



Theme 1

Status and trends of global soil nutrient budget



USE OF CITRUS PRUNING WASTE AND PLANT COVERS AS A SOURCE OF ORGANIC MATTER IN SOILS



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1. INTRODUCTION

Sustainable agriculture practices such as the use of agricultural waste, help to increase the content of organic matter in the soil and take advantage of the nutrients contained in the remains, thus reducing the need for fertilizers. In turn, the use of plant covers provides protection to the soil and improves its fertility and structure.

3. RESULTS

The application of pruning wastes induces greater humidity in the soil and an increase in organic C and biological activity in the soil, along with an enhancement of the presence of microorganisms linked to bioremediation by nitrogen, phosphorus and potassium. An important increase in the contents of organic matter, C and N was observed in the first days after the application, which decreased after 32 weeks. On the other hand, while in the control areas the sequestration of C was negative, in the areas with cover and fertigation it was positive (Fig 1 and 2). The contribution of P+G+L residues contributed more to this process in the fertigation zone than in the vegetal cover zone.

The results show that the application of pruning wastes does not negatively affect the nutritional status of the soil-plant system or the production of the fields. On the contrary, it generates a whole series of environmental benefits. Also, a greater biodiversity, increasing the microorganisms of relevance for the mobilization of nutrients. Finally the evolution of the organic content indicates that there was an important degree of mineralization.

4. CONCLUSIONS

As conclusion, these results illustrate that these practices can be a sustainable approach for the sequestration of C and could contribute to the mitigation of atmospheric CO₂ in this type of agrosystems. Likewise, this management of residues represents an innovation to be implemented in good agricultural practices within the cultivation of citrus fruits in the Valencian regions of l'Horta and La Ribera.

2. MATERIALS AND MÉTHODS

The studies have been carried out on orange and mandarin trees in the Ribera area (Valencia, Spain) with calcareous Fluvisol-type soils. 6 different treatments have been tested combining two types of residues pruning + Grass (PG) and pruning + grass + legume (PGL) and three application points (on the street, on the ridge on the irrigation line and on the ridge under the irrigation line) applied for 32 weeks. The samples were taken at four times throughout the project and have included both soil and leaf samples, following what had been programmed in the project, analyzing the main parameters of interest organic matter (%M.O) and quantification of macronutrients (assimilable N, P, K, S, Ca and Mg). In addition, additionally part of the soil samples were subjected to analysis to determine the microbial biodiversity of both bacteria and fungi.

