Tillage's indirect impacts on the soil

- Soil state resulting in C loss is the same state inducing water loss!
- The quantity of C loss affecting tillage equals or may exceed the amount of C composed into the soil in the same period.

- Continuous application of humus-conserving tillage may result in a balance near to the original level

Organic matter / Carbon management

- better water storage
- better soil bearing capacity
- better soil workability
- lower fuel demand
- less sensitivity to compaction
- longer duration of looseness
- stabile soil structure
- favourable biological processes
- less climate stress / yield loss

Tillage's indirect impacts on the soil

Non-tilled soil:
humification = decomposition

C wasting tillage:
humification < decomposition

C-conserving tillage
(>5-6 years):
humification = decomposition

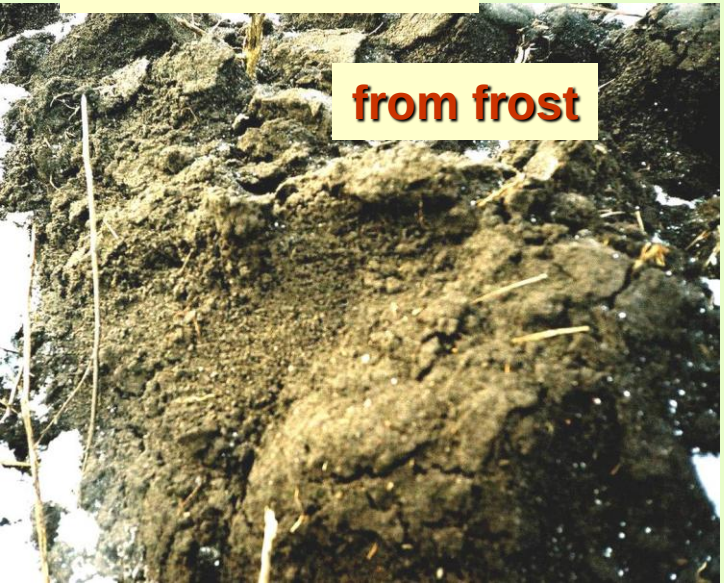
- Preserving OM and C plays an important role in the soil's resistance to settling and compacting as well.

- From the aspect of their impacts on C balance tillage interventions qualify as preserving, balance keeping or C waste increasing

Tillage's indirect impacts on the soil

mellowing → **Harmony or disharmony between soil physical, biological and chemical condition**

