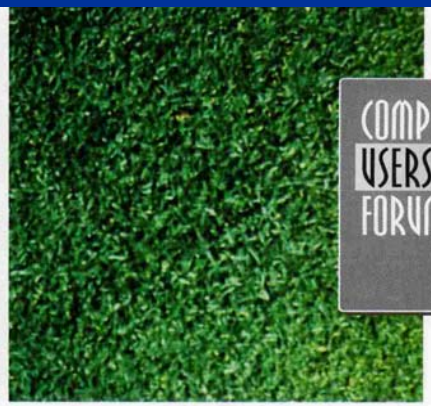
Cover with 5 cm of wood chips or bark

# White threads are hyphae from soil fungi

# Aggregation by microbial activity

# Using compost in lawn care (topdressing)

# How much compost to use ?



COMPOST USERS FORUM

Illustrating suppression of Pythium root rot on creeping bentgrass in compost-amended soil, above photos show effects 14 days after inoculation of no compost (left) and 20 percent compost, v:v (right).

## Compost-Induced Suppression Of Turf Grass Diseases

**This first part of a detailed report shows how composted products promote healthy turf grass, suppress disease development and reduce need for costly fungicide and fertilizer inputs.**

**Part I**

*Eric B. Nelson and Michael J. Boehm*

UNTIL the 1940s, composts served as one of the principal sources of fertilizer used on golf courses and athletic fields. The utilization of composts declined dramatically, however, with the advent of synthetic, urea-based fertilizers, and organic fertilizers such as Milorganite, which offered more consistent and predictive nutrient release characteristics. After nearly 60 years of heavy reliance on chemical inputs, we find ourselves in the midst of a resurgence in the use of organic matter amendments and topdressings for managing high quality turf grass. Recent research on the use of composts on turf grass has focused on the suppression of turf grass diseases, the potential for reducing fungicide and fertilizer inputs, and the effects of composts on the physical, chemical and microbiological properties of soils.

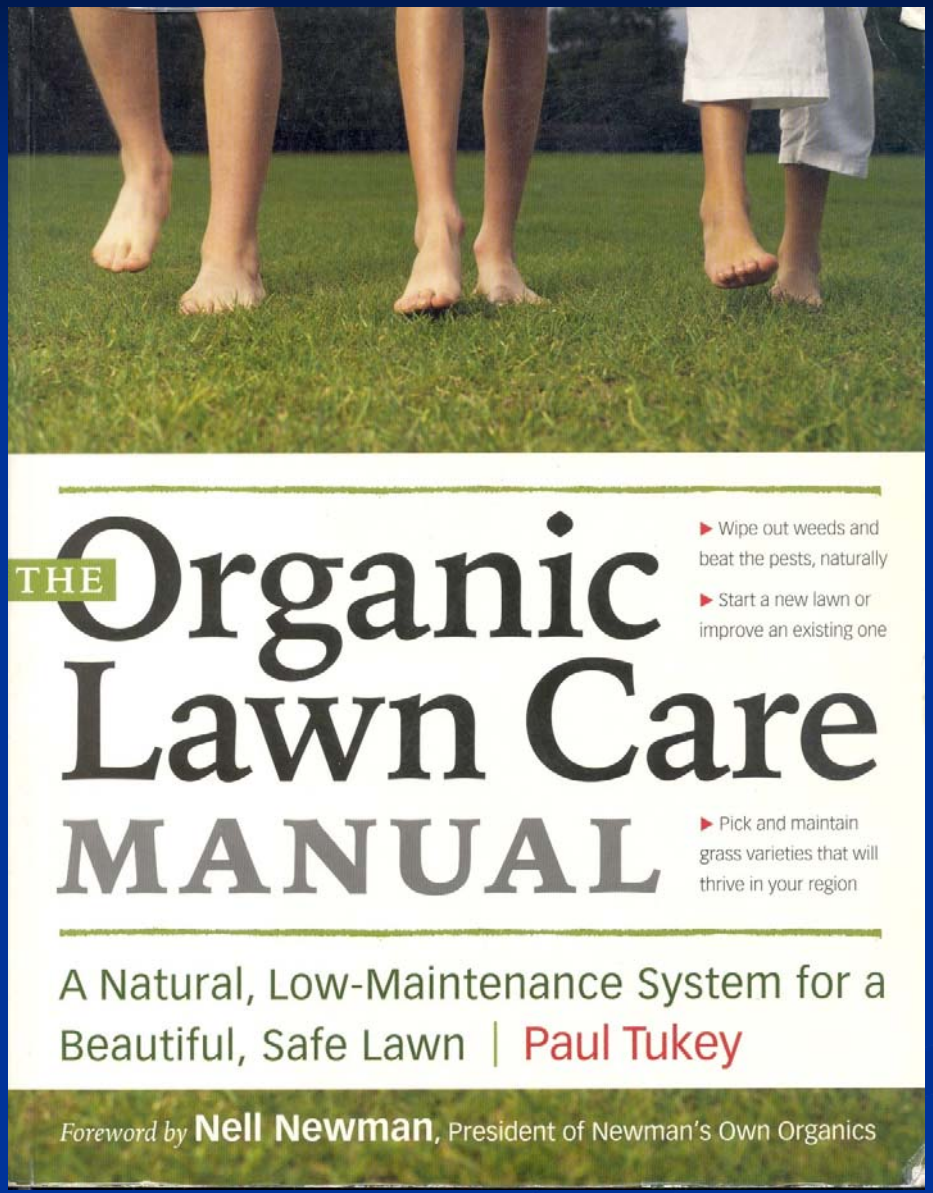
Currently there are between 20 and 30 million acres of turf grass in the United States, consisting of lawns, parks, golf courses, sod farms, industrial and institutional grounds, right-of-ways, etc. Fungal diseases represent one of the most important limiting factors to maintaining the aesthetics and functional quality of turf grass plantings. Managing diseases is particularly difficult on golf course turf where agronomically unrealistic cutting heights, high traffic and compaction, and low nutrient inputs to maintain unnecessarily high green speeds, have placed unprecedented stresses on turf grass plants, making them highly susceptible to infection.