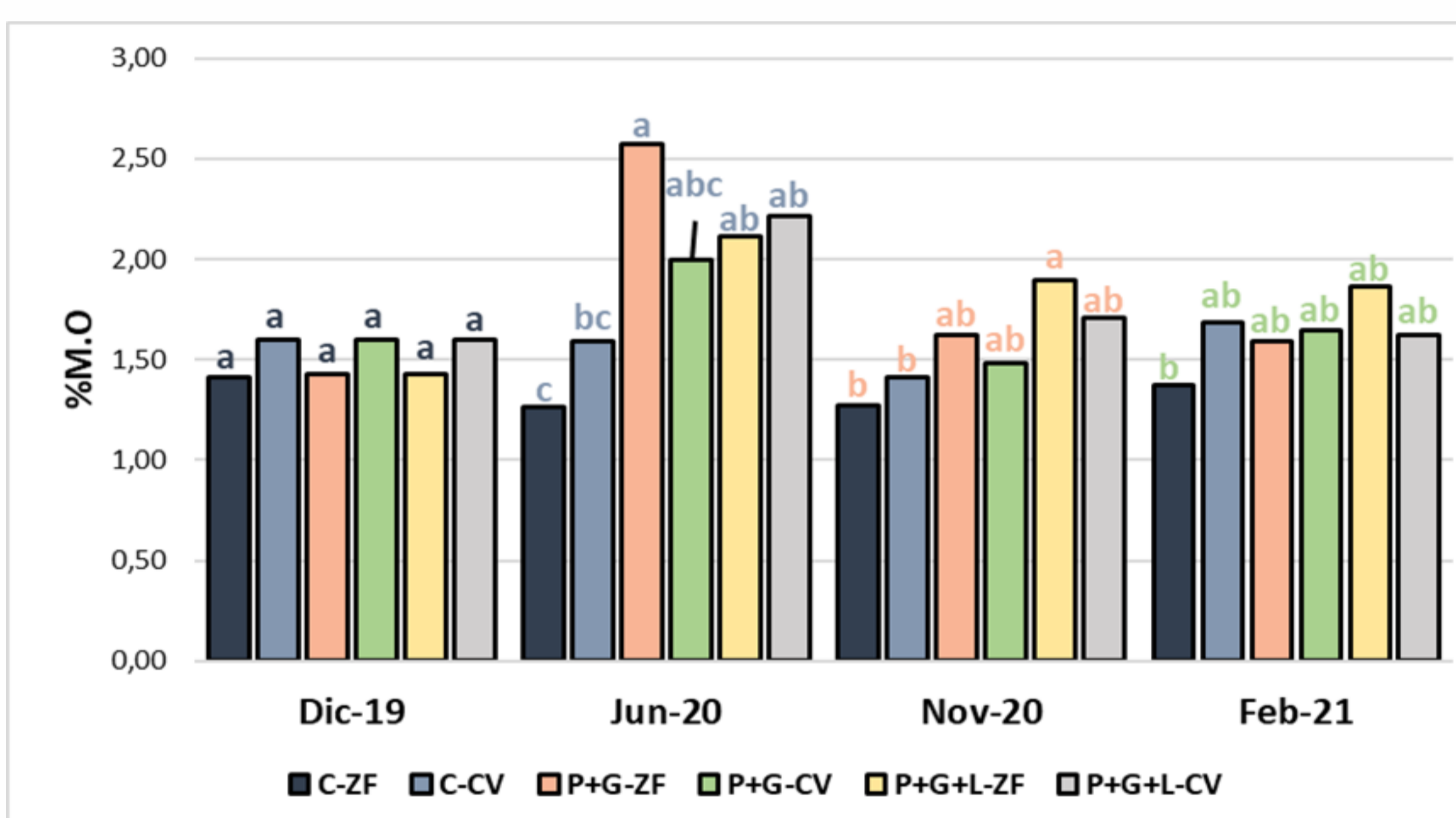


Figure 1. Effect of the different treatments (Control, P+G and P+G+L) on %M.O for the June 2020 (Jun-20), November 2020 (Nov-20) and February 2021 (Feb-2021) samples compared to the initial sampling, before application, of December 2019 (Dec-19). Treatments with different letters, significant differences (<0.05).

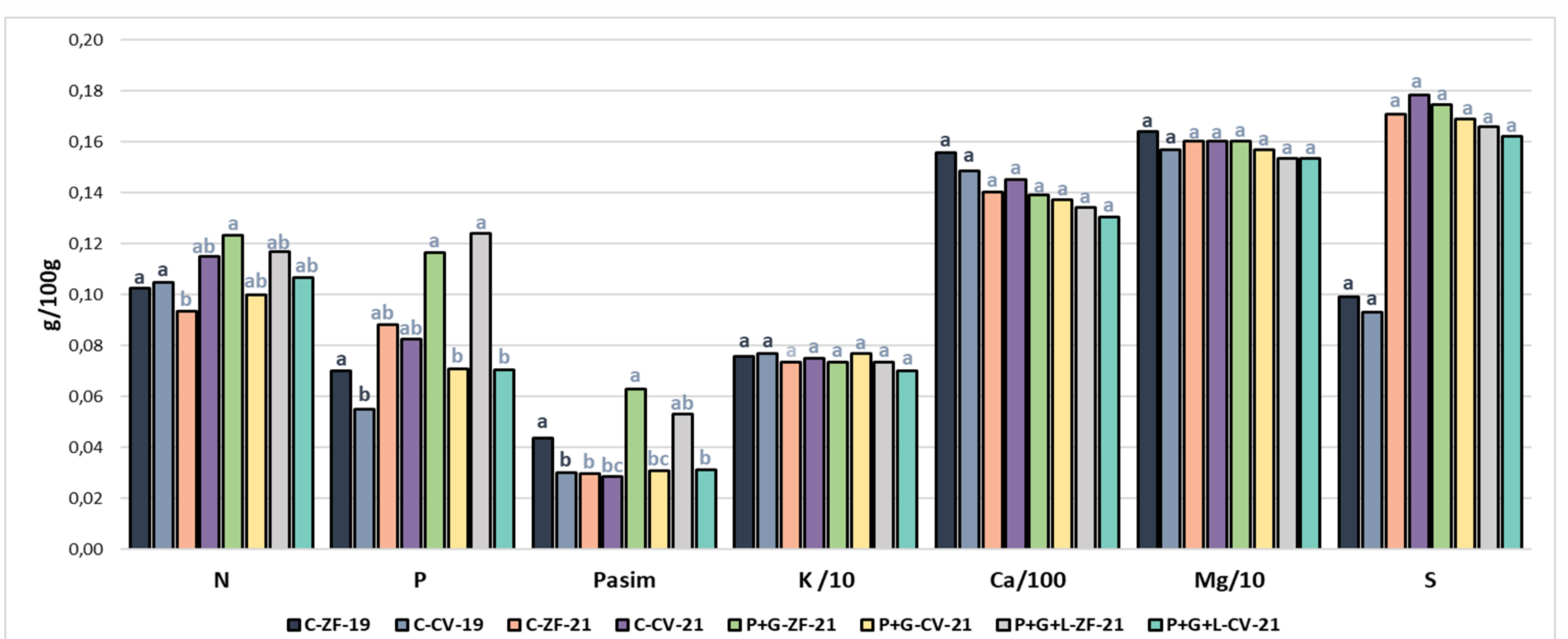


Figure 2. Different treatments on the total content of N, Pasim, K, Ca, Mg and S in g/100g for the December 2019 and February 2021 samples. Treatments with different letters, significant differences (<0.05).

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