Anion exchange resin membranes to assess soil P status following organic and mineral fertilizers in eastern Canada

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Anion exchange membranes (AEMs) have been successfully used as an alternative to chemical extraction in several studies to estimate soil nutrients availability to crops including P (Ziadi et al., 2006; Qian et al., 2007). This technique appeared to provide a better index of plant P availability than chemical extractions and may provide useful tools for monitoring *in situ* soil P availability/mineralization. However, few studies have assessed the utility of AEMs for *in situ* monitoring of P availability especially under organic fertilizer such as compost and paper mill biosolids. We investigated (1) the ability of AEMs as a P index during the growing season of different crops including potato (*Solanum tuberosum* L.), corn (*Zea mays* L.) and soybean (*Glycine max* [L.] Merr), and (ii) evaluate soil P mineralization during winter after potato and soybean harvest. Instead of soil sampling, AEMs were buried in the field for a period of time depending of the objectives of the study. To measure *in situ* adsorption of P onto membranes (PO_{4AEM}), AEMs were buried in the surface horizon (0-15 cm) at different periods during each growing season from early spring until late on fall depending of each crop/experimental site. On average, the AEMs were incubated during 2-week periods during the growing season and up to six months during winter periods. After each contact period, AEMs were collected, washed with distilled water in the field to remove adhering soil particles and placed in individual tubes containing 25 mL 1 M NaCl and analyzed in laboratory for adsorbed PO4 (Ziadi et al., 1999). Soil PO_{4AEMs} varied among P application rates, P fertilization (organic or inorganic) and with time in the growing season. Generally, an increase of PO_{4AEMs} was observed early in summer (mid June) of each year, which we attribute to soil P mineralization. Subsequent decreases in a PO_{4AEMs} from July until the beginning of September were observed each year, which we attribute to plant P uptake. Phosphorus addition had also a significant effect on PO4 adsorbed onto AEMs during winter. Relatively large amounts of PO_{4AEMs} were obtained each spring (after winter period incubation) suggesting the possibility of soil P mineralization during winter. The PO_{4AEMS} also varied with the profiles where membranes were buried. In general, the highest amounts were obtained in the 0-15 cm layer. Obtained results indicated the ability of the AEMs to detect differences between organic/inorganic P fertilizer treatments and to predict the amount of soil P which is available to different crops produced in eastern Canada. Based on its simplicity, rapidity, and low cost, AEMs have many practical advantages over chemical extractions for assessing soil P availability.

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