

# Subsoil Visual Evaluation of Structure, SubVESS

Subsoil structure quality, Ssq, is a rating of the agronomic quality of soil. Use of this rating allows identification of problem soil layers caused by compaction or waterlogging that may need improvement. Work through steps 1) to 10).

1) Dig profiles to 1-1.4m depth located across the direction of travel of cultivators and tractors. Consider locating profiles on "high yielding areas".

2) Remove soil from any surfaces compacted or smeared during digging the pit using a spade or a knife.

3) Observe the soil below the topsoil, the transition layer, and to the expected rooting depth (~ 30 cm to 1.4 m depth).

4) Aim to record information on the score sheet.

5) Identify layers of contrasting colour and hardness. Look for hard layers e.g. the transition layer that may be compacted or platy, by prodding with the point of a knife or a pen. Usually there are only one or two layers.

6) Mark the layers with a knife or by inserting plastic tags and measure their depths.

7) Using the flowchart overleaf, give a score for each heading, starting with mottling, then strength (already assessed with the knife), then roots, porosity (large worm holes and cracks) and aggregates. When observing strength and small pores, use a knife to extract fragments about 10 cm long, 10 cm wide and 2-3 cm thick. To assess the strength of a fragment, hold the ends in either hand and snap like a twig. Look for small pores on the broken surfaces.

8) Use the individual assessments to reach the final score e.g. Porosity 3b, Roots 3c, Strength 3d, Structure 3e = Ssq3.

9) After scoring each layer give the overall score as the sequence of layers and depths e.g. Ssq4 25-45 cm, Ssq3 45-90 cm.

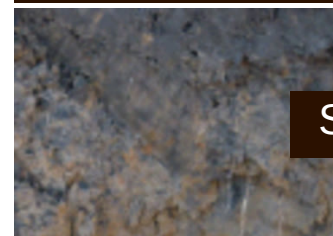
10) Repeat in another location if the pit is wide enough.

11) For a complete assessment of soil quality, that includes the topsoil, measure VESS in undisturbed soil nearby.

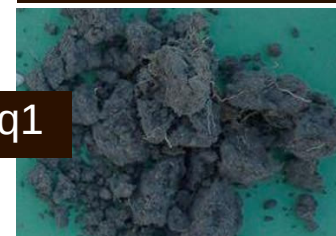
Typical profile



Typical surface



Typical fragment



Ssq1

Ssq2

Fragment extraction



Photos by Bruce C Ball and Lars Munkholm.




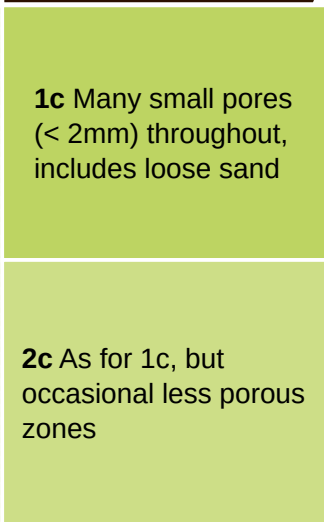
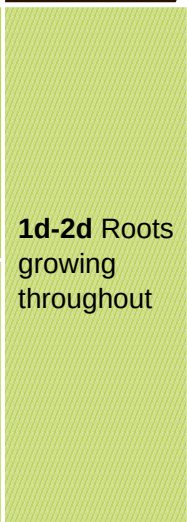


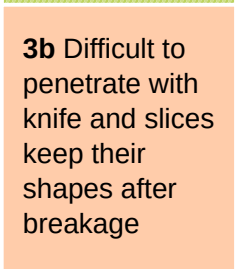
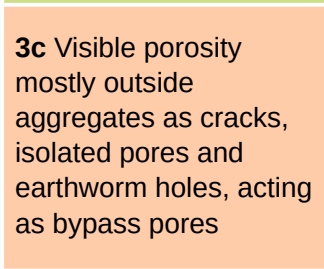
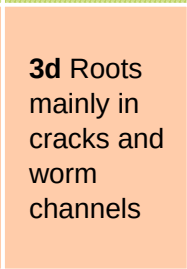


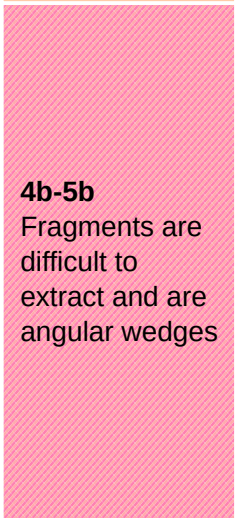
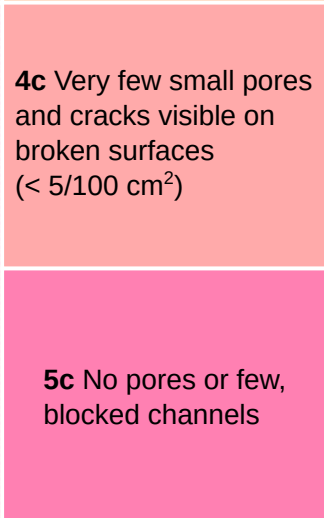


Ssq3

Ssq4

Ssq5

# SubVESS flowchart

# Subsoil structural quality (Ssq) assessment of a soil layer

a) Mottling	b) Strength	c) Porosity	d) Roots	e) Aggregates	Ssq Subsoil quality
					<b>Ssq1 Friable</b>  with high porosity and fissures. Good drainage and aeration.
					<b>Ssq2 Firm</b>  with slightly less porosity and fissures than Ssq1, but with only a small effect on rooting. If present, mottling due to anaerobism is minor.
					<b>Ssq3 Some compaction</b>  as either natural or man-made pans among angular or weak-grained structures. If present, mottling due to anaerobism is faint.
					<b>Ssq4 Compact or large scale structures</b>  Large aggregates, possibly prismatic, laminated or single grained. If poor drainage, grey colours, mottles few and well-defined.
					<b>Ssq5 Massive or structureless</b>  Dense structural units with smooth, unbroken faces, possibly laminated. If poor drainage, colour mostly grey, with very few well-defined mottles.