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Effects of weed management on soil biophysical properties and vine physiology in an English vineyard

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Climate change threatens traditional wine regions with rising temperatures and irregular rainfall patterns. Meanwhile, this is an opportunity for cooler regions to grow quality wines. In Great Britain, the land dedicated to vineyards has quadrupled since 2000 to 3,800 hectares at present. The establishment and management of these new vineyards affect soil processes that underpin ecosystem services and agriculture sustainability. The lack of long-term soil management data in the new wine regions requires the development of experiments and models that inform growers of the best practices regarding their pedoclimatic constraints. One important vineyard operation is the control of weeds under vine rows. The progressive reduction in herbicides has given way to mechanical alternatives that may lead to further soil disruption.

In this study, we investigated the effect of different weeding operations on soil biophysical properties and vine physiology in the newly developing wine region in the South East of England. A trial was established in 2018 at the NIAB EMR research vineyard (Kent, England) as part of the Horizon2020 project "Integrated Weed Management: Practical Implementation and Solutions for Europe" (IWM PRAISE) consisting of four weed management systems: 1. blade mechanical weeder, 2. serrated disc mechanical weeder, 3. herbicide application, and 4. mowing. In 2021, we collected soil samples before (April) and after (September) the application of the weeding treatments. The soil microbial community composition has been characterized by 16S and ITS metabarcoding. Aggregate stability has been measured using SLAKES app. Yield, Nitrogen Balance Index, and vine vigour were measured to evaluate plant physiological development together with grape quality parameters.

We will discuss the changes in soil structure and microbial community composition under the different weed control management and how they are linked to vine physiology (vigour and foliar nutritional status), must quality attributes, and yield.