XIIIth International Terroir Congress
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SOIL VARIABILITY EFFECTS ON VINE ROOTZONES AND AVAILABLE WATER

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Abstract

Aim: The aim of this work is educating people about soil variability, vine rootzone depth and readily available water holding capacity. The concept of terroir is readily discussed in the wine industry but many people involved are unable to describe a soil profile and interpret its limitations that impact on vine growth, fruit quality and wine produced. This paper discusses soil physical characteristics important to vine root growth and readily available water holding capacity (RAW).

Background and Results: Identification of the soil texture, structure and coarse fragment content is required to determine a vine rootzone depth and readily available water holding capacity (RAW). Vine rootzone depths are dependent on soil texture and structure. For example vine roots will penetrate 50 cm into a friable sub-angular or angular blocky clay, but only 30 cm into prismatic, columnar or lenticular clay. Vine rootzone depths are used to calculate the RAW value (mm) of the soil profile and consequently irrigation management units and design. Water retention curve data used to calculate RAW values uses the relationship between water content and matric potential (Childs, 1940), which is dependent on soil texture and structure (Hillel, 1982). The predicted rootzone depth and RAW values will therefore be dependent on the changes in a landscape which is part of the concept of terroir.
Three examples of soil profile characteristics from a 40 ha property located on the Fleurieu Peninsula of South Australia are presented:

- Soil 1 is a yellow Sodosol (Isbell, 1996) with deep sand over massive sandy clay. The predicted rootzone depth is 70 cm and the RAW value 36 mm. Vine roots are limited by the massive yellow sandy clay at 40 cm;
- Soil 2 is a red Chromosol (Isbell, 1996) with shallow sandy clay loam topsoil over friable angular blocky clay and clay soil carbonate in the lower subsoil. The predicted rootzone depth is 60 cm and the RAW value 36 mm. Vine roots will colonise 50 cm of the friable clay and will penetrate the soil carbonate in the lower subsoil;
- Soil 3 is a Calcarosol (Isbell, 1996) with sandy clay loam and 50% calcareous rock fragments to 50 cm, below which is un-weathered calcareous shale rock. The predicted rootzone depth is restricted by the calcareous rock and the high percentage of coarse fragments reduces the RAW value to 18 mm.

Conclusions: The volume of soil utilised by vine roots and the RAW value are governed by soil physical properties which change with position in the landscape, the concept of terroir.

Significance and Impact of the Study: Soil profile characterisation is essential to all forms of agriculture and horticulture. Understanding how soil variability impacts on vine root growth, fruit quality and wine production is the essence of terroir.

Keywords: Soil monolith, soil variability, soil profile description, soil horizon, field hand texture, soil structure

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Soil variability on vine rootzones and waterholding capacity

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Background and Definitions

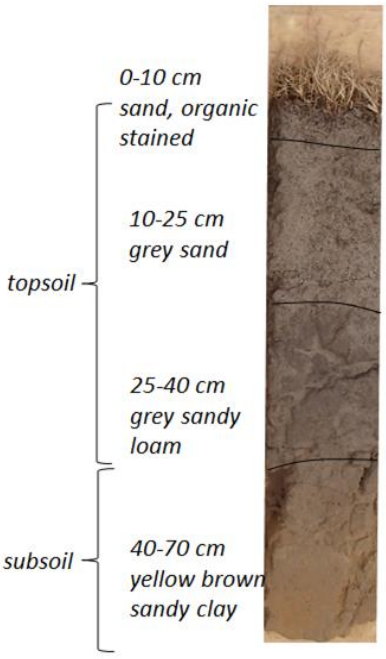
Soil monoliths Identification of the soil texture, structure and coarse fragment content is required to determine a vine rootzone depth and readily available waterholding capacity (RAW). Vine rootzone depths are dependent on soil texture and structure. For example vine roots will penetrate 50 cm into a friable sub-angular or angular blocky clay, but only 30 cm into prismatic, columnar or lenticular clay. Vine rootzone depths are used to calculate the RAW value (mm) of the soil profile and consequently irrigation management units and design. Water retention curve data used to calculate RAW values uses the relationship between water content and matric potential (Childs 1940), which is dependent on soil texture and structure (Hillel 1982). The predicted rootzone depth and RAW values will therefore be dependent on the changes in a landscape which is part of the concept of terroir.

Aim of this work The aim of this work is educating people about soil variability, vine rootzone depth and readily available waterholding capacity (RAW). The concept of terroir is readily discussed in the wine industry but many people involved are unable to describe a soil profile and interpret its limitations that impact on vine growth, fruit quality and wine produced. This paper discusses soil physical characteristics important to vine root growth and RAW.

Soil variability

Soil 1

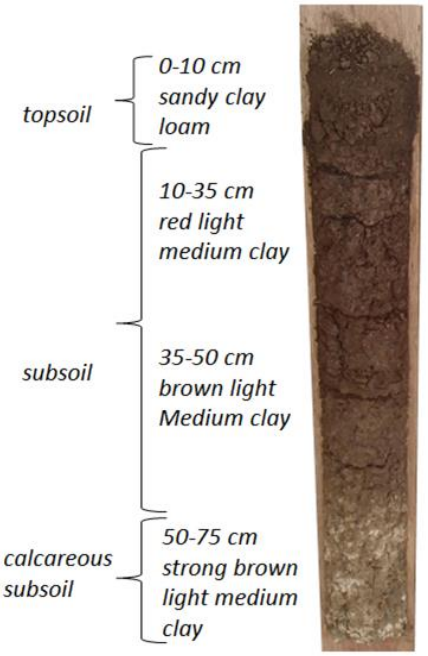
Sand over yellow-brown sandy clay (Sodosol – Australian Soil Classification).



Predicted rootzone depth is 70 cm, RAW value 36 mm. Vine roots are limited by the massive yellow sandy clay at 40 cm

Soil 2

Sandy clay loam over red structured clay mixed with soil carbonate (calcic Red Chromosol – Australian Soil Classification.



Predicted rootzone depth is 60 cm, RAW value 36 mm. Vine roots will colonise 50 cm of the friable red clay and will penetrate the soil carbonate in the lower subsoil

Soil 3

Sandy loam formed over calcareous shale rock. (Calcarosol – Australian Soil Classification).

Predicted rootzone depth is 50 am and restricted by the calcareous rock and the RAW value is 18 mm

Conclusions

- The volume of soil utilised by vine roots and the RAW value are governed by soil physical properties which change with position in the landscape, the concept of terroir.
- Soil profile characterisation is essential to all forms of agriculture and horticulture. Understanding how soil variability impacts on vine root growth, fruit quality and wine production is the essence of Terroir.

More Information

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