

Tea Bag Index: assessing soil microbial activity under different compost management practices in vineyard

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INTRODUCTION & AIM

Tea Bag Index (TBI) is a method used to assess soil microbial activity by measuring the decomposition rate of organic matter with different degradability rates.

Aim of this work was to assess the effect of two different application modalities of municipal solid waste (MSW)-compost (tilled compost or mulched compost, compared to tillage without compost as a control - Fig. 1) on vineyard soil, by using the TBI.

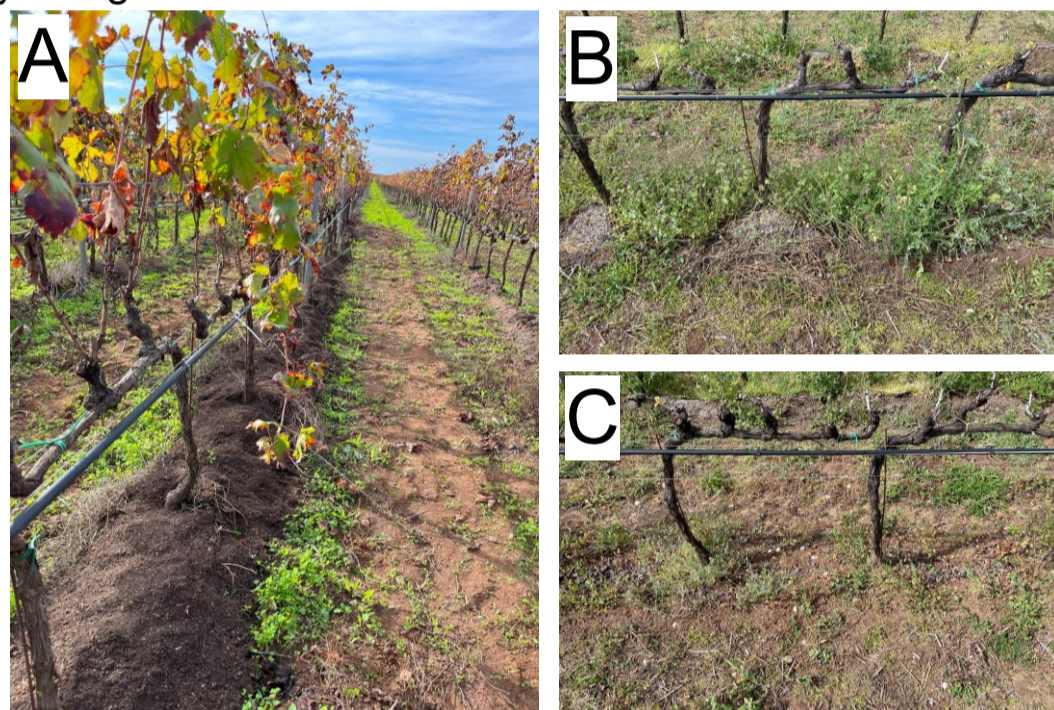


Figure 1. A: soil treatment with mulched compost; B: soil treatment with tilled compost; C: soil treatment with tillage without compost (control).

METHODS



Figure 2. A: Placement of tea bags in the vineyard for the Tea Bag Index (TBI) in vineyard; B: tea bags recovered after 3-months burying time.

The experimental site was a productive vineyard (cultivar “Primitivo”) located in Salento, Southern Italy. For two consecutive years, the Tea Bag Index (TBI) method was applied in (Fig. 2). The types of tea used, green tea, high in degradable compounds, and red (rooibos) tea, high in recalcitrant compounds, were buried at 12 cm-depth between vine plants, for each soil treatment (n=9). After three months, the bags were recovered, dried, and reweighed to determine mass loss (Fig. 2B).

Both one-way ANOVA and ANOVA repeated measures, followed by Duncan post-hoc test, were used to identify statistically significant differences between the soil management practices tested.

