APBI 200
SOIL COMPONENTS

Soil Physics -
Qualitative description of soil wetness

Lecture outline

A. Maximum retentive capacity

B. Field capacity (FC)

C. Permanent wilting point (PWP)

D. Available water storage capacity (AWSC)

E. Hygroscopic water

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Terms of a qualitative soil wetness describe various stages along continuum of soil wetness, and should **not** be interpreted to imply that soil water exists in different "forms"

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Saturation

When all soil pores are filled with water (ψ_m ~0), the soil is said to be saturated with water and it is at **maximum retentive capacity**

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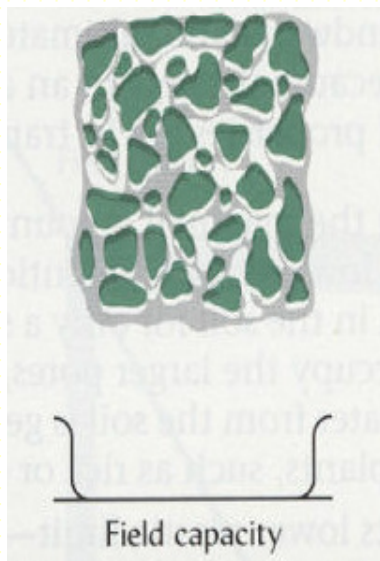
Field capacity

Field capacity (FC) of a soil is a condition a couple of days after being saturated, when the rapid drainage phase is past and drainage has become slow due to drop of K with declining water content
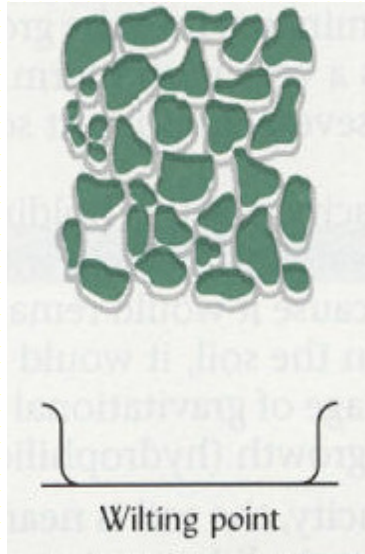
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Field capacity often
corresponds to a matric
potential of -1 to -3 m
(or -10 to -30 kPa
or 0.1 to 0.3 bars).

At field capacity a soil:

- has maximal amount of water that is useful to plants

- is near plastic limit and optimum wetness for tillage or excavation

- has optimal aeration for most microbial activity and growth of most higher plants

Permanent wilting point (PWP)

corresponds to the water content retained by the soil when the matric potential is about -150 m (or-1500 kPa or 15 bars)

Wilting point

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Xerophytes

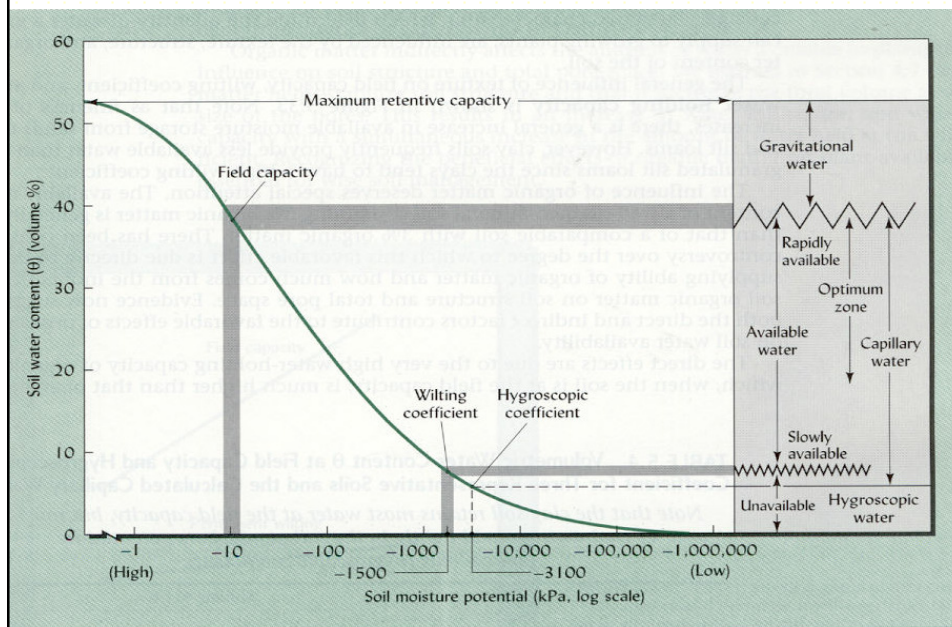can survive ψ_m of –250 m (or –2500kPa or 25 bars)

