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## WBECON- An Interactive Computer Model for the Economic Evaluation of Field Windbreaks

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## **WBECON - An Interactive Computer Model for the Economic Evaluation of Field Windbreaks**

**J. Brandle, B. Johnson, and B. Guenther**  
**Department of Forestry, Fisheries and Wildlife**  
**Department of Agricultural Economics**  
**University of Nebraska, Lincoln, Nebraska**

**J. Kort**  
**Shelterbelt Centre**  
**Prairie Farm Rehabilitation Administration**  
**Indian Head, Saskatchewan**

In 1991, Kort and Brandle released the first generation of WBECON, a computer simulation model designed to evaluate the economic viability of field windbreaks. The model had a number of restrictions that limited the use outside the Great Plains Region. Our objective in creating a second generation model was to provide the user with a program that could be easily modified for local conditions, would provide the maximum flexibility in program operation, and would require a minimum of computer programming experience.

WBECON is an interactive computer program designed to provide the landowner with information on the value of field windbreaks to their operation. The programs are written in Microsoft *QuickBASIC* and require an IBM PC, XT, AT, PS/2 or compatible computer having 640 K bytes of memory, at least one disk drive, and MS-DOS or PC-DOS version 2.1 or higher. The model runs best on a 286 processor or better.

The model consists of two main programs, WBINT and WBECON. WBINT provides the user the opportunity to customize the data files for local conditions. The program steps the user through a series of questions requesting information on wind direction; windbreak costs for establishment, planting, maintenance, and removal; windbreak species and characteristics; and crops grown in the area. WBINT then creates the data files and provides the opportunity to add additional files or edit existing files. A total of 20 individual data files are allowed. WBECON calculates the economic benefits of field windbreaks and is dependent on the data files created by WBINT. The program steps the user through a series of questions requesting information on the individual farm operation, production costs, crop rotations, field dimensions, discount rate, and windbreak design and species selection. After all of the data has been entered, WBECON calculates field areas, determines the relative proportions of sheltered and unsheltered areas, calculates yield response, determines the economic benefits, and provides a printed output. Additional analyses are available from a menu driven screen allowing the user to change one or more variables and recalculate the windbreak benefits.

Documentation and work sheets are provided to help the user develop data files and determine the economic benefits. Assistance in operation of the program or other questions may be directed to either Jim Brandle or John Kort (see addresses below).

Two versions of the model are available, a compiled version which comes ready to run and an uncompiled version which provides access to the program coding but requires the user to have Microsoft *QuickBASIC* in order to execute the program. The model is in the public domain and may be copied and distributed freely. The authors ask only that their efforts be recognized and that credit be given in any publication or report.

To obtain a copy of the program send the form below along with a high density 3.5 inch computer disk to either:

**For U.S. addresses:**

Jim Brandle  
Dept. Forestry, Fisheries, & Wildlife  
101 Plant Industry  
Lincoln, NE 68385-0814  
(402) 472-6626

**For Canadian addresses:**

John Kort  
PFRA Shelterbelt Centre  
Indian Head, Saskatchewan  
CANADA S0G 2K0  
(306) 695-2284

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Please send me the:

Compiled version \_\_\_\_\_ Both versions \_\_\_\_\_

User: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Phone Number: ( ) \_\_\_\_\_

\_\_\_\_\_ I am also interested in receiving other information on windbreaks and shelterbelts.

## ECONOMIC BENEFITS OF FIELD SHELTERBELTS

Date: 11-05-1993

Name: JIM BRANDLE

File Name: NEBRASKA

## LAND INFORMATION

Farm Location ..... MEAD  
 Width Running East to West (feet) ..... 2600  
 Length Running North to South (feet) ..... 2600  
 Field Size (acres) ..... 155.1  
 Problem Wind Direction ..... Southwest  
 Soil Texture ..... Loamy  
 Moisture Content ..... Somewhat Limited

## SHELTERBELT INFORMATION

Tree Species ..... SCOTS/AUST. PINE, 6-8 FT SPACING  
 Shelterbelt Design ..... East/West Parallel  
 Lifespan (years) ..... 75  
 Years to Maturity ..... 30  
 Height at Maturity (feet) ..... 40  
 Number of Main Belts ..... 5  
 Competition at Maturity (%) ..... 3.94  
 Distance Between Belts Running East to West (feet) ..... 433  
 Windbreak Width at Maturity (feet) ..... 20  
 Acres Occupied by Shelterbelt at Maturity ..... 5.96

