# Considering cloddiness when estimating rooting capacity and soil fertility

**Edoardo A.C. Costantini**

Accademy of Georgofili, Firenze; National Accademy of Agricolture, Bologna; Italy

**eac.costantini@gmail.com**

Clods are chunks of compacted soil masses caused by tillage in wet condition

# Surface clods may be destroyed by cultivation

Clods can be also found on depth!

Deep soil compaction

# Earthworks and clods throughout the soil profile

# Rooting Capacity (Rc)

## The part of the soil volume potentially explorable by roots

$$Rc = Rd \times (1 - St) \times (1 - Cl)$$

Rd = rooting depth to the reference layer
St = stoniness: soil volume occupied by stones
Cl = cloddiness: soil volume too compact to be rooted


Topsoil Rd = 600 mm

St = 0%

Cl = ~ 0.5 (BD = 1.45 C)

Rc = ~ 300 mm

Subsoil Rd = 900 (1500-600) mm

St = 0%

Cl = ~ 0.95 (BD = 1.7 C)

Rc = ~ 45 mm

Rc = ~ 345 mm;

AWC = 0.13 $mm\ mm^{-1}$

total AWC = 44.85 mm

# Take-home messages

1. Soil cloddiness is becaming more frequent, because of intense mechanization and worsening of soil structure
2. Hard clods can be not only found at the soil surface but also throughout the soil mass, deeply affecting soil rootability.
3. The evaluation of rooting capacity is suggested for a better estimate of the potential soil water and nutrient availability, and in the modeling of soil processes and plant growth.