

## **Sustainable biochar-based vineyard practices in grape production: improving vineyard productivity while reducing the translocation of pesticides into grapes and wine**

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The concurrent challenges of improving soil health and decreasing drought stress while reducing pesticide concentrations in grapes and wine require “win-win-win” solutions. A growing body of evidence suggests that biochars may fit this description. Although an on-farm biochar-based paradigm pairs the goals of consumers and producers, it will only be adopted if it is agronomically practical, improves grape or wine production, and is environmentally beneficial. This study aims to evaluate these critical aspects to develop and advance biochar-based sustainable alternatives for vineyard management. Physical and chemical properties of biochar produced from vineyard waste were compared with other locally-available biochar. Biochars were also tested for their adsorption of diuron. Because of its high uniformity and because it adsorbed over 99% of diuron, we choose Rogue biochar™ to use in subsequent field experiments. Field studies were established in two locations with distinct soil types and climates but planted with the same grapevine scion/rootstock combination (Pinot noir/101-14). At each location, four treatments were established in 2018 and are being monitored over the period of two years to assess the influence of tillage and biochar application rate (8 and 16 tons/acre) on a suite of soil health and plant productivity metrics. Thus far, no significant differences have been found in net carbon assimilation rate ( $\mu\text{mol CO}_2 \text{ m}^{-2} \text{ s}^{-1}$ ) among treatments 30 days after budbreak, though more measurements will occur during the growing season. Measurements of crop yield and quality will be collected at harvest, and wines produced. Analysis of residual herbicide amounts in grapes and wines will determine if biochar reduces herbicide uptake and translocation to fruit. Finally, outreach materials for local grape growers are being developed that outline biochar production from grapevine residues, biochar application methods, and the potential benefits of using biochar-based amendments in grape production.