RESULTS & DISCUSSION

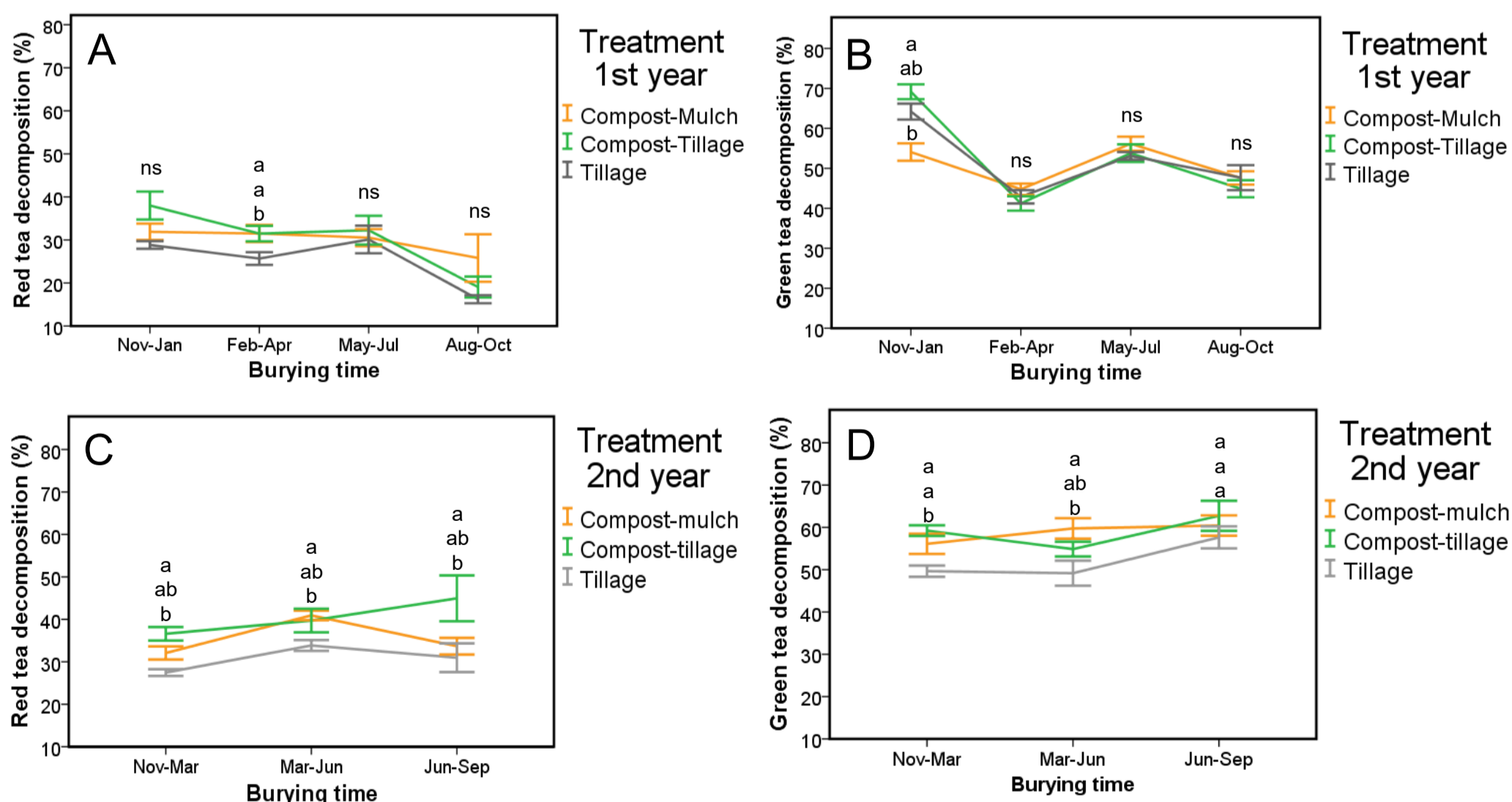


Figure 3: percentage of degradation of tea obtained by the Tea bag index method over two years; different letters above the bars indicate significantly different means.

In the first year, red tea decomposition was significantly higher in compost-mulch and compost-tillage in February – April (Fig. 3A), while for green tea (Fig. 3B) compost-tillage was significantly higher than tillage in November – January. In the second year (Fig. 3C-D), tillage had always the lowest decomposition rate for both red and green tea, while compost-mulch and compost-tillage promoted higher decomposition rates (ANOVA repeated measures $p=0.003$).

CONCLUSION

In two years of compost application, the response of soil biological activity to the MSW-compost was significant. Particularly in the second year, both tilled and mulched compost significantly increased the decomposition activity. TBI is a useful and low-cost method to evaluate the effect of different vineyard managements on soil biological activity.

REFERENCES

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