Site Preparation Cost	\$172.35	Renovation Cost	\$0.00
Establishment Cost	\$1,354.17	Removal Cost	\$6,500.00
Replanting Cost	\$537.73		
Maintenance Cost	\$2,446.36	Total Cost	\$11,010.61

## CROP INFORMATION PER ACRE

Crop	Unsheltered Yield	Crop Prices	Crop Inputs
1. SOYBEANS	45.0 bu	\$6.50	\$150.00
2. CORN (GRAIN)	95.0 bu	\$2.25	\$190.00

## ANNUAL BENEFITS OF THE SHELTERBELTS AT MATURITY PER ACRE

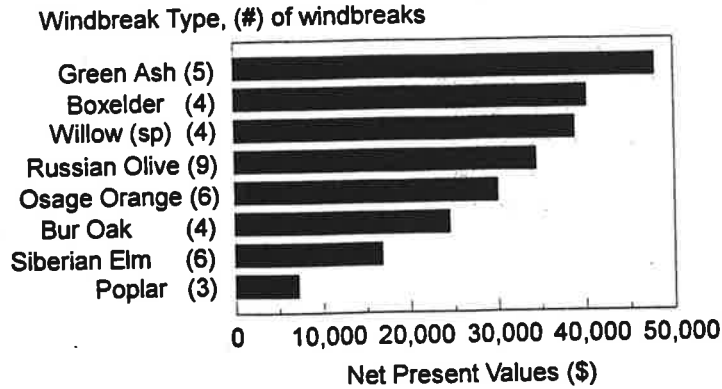
Crop	Sheltered Yield	Percent Increase	Economic Benefits
1. SOYBEANS	51.0 bu	13.4%	\$46.76
2. CORN (GRAIN)	104.0 bu	9.5%	\$28.58

## TOTAL ECONOMIC BENEFIT OVER SHELTERBELT LIFESPAN

In Constant Dollars	\$330,038
In Present Dollars (Discounted at 5.0% Annually)	\$52,604

# Net Present Values

## Hardwood Windbreaks

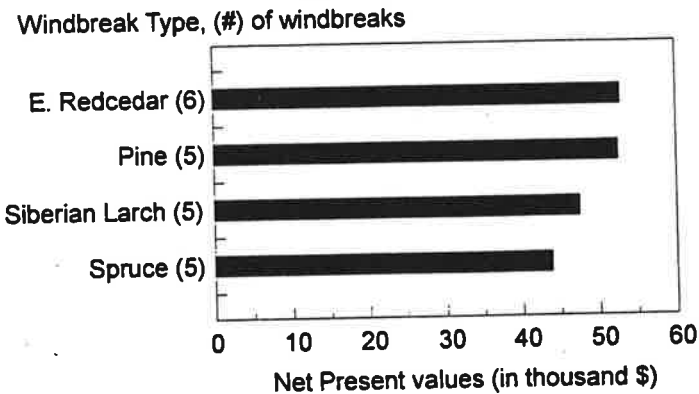


Field area: 160 acres

Windbreak intervals: 10-13 H (height)

# Net Present Values

## Conifers

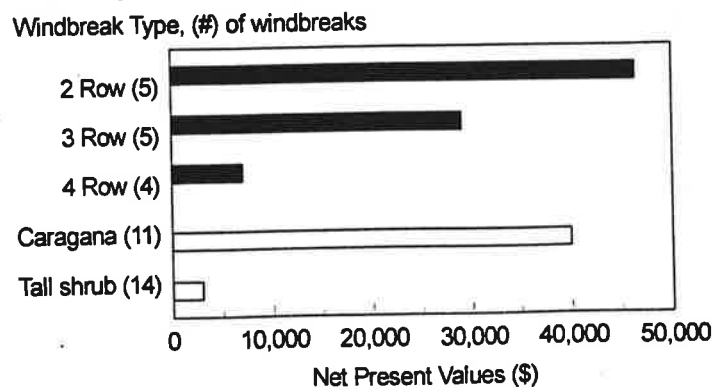


Field area: 160 acres

Windbreak intervals: 10-13 H (height)

# Net Present Values

## Multi-Row ■ and Shrub □



Field area: 160 acres

Windbreak intervals: 10-13 H (height)