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Phosphorus (P) sorption dynamics in soils cropped with silage corn at Agassiz

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Objectives:

- Assess P sorption characteristics to estimate P sorption maximum (Smax) of a range of soils under silage corn with contrasting P levels
- Objective 2
- Objective 3
- Objective 4

Activity Description:

- Soil sampling. Composite soil samples were collected from silage corn fields at Agassiz and Rosedale in spring 2019.
- Phosphorus sorption experiments. 30 ml solutions with a range of P concentrations (0, 5, 10, 20, 30, 40, 50, 100, 200, 300 mg P/L) were shaken with 2.0 g soil during 24 hours and the suspensions were filtered.
- Phosphorus determination. P remaining in the solution was analyzed using colorimetric method.
- P sorption characteristics: P sorption isotherms were determined using Langmuir equation and P sorption maximum for each soil was determined. The P sorption maximum (Smax) values were also derived.
- Soil properties: Soil pH, total carbon and nitrogen, acid oxalate ammonium extractable P (POx), aluminum (AlOx) and iron (FeOx) were were also determined.

Results:

- This study showed that, among the variables analyzed, aluminum and organic matter content had the greatest influence on P sorption characteristics.
- he Smax values were: site8 (839 mg/kg); Site7 (948 mg/kg); Site6 (1441 mg/kg); Site5 (1565 mg/kg); Site2 (2108 mg/kg); Site3 (2394 mg/kg); Site4 (2397 mg/kg); Site1 (2533 mg/kg).
- The wide range of Smax values observed indicates differences among soils in their capacity to retain or fix newly-applied P from fertilizer or manure without potential P loss to the environment
- Results 4

Benefits & Analysis:

- Soils at Agassiz and Rosedale exhibit a maximum capacity to fix newly applied P from fertilizer or manure
- A maximum P sorption capacity indicates that there is a threshold above which soils cannot retain extra P. This limit is defined by the P saturation index used to assess the risk of P to the environment
- There is a need to understand P sorption characteristics of soils from other areas including the Fraser Valley and Okanagan Valley
- This knowledge is useful to develop a P saturation index for soils of BC

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DIREC Mission Statement:

The BC Dairy Association actively funds research and education projects. Our objective is to facilitate, encourage and financially support projects and programs that have been identified by the BCDA to benefit the BC dairy industry.