

IS WILDFIRE REALLY AN AGENT OF SIGNIFICANT SOIL DEGRADATION IN PORTUGUESE EUCALYPTUS AND PINE FORESTS?

Swansea University, United Kingdom

The study investigates the impact of wildfires on soil degradation in Portuguese eucalyptus and pine forests. Soil losses produced by agricultural practices and wildfire are compared.

Key words: wildfires, soil degradation, forests.

Р. Шейксбі

Університет Суонсі, Великобританія

ЧИ ДІЙСНО ПРИЧИНОЮ ДЕГРАДАЦІЇ ҐРУНТУ В ПОРТУГАЛЬСЬКИХ ЕВКАЛІПТОВИХ ТА СОСНОВИХ ЛІСАХ Є ПОЖЕЖІ?

Дана робота досліджує вплив пожеж на деградацію ґрунту в португальських евкаліптових та соснових лісах. Порівнюються втрати ґрунту, які викликані сільськогосподарською діяльністю та пожежами.

Ключові слова: пожежі, деградація ґрунту, ліси.

Р. Шейксбі

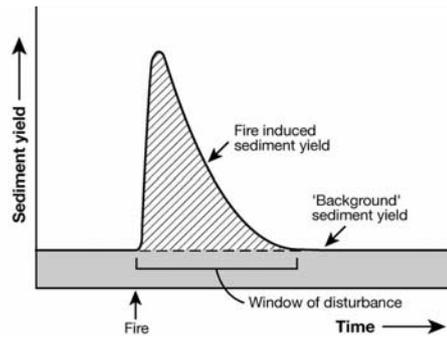
Університет Суонси, Великобританія

ДЕЙСТВИТЕЛЬНО ЛИ ПРИЧИНОЙ ДЕГРАДАЦИИ ПОЧВЫ В ПОРТУГАЛЬСКИХ ЭВКАЛИПТОВЫХ И СОСНОВЫХ ЛЕСАХ ЯВЛЯЮТСЯ ПОЖАРЫ?

Данная работа исследует влияние пожаров на деградацию почвы в португальских эвкалиптовых и сосновых лесах. Сравниваются потери почвы, вызванные сельскохозяйственной деятельностью и пожарами.

Ключевые слова: пожары, деградация почвы, леса.

Wildfire can cause significant changes to soil and vegetation, including complete or partial destruction of vegetation and litter, and alterations to the chemical and physical properties (including a reduction in soil aggregate stability and possible inducement of soil water repellency). These changes generally lead to increased overland flow and soil erosion in the first few months to years after fire until rates of erosion decline towards levels typical of comparable long-unburnt terrain (*figure*). In the Mediterranean, the impacts of wildfire on soils since the 1980s have become an increasingly important focus of research, yet the evidence actually suggests mostly comparatively modest soil losses compared with those reported elsewhere in the world such as the western USA and south-east Australia, and also compared with common agricultural land use practices (e.g. tillage). Thus, whereas wildfire in the Mediterranean rarely causes soil losses of more than 10 t/ha/yr for the first two years with perhaps at most 25 t/ha/yr of soil loss for an entire 'fire erosion cycle', agricultural practices not infrequently cause losses of 20–100 t/ha/yr, and this on a regular basis compared with the fire cycle erosion, which is limited to the period during which the soil is comparatively unprotected (the so-called 'window of disturbance') (*figure*). Since the 1980s, there has been a substantial increase in fire ignitions and areas affected by wildfire in Portugal. Between 1990 and 2005, an equivalent of 25 % of the country's area was burnt and, for 2003 alone, the figure was 4 %. Many of these fires have affected plantations of highly flammable *Pinus pinaster* and *Eucalyptus globulus* trees and their litter typically situated on steep slopes with thin, stony and highly water-repellent soils. Despite these factors favouring soil erosion, measured post-wildfire soil erosion rates in these plantations are comparatively modest because of the thinness and high stone content of the soils and rapid development of a vegetation cover, which tend to act to reduce this soil loss tendency.



Schematic representation of post-fire sediment yield

Nevertheless, the soil that is eroded is relatively enriched in fine sediment, organic matter and nutrients compared with the source soil, with possible significant implications for depletion of the soil nutrient store, particularly for the thinnest soils. As a complicating factor in the assessment of the significance of post-wildfire erosion, post-fire preparation of the soil prior to replanting with eucalyptus seedlings involves major disturbance to the soil, which leads to higher total soil losses than those caused by wildfire. These considerations will be discussed and an assessment made of the long-term soil degradation consequences for these forest soils.

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