

A NEW EXPLANATION FOR INCREASING WOODY BIOMASS IN THE ARID AND SEMI-ARID REGIONS

A. Palmer
ARC Animal and Forage Production, Grahamstown

Abstract

Atmospheric carbon dioxide (CO₂) concentrations have been increasing since the start of the industrial revolution. The rate of fixation of CO₂ by leaves generally increases as the supply of CO₂ to chloroplasts increase and this might be expected to support additional plant growth and the proportional increase is larger under water limited (xeric) conditions than mesic conditions. In support of this explanation, increased long-term forest growth has been observed in tree-ring analyses and forest inventory data. Similarly, increased tree and shrub density have been observed across the arid and semi-arid zones of Australia and Africa. However, mechanisms to explain the increased standing biomass of xeric environments observed over the past century remained debated. We show how changes in pan evaporation rates, decreased stomatal conductance and resulting increased "climate wetness index" can explain these observations. We highlight recent observations of increased tree water use efficiency, reduced global run-off and increased soil moisture as supporting the mechanisms described.

Editorial note

Pending publication of this title in other scientific media, the author withheld the full text of this paper as a discretionary measure. Readers interested in the full text are advised to contact the author for more information.