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## **Geology as a component of vineyard terroir in the Western Cape Province, South Africa.**

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The role of soils and bedrock geology has long been acknowledged as a fundamental component of terroir in the wine industry. Combined with climate, topography/aspect and grape varietal the terroir concept is often used as a term of expressing site specific characteristics in wines. In South Africa the influence of geology and soils is being increasingly understood by wine producers. This paper will highlight and some important geological components of terroir in South Africa and provide examples of wine producers at the forefront of understanding the terroir of South Africa's vineyards.

The wine producing areas of the Western Cape Province covers an increasingly wide area stretching both north and east of Cape Town. Between Cape Town, Stellenbosch, Paarl and north into the Swartland the geology comprises the shale dominated Proterozoic sediments of the Malmesbury Group, and the Late Proterozoic–Early Cambrian granitic intrusives of the Cape Granite Suite. These units are unconformably overlain the Middle Ordovician–Early Carboniferous Cape Supergroup, and in particular the basal sandstone dominated Table Mountain Group which produces much of the dramatic mountain scenery of the area (Bargmann [1]).

To the east in the Breede River valley, the Worcester fault marks a distinct change in the geology. East of the fault, the outcrop geology includes the upper portions of the Cape Supergroup, the Bokkeveld and Witteberg Groups, both of which include shale sequences. Late Carboniferous–Permian age sediments of the Karoo Supergroup and Upper Jurassic–Early Cretaceous sediments of the Uitenhage Group unconformably overly the earlier successions and locally remnants are preserved. Vineyards along the south coast, from Elgin to Plettenberg Bay - including the Klein Karoo, show a similar geology.

Due to the prolonged exposure of the Western Cape land surface, alluvial sediments, saprolitic weathering profiles and in some cases dune sands are also an important feature in vineyard areas.

The granites produce acidic and potassium rich soils above saprolite profiles which include kaolin. Clay based soils both from granite and shale sources are common in soil profiles and represent an important water source for vines during the usually dry summer months. Sand is also a component in many vineyard soils, this often being derived from the weathering of the Table Mountain sandstones. River gravels are noted in two scenarios, firstly in river floodplains and secondly fossil gravel terraces. In the Breede River Region a significant portion of vineyards are planted on loam soils containing calcareous layers. These calcareous soils typically overly inliers of Karoo sediments although some Malmesbury age limestones are also present. The formation of carbonate in these soils is a result of excess evaporation over precipitation in this low rainfall region. In the South African vineyard context these naturally alkaline soils are rare and represent distinct local terroir.

In addition geology influences the topography through differential weathering of the geological units. Factors such as warm or cool slope orientation and the effects of altitude on mean temperatures and

rainfall are important component in the local terroir. The Western Cape climate is warm to hot in viticultural terms and mitigating features such as altitude, slope orientation and exposure to sea breezes represent important features in creating vineyard microclimates.

*References:*

[1] Bargmann C J (2003) *Geoscience Canada* 30 (4): 161 - 182