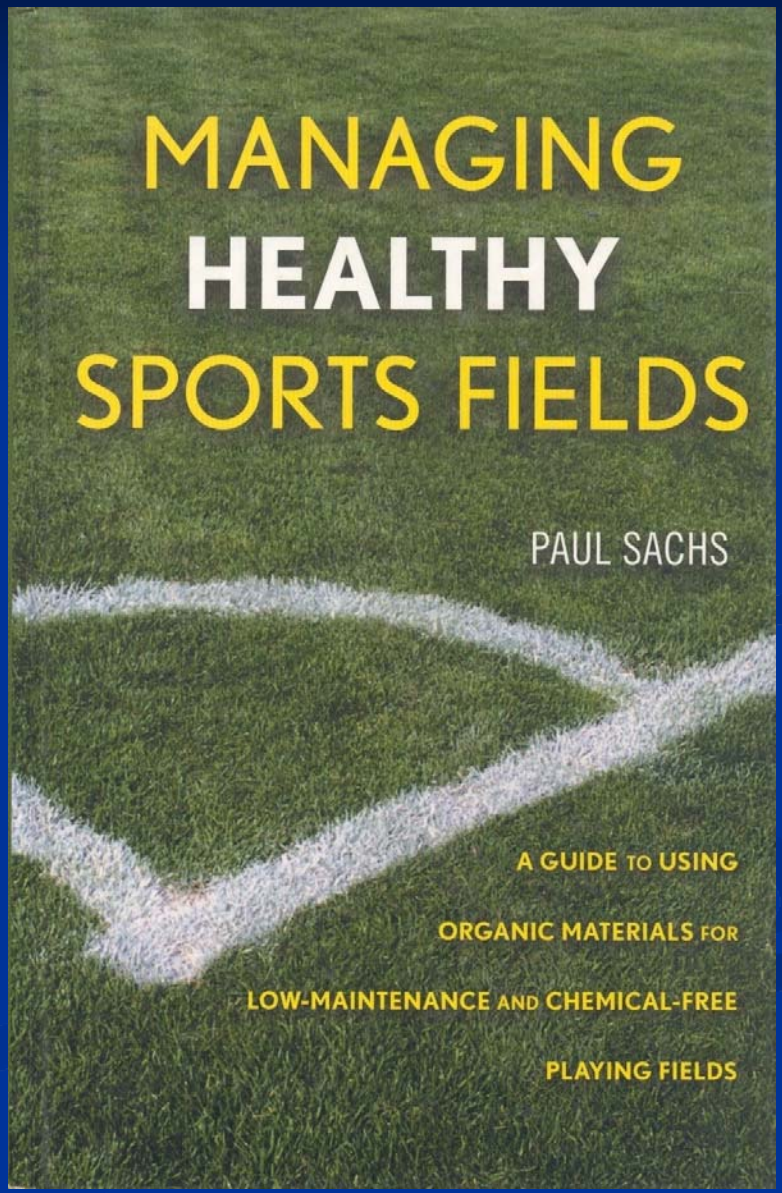
The application of fungicides has historically been the major tactic for controlling diseases on high quality turf grasses. Because of the ideal conditions for disease development, golf course turf grasses receive more fungicide inputs than any other agricultural or horticultural crop, with total dollars spent exceeding 20 percent of the total U.S. fungicide market. The vast majority of those



