VESS 2020 Version 09.06.2020	Layer appearance Aggregate/clod size	Appearance of intact aggregate/clod		Resistance [observe only in optimal moisture conditions, if not optimal refer to appearance after opening]	Opening (breaking) the clod	Appearance of opened aggregate/fragment size and shape	Appearance after "opening"		Roots and color [root observation only possible on established crop]
		Size	Shape				Shape	Porosity	
Sq1 Very good (friable)		Mostly < 6 mm. [not relevant if recent tillage --> refer to shape instead]	**Crumbly.** Small rounded aggregates	readily crumble with fingers			Large aggregates are composed of smaller ones, held by roots.	High intra-aggregate porosity	Roots within aggregates
Sq2 Good (intact)		From 2 mm to 7 cm [not relevant if recent tillage --> refer to shape instead]	Rounded aggregates. No clods present.	aggregates easy to break with one hand	porous clod: The whole clod can be colonized by roots. When "opening" the clod, it does not break exactly where you want and for Sq1-2 seems to be composed of smaller aggregates.		Opening reveals some smaller agregates and faces with rough structure	**High intra-aggregate porosity**	Roots within aggregates
Sq3 Moderate (firm)		From 2 mm to 10 cm. Less than 30% are <1 cm.	Mixture of various sizes of rounded aggregates. Possibility of some angular non-porous clods	most aggregates break with one hand			Opening reveals faces which are **more or less rough**. Possibly some areas with flat faces	Low intra-aggregate porosity. Some macropores and cracks may be present.	Few roots but mostly within aggregates.
Sq4 Poor (compact)		Mostly large >10 cm. Less than 30% are < 7 cm.	Sub-angular clods. With posible sharp edges. Horizontal/platy structures or cracks also possible.	requires considerable effort to break clods with one hand	non-porous clod, massive structure: roots cannot grow freely, they are restricted. When "opening" the clod, it breaks exactly where you want or along cracks and reveals flat faces.		Opening a clod reveals rather flat faces.	Very low intra-aggregate porosity. Distinct macropores	**Roots usually clustered in macropores and cracks**. Or around non-porous clods
Sq5 Very poor (very compact)		Mostly large >10 cm.	Angular clods. Sharp-edged and non-porous.	difficult to break up			Opening a clod reveals flat angular faces. **Possible to make sharp edged cubes**	No intra-aggregate porosity. If some pores present, then restricted to a few macropores	Anaerobic zones with **grey-blue color possible**. Few roots, if present restricted to cracks.

Image labels: 1.5 cm · 6 cm · rough faces · 13 cm · distinct macropores · flat face · angular edges · 15 cm · restricted roots

cm scale: 0 · 1 · 5 · 10

VESS$_{2020}$ Visual Evaluation of Soil Structure (v.09.06.2020)

Field methodology

Equipment? Spade, measuring tape, camera, paper, pencil, plastic sheet.

When? The soil should be moist. Avoid very wet soil (deformable) and very dry soil (hard). Avoid recent tillage. Preferentially choose a time when roots are well established.

How many? 5 samples are necessary to describe a homogenous field.

How to proceed?

1. Extract a block with a spade of about 25-35cm depth.
   - **Do not trample or compress the side of the hole which will be evaluated**
   - It can be useful to make a «pre-hole», in order to facilitate block extraction.
   - For tilled soils, **the bloc must include the plough pan.**
2. Open the block and gently manipulate using both hands to reveal cohesive layers or clumps
   - Either open it like a book to reveal the structure.
   - Either by removing the soil that has been compacted by the spade.
3. Identify the layers
   - Observe changes in soil structure (compactness, aggregate size and shape, root behaviour) and identify the number of layers with different structures.
   - Measure the thickness of each layer.
   - Score each layer individually with the illustrated chart.
   - If the block contains the subsoil, **evaluate subsoil separately with the SubVESS$_{2020}$ chart**.
4. Observe and score the aggregates and clods
   1. Start with observing whole aggregates/clods to estimate their sizes and general shapes (rounded? angular?). Use the illustrated chart to score what you observe.
   2. Then open (break) these aggregates/clods to reveal internal structure (are they composed of smaller aggregates? Are they porous? Do roots go everywhere?). Confirm (or not) the score you chose.

Explaining video of the method on Youtube channel Agroscopevideo
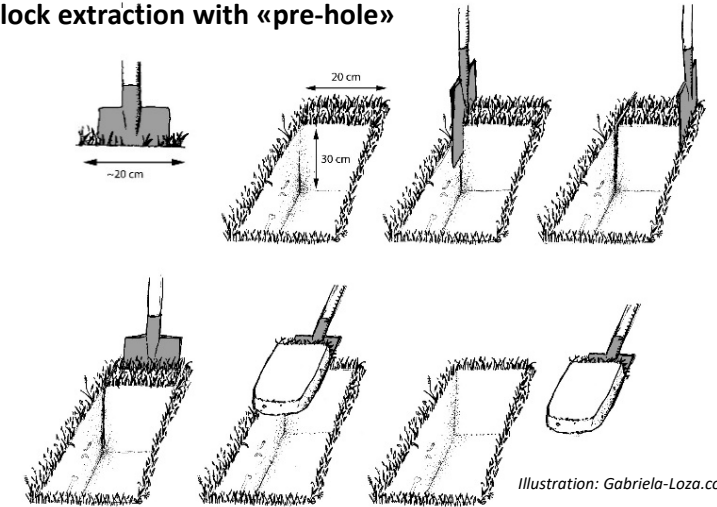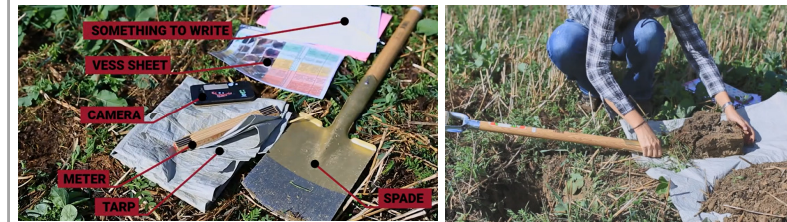
Block extraction with «pre-hole»

20 cm
~20 cm
30 cm

Illustration: Gabriela-Loza.com

SOMETHING TO WRITE
VESS SHEET
CAMERA
METER
TARP
SPADE

Adaptation to anthropogenic soils. These soils are more heterogeneous compared to natural soils. The different structural qualities are not only distributed vertically but also horizontally within a layer. In this case, the proportion of each structural quality observed within a layer must be recorded and averaged for the layer. The weighted average of the layer is then used to calculate the weighted average of the block. This way of proceeding also allows to keep a track of the observed heterogeneity.

Calculate the score of the whole block

Score of the block = [(thickness layer_1 x score layer_1) + (thickness layer_2 x score layer_2) + (thickness layer_n x score layer_n)] / total thickness of the block

Example of calculation: A block of 27 cm containing a layer 9 cm thick with a score of Sq2 and a layer 18 cm thick with a score of Sq3.

Score of block= [(9x2)+(18x3)]/27 = 2.7

9 — SCORE 2 — LAYER 1
27
18 — SCORE 3 — LAYER 2

VESS App
An application for smartphone and iPhone is available for free

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Agroscope — gutes Essen, gesunde Umwelt