These are labile



Tillage's indirect impacts on the soil

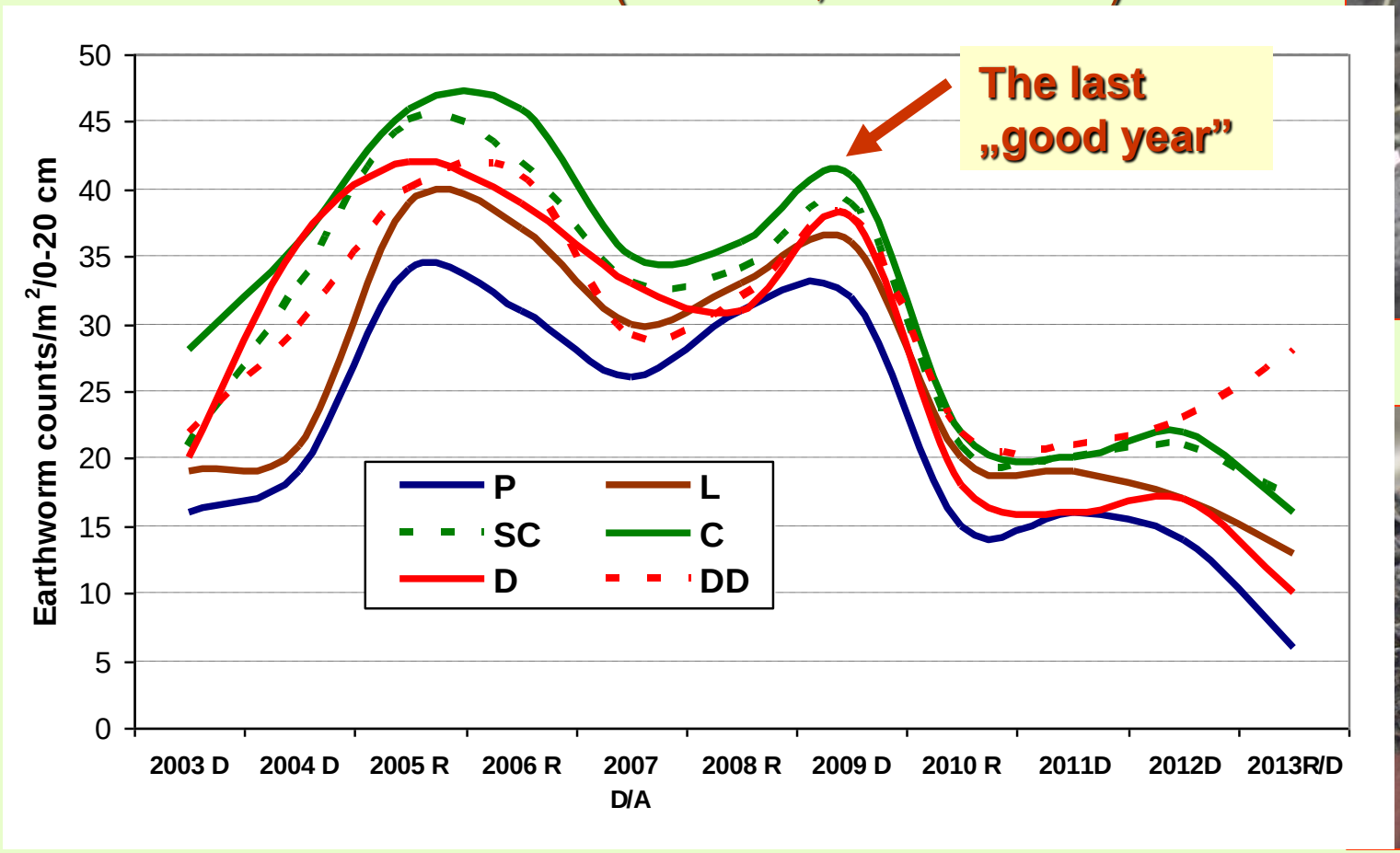
Earthworm activity

Degree:

<10 / 11-15 / 16-20 / > 21 count/m^2/ 0-20/ 0-25 cm layer, or
<10 / 11-20 / 21-30 / > 31 burrows /m^2/0-20/ 0-25 cm layer

Soil state, as habitat for earthworms in different seasons

(Hatvan, 2002 – 2013)



Legend: D: dry year, R: rainy year, A: average period
P: ploughing + levelling, L: loosening, SC,C: cultivator use,
D: disking, DD: direct drilling

Earthworms burrows and casts in the soil indicate good habitat that is good, preserved condition

Tillage induced factors impacts on… (summary)

Factor	soil	plant
Looseness	Free from compaction = regeneration = less climate sensitivity	Deep rooting = less climate sensitivity
Depth of loosened layer	Depth of water storing! No compacted layer = good water infiltration and storing	Depth of water intake! 35-45 cm good, 28-34 cm adequate, 18-20 cm dubious (weather!)
Aggregation	Less sensitivity to settlement, good trafficability = less climate sensitivity	Deep rooting = less climate sensitivity
Optimal water balance	Intake > loss = less climate sensitivity	Good chance of water utilisation
Surface conservation	Soil preservation = less climate sensitivity	Less plant sensitivity
Optimal C balance	Incorporation > loss = less climate sensitivity	Better water state = less climate sensitivity

Repin, 1887: Tolstoy (Russia)