Planning for New Windbreaks
Layout, Species Selections & Spacing

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Special thanks to the Iowa Pork Producers
BENEFITS OF WINDBREAKS

- Reduced Wind Velocity
- Controls Snow Drifting
- Source of Food
- Property Value Enhancement
- Wildlife Habitat
- Reduced Fuel Consumption
- Reduced Livestock Feed Costs
Figure 1. Zones of reduced wind velocity downwind of barrier as percentage of open field velocity. Vertical scale exaggerated.
Critical to Understand:

- **Soils** (clay, loam, sand, old cattle lot, etc)
- **Drainage** (most trees do not like wet feet)
- **Available space** (distance from buildings to property line)
- **Tree and Shrub growth habit** (how big when trees are fully mature)
- **Cost share availability** (there is money to help with windbreaks)
- **Availability of **GOOD** planting stock** (start looking/ordering now)
2 rows of conifers (wind reduction)
1 row of shrubs (snow fence)
Multiple conifer rows
Multiple shrub rows
Side profile
SPACING

(Varies With Species & Objectives)

Large Conifers 20 to 30 feet
Small Conifers 10 to 20 feet
Hardwoods 8 to 15 feet
Shrubs 3 to 8 feet
The Online Windbreak Program

1. Google earth
2. NRCS Soil data
3. DNR Woodland Suitability Index
4. ISU Tree spacing and species recommendations

https://veb.nrem.iastate.edu/app
Step 1. Enter your address and find the location.
Step 2. Zoom in on the site.
Insert New Building

**Building Type**
- Hybrid

**Orientation**
- East - West

**Plant Sides**
- North
- West
- South

[Cancel] [Save]
• Click on a tree in a row and select
  – Hardwood, Shrub, Evergreen
### Soil Types

<table>
<thead>
<tr>
<th>Soil</th>
<th># of Trees</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clarion</td>
<td>13</td>
</tr>
<tr>
<td>Nicollet</td>
<td>13</td>
</tr>
<tr>
<td>Webster</td>
<td>13</td>
</tr>
</tbody>
</table>

### Pick a tree type

- **Selection #1**: Evergreen
- **Select Tree**
  - Arborvitae
  - Black Hills Spruce
  - E. Red Cedar
  - E. White Pine
  - Jack Pine
  - Norway Spruce
  - Red Pine
  - White Spruce
  - White/Concolor Fir
At least 1 tree does not have a tree type specified for it. Please make sure all trees have been assigned a tree type.

<table>
<thead>
<tr>
<th>Planting Costs</th>
<th>Barefoot cost per tree</th>
<th>Container (18&quot;-24&quot;)</th>
<th>Container (2'-3')</th>
<th>Container (3'-4')</th>
<th>Container (4'-5')</th>
<th>Container (&gt; 5')</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hybrid willow (15&quot;)</td>
<td>$1.40</td>
<td>$16.00</td>
<td>$24.00</td>
<td>$30.00</td>
<td>$46.00</td>
<td>$13.00</td>
</tr>
<tr>
<td>Eastern Red Cedar (8&quot;-15&quot; transplant)</td>
<td>$2.40</td>
<td>$15.50</td>
<td>$24.00</td>
<td>$30.00</td>
<td>$46.00</td>
<td>$13.00</td>
</tr>
<tr>
<td><em>Conifers</em> *</td>
<td>$0.40</td>
<td>$15.00</td>
<td>$24.00</td>
<td>$30.00</td>
<td>$45.00</td>
<td>$13.00</td>
</tr>
<tr>
<td><em>Hardwoods</em> *</td>
<td>$0.54</td>
<td>$15.50</td>
<td>$24.00</td>
<td>$24.00</td>
<td>$30.50</td>
<td>$13.00</td>
</tr>
</tbody>
</table>

**Tree/shrub planting costs**

| Tree planting by hand  | $0.25                  | $1.00                | $1.00             | $1.00             | $1.00             | $1.00            |

**Ancillary planting costs**

| Plastik mulch or fabric | $0.25                  | $1.00                | $1.00             | $1.00             | $1.00             | $1.00            |
| Drip irrigation         | $0.25                  | $1.00                | $1.00             | $1.00             | $1.00             | $1.00            |
| Labor                   | $0.25                  | $1.00                | $1.00             | $1.00             | $1.00             | $1.00            |
| Other                   | $0.25                  | $1.00                | $1.00             | $1.00             | $1.00             | $1.00            |

**Total**

| Total site preparation costs | $1.25 | $5.00 | $5.00 | $5.00 | $5.00 | $5.00 |
| Total site preparation costs | $6,976.00 |

* Average price across species
SHRUBS

- Dogwoods
- Highbush Cranberry
- Ninebark
- Lilac
- Hazelnut
- Wild Plum
- Nanking Cherry
- Elderberry
- Aronia berry
Hazelnut

*(Corylus americana)*

- Height 8-10’
- Space 6’ within row, 8’ between rows
- Well drained soil
- Full sun
- Edible nuts *(mice and squirrels!)*
  - Cultivars Grand Traverse and Skinner
  - Grand Traverse
    - Blight resistant –
    - Uniform nut size
    - Excellent Taste
    - Low to moderate winter dieback
Elderberry
(Sambucus canadensis)

- Height 5-12’
- Space 6’ within row, 8’ between rows
- Prefers moist soils, can tolerate dry soils
- Full sun to partial shade
- Edible berries (birds!)
  - Jams
  - Jellies
  - Juice
  - Wine
Wild Plum

*(Prunus americana)*

- Height 10-15’
- Space 10’ within row, 8’ between rows
- Prefers moist soils
- Full sun but can tolerate light shade
- Edible fruit *(birds!)*
- Moderate ability to spread
  - Forms a thicket
  - White flowers before leaf set
Aronia
(Aronia melanocarpa)

- Height 3-4’ up to 8’ – cultivar dependent
- “Viking, Nero, Autumn Magic
- By year 5 – 30-40lbs per plant
- Space 10’ within row, 8’ between rows
- Wide range of soils (pH 6-6.5 optimal)
  tolerates 5-8.5
- Full sun but can tolerate light shade
- Edible fruit (after freezing birds will eat!)
- Deer damage to seedlings
Highbush Cranberry  
(*Viburnum opulus*)

- Height 10-12’
- Space 8’ within row, 10’ between rows
- Prefers moist soils, well drained soils
- Full sun to shade but flowering and fruiting is best in full sun
- Edible berries (*birds*)
  - Late August early September
Ninebark
(Phsocarpus opulifolius)

- Height 8-10’
- Space 8’ within row, 10’ between rows
- Prefers moist soils, well drained soils
- Full sun to partial shade but flowering and fruiting is best in full sun
Lilac  
(Syringa spp.)

- Height 8-10’
- Space 12’ within row, 12’ between rows
- Prefers moist soils, well drained soils
- Full sun for best flowering
Dogwood
*(Cornus spp.)*

- Height 10’-15’
- Space 12’ within row, 12’ between rows
- Prefers moist soils, well drained soils
- Full sun to partial shade
Shrub Maintenance

• Regular pruning cycle for most shrubs
  – 3-5 year removal of old wood shoots
  – Renewed sprouts flower and fruit more
  – Control height and vigor
  – Less disease problems when pruned
  – