

Physical soil properties – Exercise P08

# SOIL COMPACTION AND AERATION: MOTTLES

*Reference posters n. 4, 7a, 8a, 8b*

## RELEVANCE

The number and color of soil mottles is a good indication of soil drainage and aeration<sup>1</sup>. They are also an early warning of a decline in soil structure caused by compaction. Mottles develop as various shades of orange and grey. As oxygen depletion increases, orange, and ultimately grey, mottles predominate. An abundance of grey mottles indicates the soil is poorly drained and poorly aerated for a significant part of the year. Soils dominated by orange mottles indicates the soil is moderately well drained, while the absence of mottles indicates good drainage conditions.

## MATERIALS



Shovel



Trowel

## PROCEDURE

1) Open a pit of about 40 x 40 x 40 cm (70 x 70 x 70 cm; in case of tree crops) using a shovel if possible.



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2) Using the trowel take a sample of soil (about 20 × 20 x 20 cm) from the side of the pit




3) Observe the color, the size and the percentage of soil mottles. Mottles are spots or blotches of different color compared to the soil matrix. Usually look for orange, red, blue or grey mottles.



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<b>ADVANTAGES OF THE METHOD</b>	It is based on a visual assessment and no particular tools are needed
<b>LIMITATION OF THE METHOD</b>	Soil observation may require a certain level of expertise. Color of the mottles can be subjective
<b>QUESTIONS TO BE ADDRESSED</b>	Does the soil show mottles? What is the dominant color and the size of the mottles? If mottles with different colors are present, what is their respective percentage? Did you observe any signs of soil compaction? How can you improve soils that show poor drainage and aeration?

**EVALUATION EXAMPLES**

<b>POOR</b>	<b>MODERATE</b>	<b>GOOD</b>
<p>The soil has medium and coarse orange and particularly grey mottle at over 50%.</p>	<p>The soil has a few fine and medium orange and grey mottles that can go from 10 to 25% of a soil sample.</p>	<p>There are generally no mottles in the soil.</p>
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1 <https://www.fao.org/3/ca2796en/ca2796en.pdf>