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KEEPING SHELTERBELTS FOR CARBON STORAGE AND GREENHOUSE GAS MITIGATION

No. SASK-17

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For more than a century, over 600 million shelterbelt trees have been distributed to land owners in the Canadian Prairies mainly to protect farms from soil erosion and extreme wind events. In Saskatchewan, there exists over 60,000 km of planted shelterbelts. Recent studies suggest that shelterbelts play a significant role in storing atmospheric carbon in the soil and in mitigating the emissions of greenhouse gases from agricultural activities (Fig. 1). With the on-going muse of developing a carbon pricing policy in Canada, there is a growing awareness that landowners may derive economic benefits from GHG reduction and carbon sequestration associated with their shelterbelt-planting activities.

Fig. 1. Shelterbelts play a role in carbon storage and greenhouse gas mitigation

CARBON BENEFITS OF PLANTING SHELTERBELTS

The effect of planted shelterbelts on carbon storage and the mitigation of greenhouse gas emissions (CO_2, CH_4 and N_2O) from cropping was studied across three sites in the Boreal Plains and Prairies Ecozone of Saskatchewan- Outlook, Saskatoon and Prince Albert

Major Findings

- Soil carbon storage was 27% greater in the shelterbelts than in the cultivated fields, despite greater CO_2 fluxes
- The potential of the soil to produce methane gas was 3.5-times lower in the shelterbelts compared to cropped fields (Fig. 2)

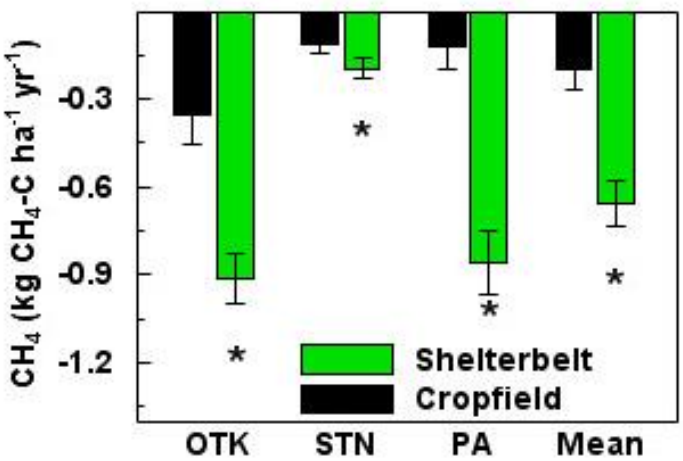

Fig. 2. Exchange of CH_4 from shelterbelts and cropped fields at Outlook, Saskatoon and Prince Albert study sites averaged for 2013 and 2014

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- Compared to cultivated soils, nitrous oxide emissions were 4-times lower in the shelterbelts. The reduced nitrous oxide emissions in shelterbelts was mainly due to lack of excess nitrogen in the soil and micro-climate modification by the trees (Fig. 3).
- Total seasonal exchange of non-CO_2 GHGs was lower by 0.6 Mg CO_2e ha^{-1} yr^{-1} in shelterbelts as compared with cropped fields.

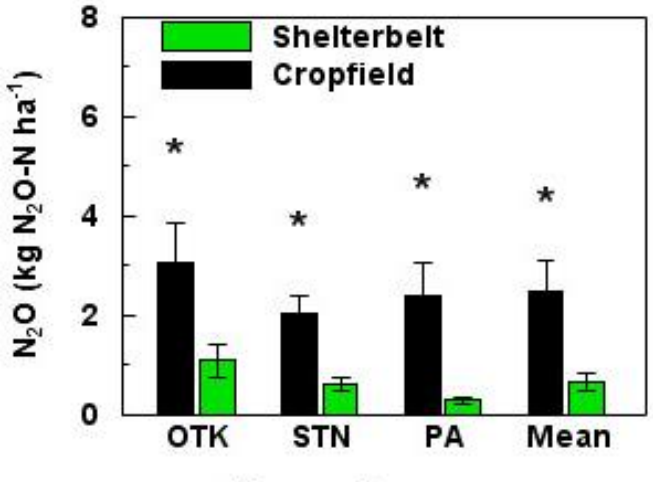

Fig. 3. Exchange of N_2O from shelterbelts and cropped fields at Outlook, Saskatoon and Prince Albert study sites averaged for 2013 and 2014

The results demonstrate that shelterbelts have substantial potential to mitigate GHGs by enhancing C storage and reducing N_2O emissions, while maintaining a strong CH_4 sink.

FURTHER READING

- Amadi, C.C., K.C.J. Van Rees, R.E. Farrell. 2016. **Soil – atmosphere exchange of carbon dioxide, methane and nitrous oxide in shelterbelts compared with adjacent cropped fields**. *Agric., Ecosyst. Environ.* 223:123-134
- AGGP Fact Sheet(s): **SASK-18**; **SASK-19**

CONTACT FOR MORE INFORMATION: SASKAGROFORESTRY.CA/

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