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Use of Acacia Pods as a Source of Vegetal Organic Matter for Soil

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Abstract

Incorporating vegetal organic matter into the soil releases nutrients and increases its contents in organic matter, which can provide higher soil productivity and lower susceptibility to compaction. Acacia is an invasive plant in Portugal, and the huge seed bank incorporated into the soil every year is problematic for their dissemination. Suppose the green pods can have a sustainable use contributing to soil fertility. In that case, it will be possible to reduce this seed bank and contribute to delaying the proliferation of this species. In this work, the value, and mineral elements contents of *Acacia pycnantha*, *A. retinodes* and *A. longifolia* green pods were evaluated concerning their potential use as soil fertilizers. The crude protein (CP), ether extract (EE), fiber (CF) and ash (Ash) content were determined according to the Association of Official Analytical Chemistry

(AOAC) standardized methods. Carbohydrate content was calculated using the difference in dry weight. The mineral content (Ca, Mg, K, Na, Fe, Cu, Zn, Pb, Mn, Ni, Cd) in green pods was determined using atomic absorption spectrophotometry on an AA-7000 spectrophotometer (Shimadzu, Kyoto, Japan). Total nitrogen was quantified by the Kjeldahl method. The fresh green pods were also analyzed by Near-infrared spectroscopy (NIR)(MPA Bruker). The least significant difference (LSD) test and principal component analyses (PCA) were used to identify the differentiation between samples and their correlation with the analytical parameters. *A. pycnantha*, *A. retinodes* and *A. longifolia* showed distinct compositions. Still, all presented appropriate mineral elements content, higher amount of N and low in Cu and Cd, with good value rich in CP and CF and low EE content. Ni, Cu, Pb and Fe do not vary significantly between species. *A. pycnantha* shows a higher content in CF and Mn; A. longifolia in Na and EE, and *A. retinodes* in Ca, Mg, K, Na, Zn, Cd, N, CP and ash content. The PCA achieved with NIR spectra produced similar findings to those obtained with analytical data and confirmed that the analyzed green pods present a distinct profile that this technique could easily distinguish. The composition of Acacia green pods, evaluated previously to the seed's viability, suggests a potential use in soil fertilization, either directly incorporated into the soil or after composting. Nevertheless, this is a preliminary study, and more research is still needed to obtain sounder results.

Keywords: Acacia, pods, soil, nutritional, mineral content, NIR

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