

EGU22-2825, updated on 08 Aug 2022

<https://doi.org/10.5194/egusphere-egu22-2825>

EGU General Assembly 2022

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Pollen-based reconstruction reveals the impact of the onset of agriculture on plant functional trait composition

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In the past two decades, plant functional traits have become an important tool in ecology and biogeography for the study of consequences of changing plant composition on ecosystem functioning and the effect of environment factors on plant composition. Recently, considerable interest in the trait-based approach has arisen in palaeoecology as well. Applying the trait-based approach could offer a new way of interpreting pollen data, but the intricacies of using this method in palaeoecology are underexplored. Here we test the validity of the use of pollen records for plant functional composition reconstruction using modern pollen samples. Using a Bayesian approach for reconstructing plant trait composition from pollen records, we provide a robust method that can account for trait variability within pollen types. We apply this method to assess changes in plant functional composition over 10 000 years for 79 European sites with an agricultural history. We evaluate how agriculture and climate affect plant functional composition. We reveal selection of common traits across agricultural landscapes, with resource-acquisitive communities of low stature and seed mass dominating after the arrival of agriculture. Understanding these selection processes and trade-offs between traits will advance our understanding of the legacy of human impact on ecosystems functions.