Science Societies

Biochar type choice matters for limiting evaporation

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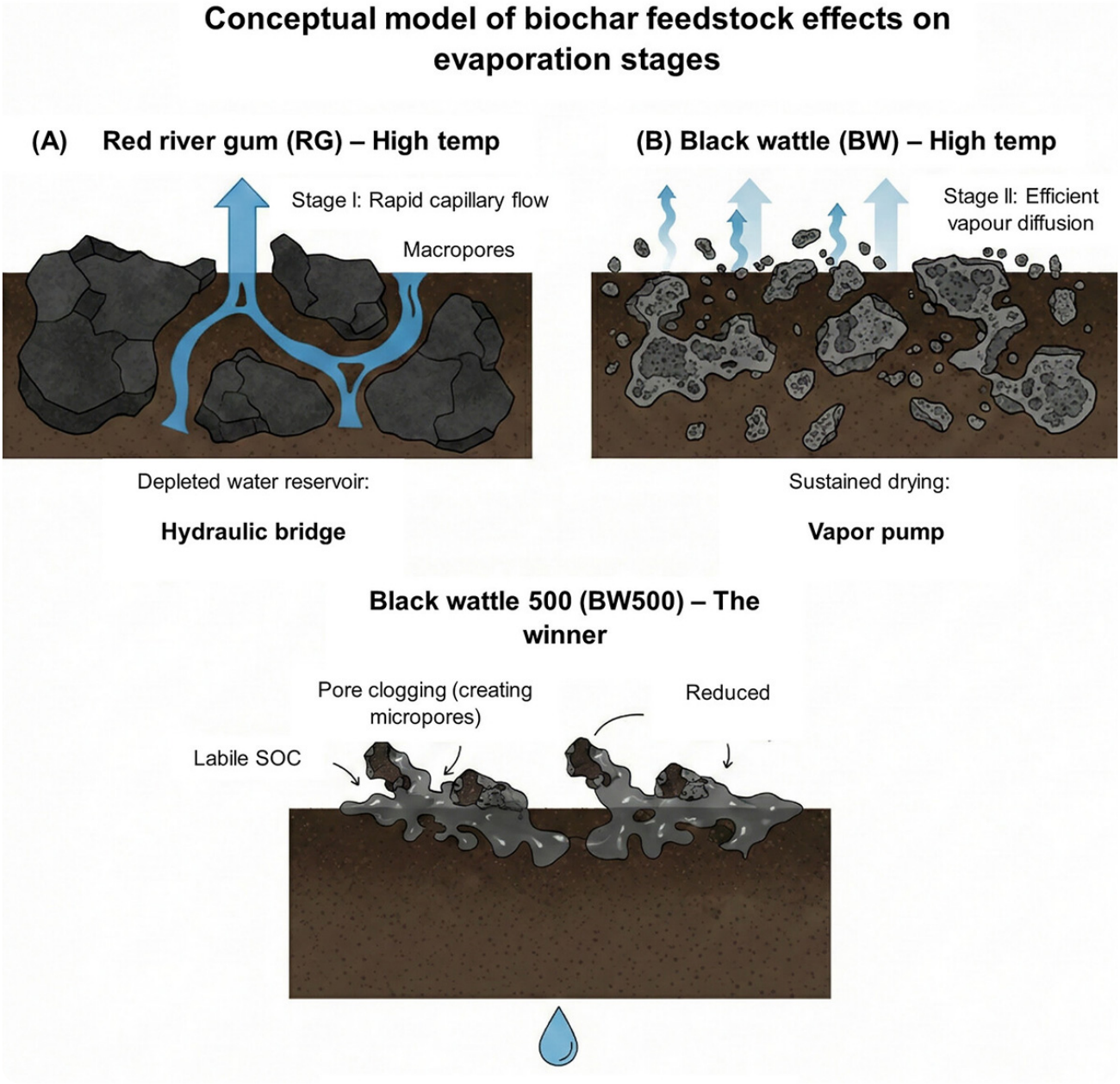

Conceptual model showing how different biochars affect water loss. High-temperature red river gum particles create fast water flow paths that increase early evaporation. High-temperature black wattle particles pull out more water vapor later. Low-temperature black wattle helps block water movement and conserves soil moisture. Image courtesy of Roeline van Schalkwyk and Ailsa G. Hardie, Stellenbosch University.

Sandy soils lose water quickly through evaporation in hot, dry regions. This rapid drying limits plant growth and challenges farming in water-scarce areas. Many hope that adding biochar will help the soil retain more moisture, yet previous studies report inconsistent outcomes.

Researchers at Stellenbosch University produced biochars from two local invasive trees, black wattle and red river gum, at temperatures ranging from 500–800°C. They mixed each biochar into sandy soil and tracked how much water evaporated over 20 days.

The results surprised them. Biochars made at high temperatures (700–800°C) caused the soil to lose more water overall than plain soil. Red river gum sped up early water loss by helping water move quickly to the surface. Black wattle kept pulling water vapor out later in the drying process. In contrast, when black wattle biochar was made at the lower temperature (500°C) and applied to soil, it cut total water loss by more than 20%.

This work shows that *how* biochar affects water movement through soil matters more than simply how much water it can hold. It also shows that, for conserving water in sandy soils, lower-temperature biochars from certain woods work best and that choosing the right biochar can make a real difference for dryland farmers.

Dig deeper

Van Schalkwyk, R., Görgens, J. F., & Hardie, A. G. (2026). Linking two wood biochars physicochemical properties with soil water evaporation dynamics from amended sandy soil. *Soil Science Society of America Journal, 90*, e70243.

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