E. Nelson and M. Boehm
Cornell University
Published 2002

# Research has become recommendation



# Question # 6
# Using compost for lawn topdressing

# What is currently recommended for using compost in topdressing of lawns ?

A. Apply 0.5 to 1.0 cm deep

B. Apply 1.0 to 2.5 cm deep

C. Apply 2.5 to 5.0 cm deep

D. Use compost at installation, not for topdressing

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## *Beginning Applications*

In spring of the first year, begin by cleaning up the lawn with a hand rake or a dethatching machine (see page 97). Move all debris to the compost pile. At this point, you may also consider aerating the soil if it feels compacted (see page 98).

After cleanup, top-dress the lawn with a ½-inch layer of compost, and spray on compost tea (see page 130). Apply fertilizers and any soil amendments based on the soil test results. If



### HOW MUCH COMPOST IS NEEDED?

To calculate how much material is needed to cover a given area, multiply the thickness of the intended topdress layer by 3.086 for cubic yards per 1,000 square feet, or multiply by 134.44 for cubic yards per acre. For example, to topdress a ¼-inch layer of material,

$$3.086 \times 0.25 = 0.77 \text{ yd}^3 \text{ per } 1000 \text{ ft}^2, \text{ or}$$
$$134.44 \times 0.25 = 33.6 \text{ yd}^3 \text{ per acre.}$$

If the topdress mixture contains 50 percent compost, then 16.8 cubic yards of compost is needed per acre of turf per topdress application. (To convert fractions to decimals, divide the numerator by the denominator, e.g., ¼ = 1 ÷ 4 = 0.25.)

Section 3

# WaterWise Landscaping

Regional District of North Okanagan – Greater Vernon Water

## Landscape & Irrigation WaterWise Handbook




Overwatering can lead to overgrowth.

Too much water makes plants grow more than they should, meaning extra mowing, pruning, and fertilizing.

Check your system once a month to make sure the spray is staying on your plants and not the pavement.

Sprinkler heads are easily broken, particularly those near driveways or walkways.

Sprinkler heads can be easily replaced to reduce overspray and better fit the area you're watering.

During the monthly check, make sure that all of the sprinkler heads are directed where they

**Topdress** - add no more than 6mm (1/4") of topsoil mixed with compost in a thin layer over the lawn. This returns nutrients to your lawn like a fertilizer while also helping improve your soil.

Plan to topdress immediately after aerating in the spring.

If grass is well established it also helps to leave the clippings on the ground after mowing. This recycles nutrients back into the soil.

If you are regularly mowing to the recommended 6-8cm, clippings should be short and mix well into the lawn.

Train your lawn to use less water by delaying watering until June to encourage deep root growth.

An application 1 cm thick
is 1.5 cubic yards per 1000 square feet of lawn

# Thank you for attending !