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Available water storage capacity (AWSC) is

considered to be that water retained in soils between the states of field capacity and permanent wilting point

AWSC = FC - PWP

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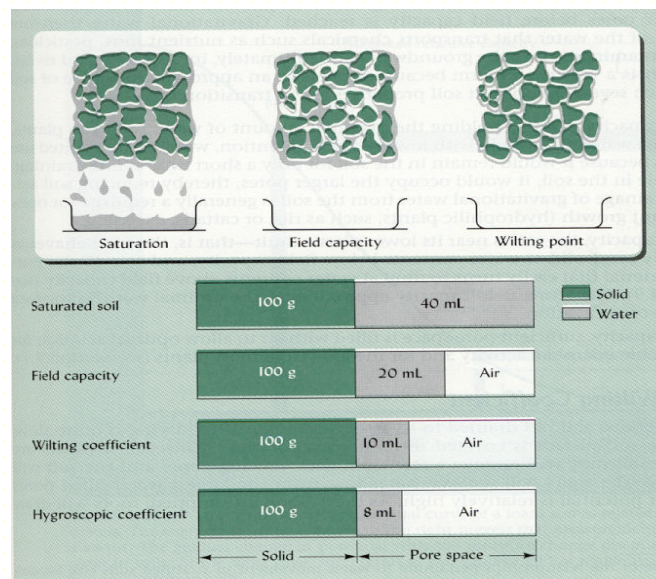
Water content - matric potential curve of a loam soil

Hygroscopic coefficient (or hygroscopic water)

is soil water content below the permanent wilting point, i.e. below a matric potential of about -310 m (-3100 kPa or 31 bars)

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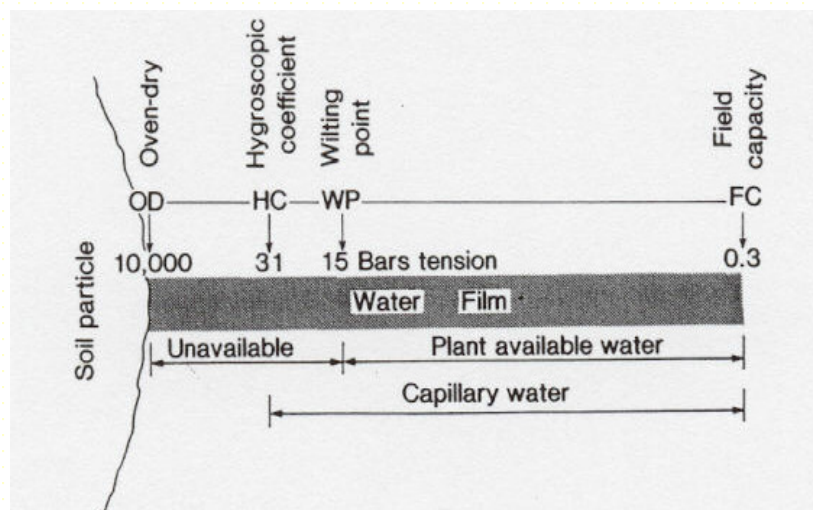# Volumes of water and air in a silt loam at different moisture levels

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The film of water attracted to the surface of soil particle

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