



VINE-INTERROW MANAGEMENT ON SLOPE SYSTEMS IN THE OLTREPÒ APENNINES (ITALY): ASSESSMENT OF BEST AGRONOMIC PRACTICES BASED ON A MULTIDISCIPLINARY APPROACH

Sauro Simoni¹, Elena Gagnarli¹, Massimiliano Bordoni², Alberto Vercesi³, Michael Maerker², Claudia Meisina², Emanuele Mazzoni³, Cristina Ganimede³, Enrica Capelli², Xinsheng Wei⁴, Maria Cristina Reguzzi³

- ¹ CREA DC, Firenze, IT, Autore corrispondente: sauro.simoni@crea.gov.it
- ² Dip. di Scienze della Terra e dell'Ambiente, Univ. Pavia, IT
- ³ DIPROVES, Università Cattolica del Sacro Cuore, Piacenza, IT
- ⁴ Dep. of Geological Engineering, Chang'an University, Xi'an, China



Introduction

Grapevine root development can be susceptible to slope instabilities and different inter-row management can affect vineyard soil ecosystem. In this study the traditional techniques of tillage practices were evaluated.

Materials and Methods

In Oltrepò Pavese, study area covers 265 km² (Fig. 1) and vineyards are mainly cultivated in a range 60÷500 m a.s.l. and on slopes between 5° and 37° (Bordoni *et al.*, 2019). The microarthropod community was described by adaptation to soil life (epe-, hemi- and eu-edaphic forms). Molecular based methods was used to determine soil microbial communities.

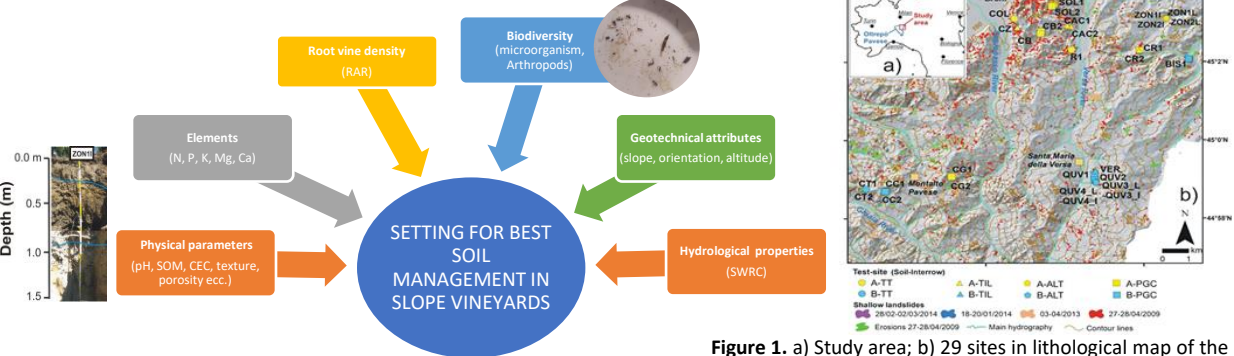


Figure 1. a) Study area; b) 29 sites in lithological map of the bedrock: low-medium plastic clayey silts (A); high plastic silty clay (B). Total Tillage (TT); Tillage (TIL); Alternating tillage-grass (ALT); Permanent Grass Cover (PGC).

Results

Among different inter-row management, the best development of the root apparatus was registered in ALT (Fig.2).

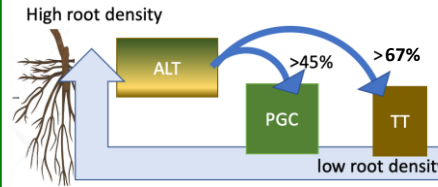


Figure 2. Root density and strong root reinforcement were highest in ALT.

Concerning microorganisms, *Firmicutes* and *Bacteroidetes* were abundant in tilled soils while Actinobacteria in PGC (Fig.4a); Fungi Ascomycota was the most abundant group (Fig.4b). Microarthropod community showed more complexity in PGC (Fig. 4c).

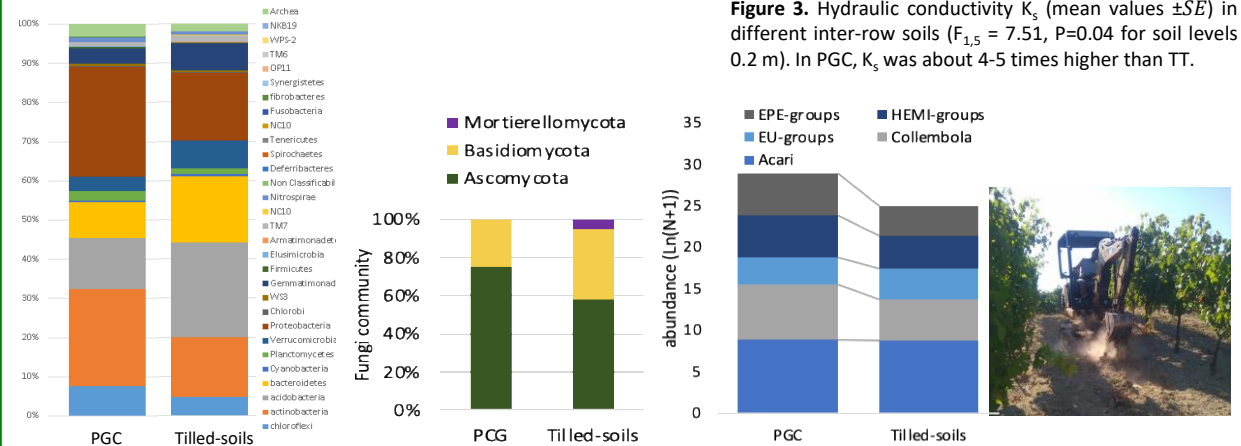


Figure 4. Biological community: (a) Bacteria and (b) Fungi community (%); (c) Arthropods' abundance (functional groups) in tilled-soils and PGC.

Acknowledgments: This study was performed in "Oltrepò BioDiverso – Attiv-aree" project, Cariplo Foundation.

Bordoni M. *et al.*, 2019. STOTEN doi:10.1016/j.scitotenv.2019.07.196



About soil properties, the geotechnical and hydrological attributes were the most affected ones by inter-row practices (Fig 3).

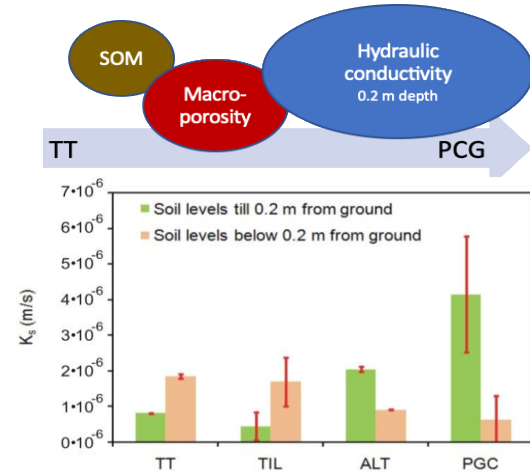


Figure 3. Hydraulic conductivity K_s (mean values $\pm SE$) in different inter-row soils ($F_{1,5} = 7.51$, $P=0.04$ for soil levels 0.2 m). In PGC, K_s was about 4-5 times higher than TT.

Conclusions

To reduce slope instability, the best vine-interrow management practices were ALT and PGC for conserving organic matter, biological functionality and, at the same, a better development of vine root apparatus.