WCCE11 - 11th WORLD CONGRESS OF CHEMICAL ENGINEERING
IACCHE - XXX INTERAMERICAN CONGRESS OF CHEMICAL ENGINEERING
CAIQ2023 - XI ARGENTINIAN CONGRESS OF CHEMICAL ENGINEERING
CIBIQ2023 - II IBEROAMERICAN CONGRESS OF CHEMICAL ENGINEERING
Buenos Aires - Argentina - June 4-8, 2023
BUENOS AIRES 2023
JUNE 4 - 8
"The global chemical engineering working for a better future world"

Composting and on-site reusing of pear pomace

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The main objective of this work was to evaluate the organic amendment effect obtained from pear pomace derived from the agroindustry as an improver of the physical and chemical properties of the soil and vegetable parameters in pear orchards of Alto Valle de Río Negro, Argentina. Our study represents the first contribution dealing with compost obtained from pear pomace and its application in different pear orchards places.

Intensive agricultural practices have led to decrease organic matter (OM), causing severe erosion in soils together with biodiversity loss, so improving and maintaining soil quality and fertility in a sustainable way is an important challenge for modern agriculture (Viaene et al., 2016). Soil OM is one of the main factors in modifying physical, chemical and biological properties of the soil, used as indicator for assessing soil quality in response to nutrient management practices (Li et al., 2018). Soil compaction because of agricultural traditional practices is the main cause of its physical degradation has been mentioned as a worldwide problem, which affects agricultural, horticultural and forestry production (Keller et al., 2019). Therefore, maintaining and increasing organic matter in soils is the key to improving its physical, chemical and biological properties and also provides countless benefits (Sharma et al., 2017).

Experimental essays were performed during three seasons. A random experimental analysis was implemented on pear fruit orchards. Our goal was to evaluate the differences between crops with and without compost applied (the latter used as control). Samples of soil were taken in a depth of 0,2 m for analysis. OM was determined by Devis method and potentially toxic elements (PTE) were determined by mass spectrometry with an inductively coupled plasma source. Apparent density (AD) was determined by the cylinder method and penetration resistance (PR) was made with a 1,4 m steel penetrometer. In each plant found in the orchards under study, the stem circumference (SD) and height (HE) of each plant were measured to evaluate growing. Leaf area (LA) was measured with a Hewlett Packard ScanJet.

An increment in OM for all treatments was observed between initial and final year, but the increase in OM observed in the compost treatments was higher than the control (39,13 vs 111,11%). According to the Regulatory Decree of SENASA the PTE (cadmium, zinc, copper, chromium, mercury, nickel and lead) are within established ranges by the reference. The lower AD observed after the application of compost (1,31 vs 1,40 g.cm-3) indicates lower compaction, improve aeration and hydration of soil. Thus, the application of pear compost could affect the macrostructure of soil allowing the formation of stable aggregates, increasing porosity and improving the resistance of the soil to root elongation. On the other hand, PR values are lower in compost applied than control (1,86 vs 2,07 MPa). It should be noted that for values that exceed 2,0 MPa a radical growth impediment can be generated. In this way, the application of the amendment on orchards was favorable since soil properties were improved. Higher values of SD (289.1 ± 7.0 mm), HE (441.5 ± 4.5 cm) and LA (24.4 ± 0.7 cm2) were obtained in treatments and in comparison, with control treatment were 34%, 20% and 19% higher. Using this soil improver, reserves of nitrogen, organic matter, macro and micronutrients are increased. Mainly, organic matter incorporation improves nutrients availability also increasing porosity and water filtration in the soil. It was evidenced that the use of compost does not present any risk of PTE accumulation in the soil improvements in quality were detected in vegetable parameters in pear orchards.

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