

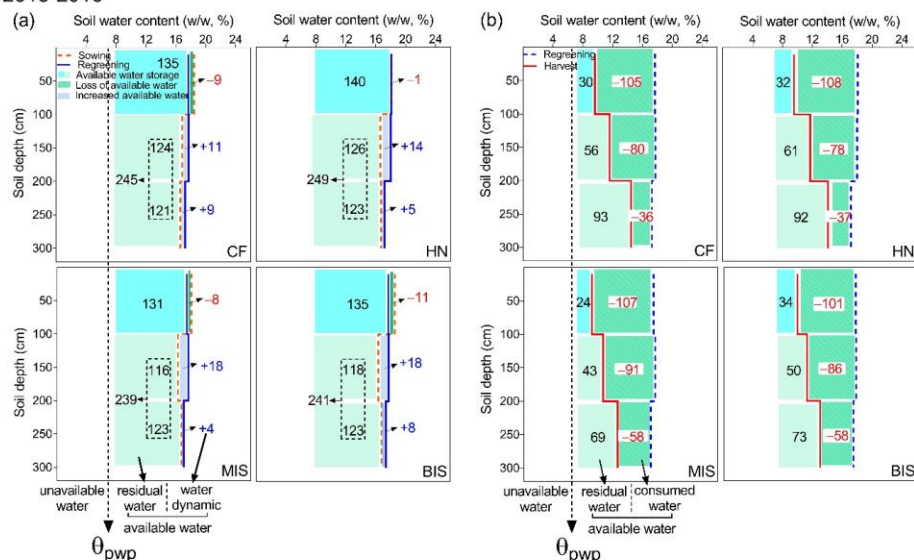


# Sustainable high yields can be achieved in drylands on the Loess Plateau by changing water use patterns through integrated agronomic management

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The yield of winter wheat in the Loess Plateau is generally low due to erratic rainfall and mismatch with the growing season of winter wheat. How to achieve the sustainable high yield of dryland crops always is a problem for dryland agriculture. In order to achieve sustainable high yields of winter wheat in the Loess Plateau, we set 6,000 kg  $\text{hm}^{-2}$  as our yield goal and investigated the effects of four types of management systems on winter wheat production over five consecutive years. The results showed that under the manure integrated system (MIS) or biochar integrated system (BIS), the average yield of winter wheat could achieve nearly 6,000 kg  $\text{hm}^{-2}$  while also enhancing water use efficiency (WUE) to 1.63–1.69  $\text{kg m}^{-3}$ . The high WUE under both systems was mainly due to decreased loss of precipitation (i.e., increased storage in the soil) during early growth stages (from sowing time to regreening stage) and increased use of subsoil water (100–300 cm) during late growth stages (from regreening to harvest time) by the large root system, which realized the temporal and spatial regulation of water use, and provided a theoretical basis for the sustainable high yield of Winter Wheat in the Loess Plateau.

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