Determination of minimal duration essential for isolation of humic acids from soils in forest restoration programmes.

ABSTRACT

This study was conducted to investigate whether a simple and rapid method could be developed for extracting, fractionating and purifying soil HA in forest rehabilitation programmes. Humic acids from 10 g of soil were extracted with 100 mL of 0.10 M NaOH. Different extraction periods (4, 8, 12, 16, 20 and 24 h) were tested. Samples were centrifuged (16,211 G for 15 min) at the end of each extraction period. The dark-coloured supernatant liquor containing HA was decanted and the pH of the solution adjusted to 1.0 using 6 M HCl. After acidification, the fractionation periods evaluated were 4, 8, 12, 16, 20 and 24 h. After each fractionation period, the sample was transferred to a polyethylene bottle and centrifuged (16,211 G for 10 min). The HA were purified by suspending them in 100 mL distilled water, centrifuged (16,211 G for 10 min). After repeating this procedure three times, the supernatant was analyzed for Na, Mg and K. Standard procedures were used to characterize the HA (C, E4/E6, phenolic OH, carboxylic COOH, total acidity) and soil (pH, C, organic matter). Although there was significant effect of different extraction periods on yield of HA, there was no significant relationship between fractionation period and yield of HA. There was also no significant relationship between fractionation periods and yield of HA for different extraction periods studied. In terms of purification, the distilled water used in this study was able to effectively purify HA (e.g., reduction in mineral matter such as Na+) of the soil without altering the true nature of HA as C, E4/E6, phenolic OH, carboxylic COOH, total acidity values of the acids were consistent with those reported in the literature. The significance of this work is that it enables the isolation of HA from soil within 9 h (4 h extraction period, 4 h fractionation period and 1 h purification period) instead of the existing range of 2-7 days, hence helping in facilitating the idea of producing for instance ammonium and potassium-humates from soils, a practice that could have less undesirable environmental effects.

Keyword: Humic acid; Forest restoration.