Effect of Soil Properties on Pyroxasulfone Bioactivity and Field Application Rates

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Introduction

Pyroxasulfone herbicide is a seedling shoot growth inhibitor, and is used for control of most annual grass and small seeded broadleaf weeds in wheat, corn, and soybean. Pyroxasulfone is classified as group 15 herbicide by WSSA, as the primary target enzyme in weeds is a very long chain fatty acid elongase (Tanetani et al. 2009).

The effect of soil properties on pyroxasulfone bioactivity has not been investigated in a wide range of soils typical of western Canada.

Objectives

The objectives of this study were to establish the relationship of pyroxasulfone bioactivity to the combined effect of soil organic matter content, pH, and clay content using a large number (47) of soils, and to relate bioactivity to field application rates in Canadian prairie soils.

Materials and Methods

- Soil samples were collected from 47 sites in western Canada.
- Laboratory bioassay was performed in 2-oz WhirlPak™ bags in the laboratory. Sugar beet (*Beta vulgaris* L. 'Beta 1385') was grown for 7 days (Szmigielski et al. 2014), and shoot length was measured in response to 0, 92, 184, and 368 ppb pyroxasulfone.

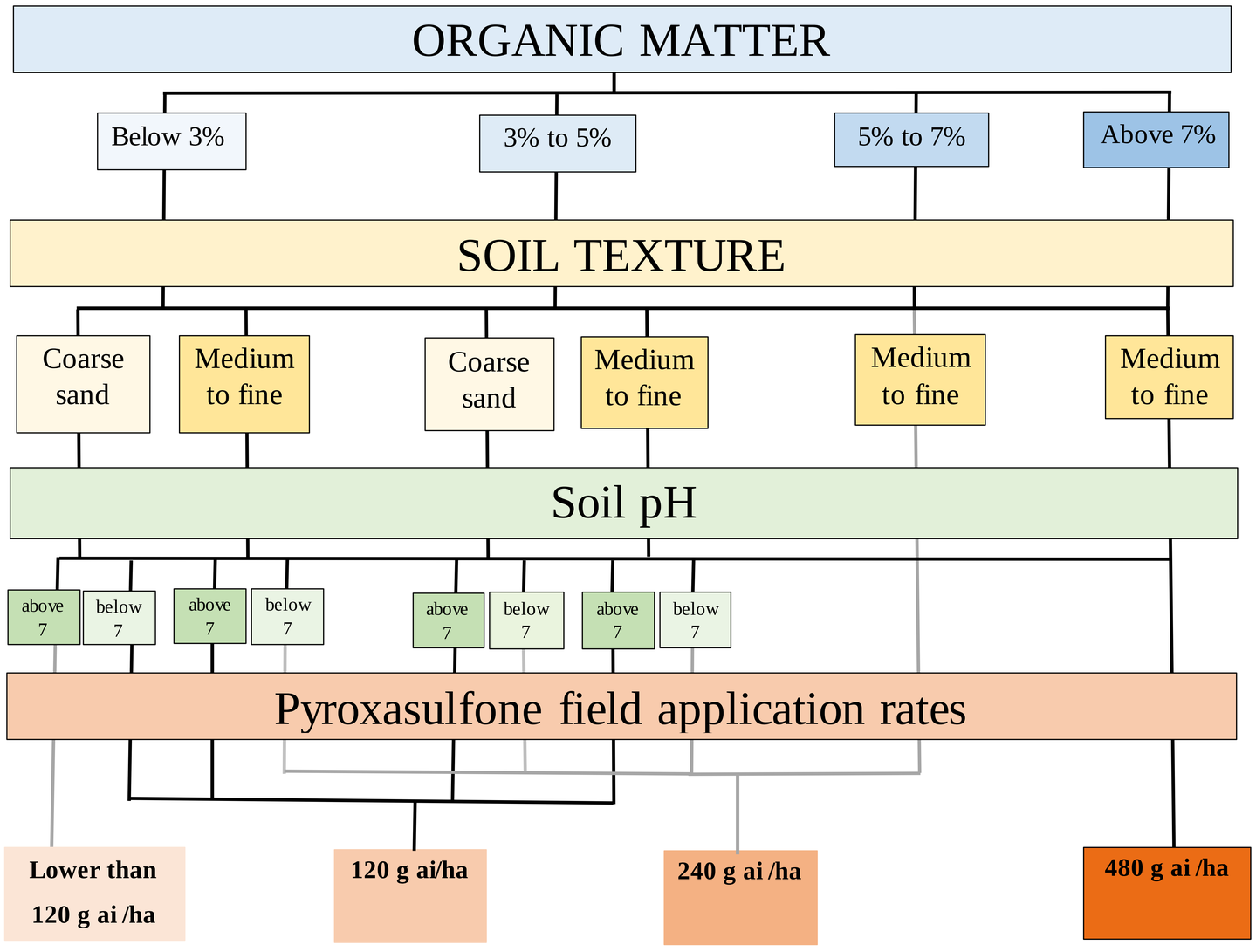
Results

- Multiple regression analysis showed that pyroxasulfone bioactivity in soil was primarily related to the soil organic matter content ($p < 0.001$), and also pH ($p = 0.001$) and clay content ($p = 0.008$).
- To examine the patterns in pyroxasulfone bioactivity, soils were grouped based on organic matter content, texture and pH, For each soil subgroup, the average shoot length inhibition (%) of sugar beet was calculated and converted to field application rates (Fig. 1).

Conclusions

Pyroxasulfone bioactivity in soil and consequently its field application rates were shown to be strongly related to organic matter content, pH, and clay content. Therefore rates of application should be adjusted for these properties in western Canadian soils as they can vary greatly from region to region, field to field, and even within individual fields.

Fig. 1. Estimated pyroxasulfone field application rates based on soil properties



References: *Tanetani et al. 2009, Pestic. Biochem. Physiol. 95:47-55*
Szmigielski et. al. 2014. J. Pestic. Sci. 39:22-28

Acknowledgements: *Assistance from FMC Canada is gratefully acknowledged.*