AGGP-Agroforestry

MODELLING ECONOMICS OF FIELD SHELTERBELTS ON A SASKATCHEWAN CROP FARM

No. SASK-24

by SUREN KULSHRESHTHA

INTRODUCTION

Benefits provided by having shelterbelts on a farm accrue both to the producers as well as to the society at large. Some of these benefits are identified by producers, but those accruing to the society are not considered in either maintaining or removing shelterbelts. Even for those benefits that are received by producers, some short-sightedness may be present. Many producers see them as hindrance in their farming operations on account of newer technology. Others see the loss of land understand the shelterbelts as lost opportunity cost for farming, especially during periods of high crop prices.

OBJECTIVES OF THE STUDY AND BRIEF METHODOLOGY

Main research question that is posed is whether shelterbelts are in the best interests of the producers as well as the society if a longer term perspective is taken. The model was developed to meet this objective.

The model developed is Excel based. Various worksheets in the model are linked to produce net benefits of keeping the field shelterbelts from the producer's private accounting stance, as well as from societal accounting stance. An overview of the major operations in the model is shown in Figure 1. The model is simulated over a 50-year period. To compare the value of the final decision criteria (net benefits), these are discounted at 5% rate to yield Net Present Value of benefits.

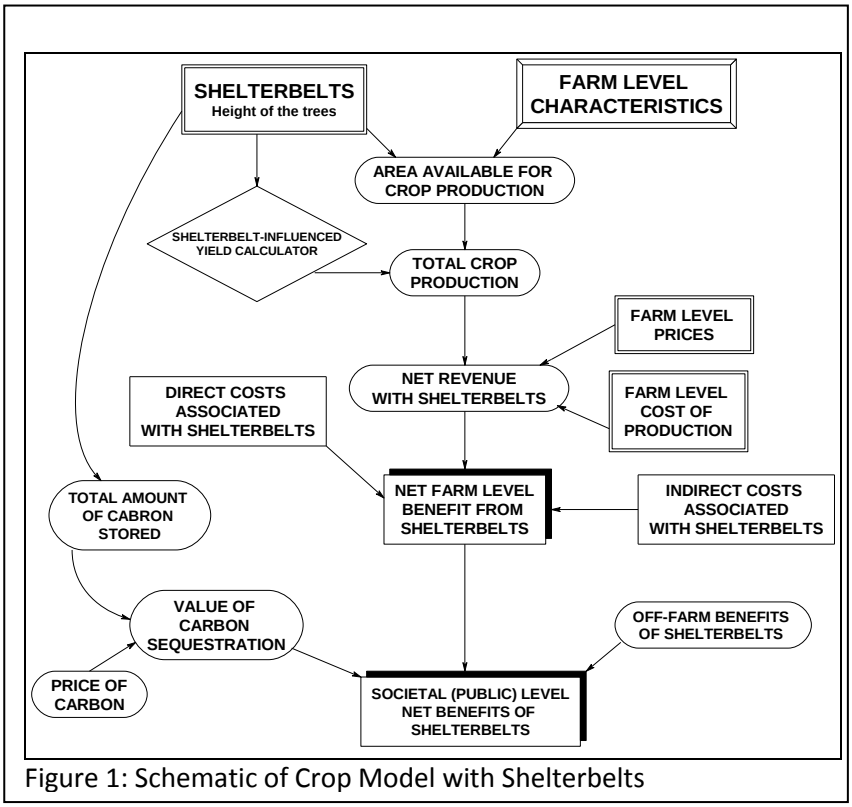

Figure 1: Schematic of Crop Model with Shelterbelts

Benefits to the producer of having field shelterbelts included improved yields after an initial period of shelterbelt growth. However, there are two types of costs also associated with such shelterbelts. First type is the direct cost of developing and maintaining such shelterbelts. The second type of cost is more indirect in nature. First indirect cost is the loss of land occupied by shelterbelts which otherwise could be used for crop production. Second indirect cost is associated with field operations. With the newer technology of larger equipment, the shelterbelts make some area inaccessible while some other area where treatments are duplicated. These possibilities are for fertilizer and herbicide application. These affect the cost of production of various crops.

The study crop farm had 1699 acres (688 ha) of land. Typical crops grown included: spring wheat, barley, oats, canola and alfalfa. Cost of production data were obtained from secondary source (Saskatchewan government websites), whereas the crop yields were estimated using yields curves provided by Agriculture and Agri-Food Canada.

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RESULTS OF THE STUDY

This research identified:

- Maintaining field shelterbelts in the economic interest of the producer, but only in the Brown and Dark Brown soil zones of Saskatchewan;
- On average, highest net return from shelterbelts was in Dark Brown soil zone of $162 thousand, or approximately $3,238 per annum. On a per acre basis it amounts to $61.91 over the 50-years period or only $1.24 per acre per annum.
- Although shelterbelts can provide some benefits, the estimated level could be considered to be too low for a producer to look at it in a positive manner.
- When value of carbon sequestration and other off-farm benefits are added, the highest net return (in present value terms) is estimated at $332 thousand or $195.39 per acre. When this value is converted to annual value, it still is low -- only $3.93 per acre per annum. This value is estimated under the assumption tht carbon is traded at $55 per ton. Increasing the value of carbon would certainly help the economics of shelterbelts in Saskatchewan.

Table 1: Total Net Present Value over a 50-year period for a Saskatchewan Crop Farm, by Soil Zones

Soil Zones	Gain or loss in Thousand $
Private Accounting Stance	
Brown	$105.2
Dark Brown	$161.9
Black	-$195.6
Public (Society) Accounting stance	
Brown	$254.9
Dark Brown	$332.0
Black	$7.6

FURTHER READING

AGGP Fact Sheet(s): **SASK-22, SASK-23, SASK-25**

CONTACT FOR MORE INFORMATION

For further information contact Professor Ken van Rees at the www.saskagroforestry.ca

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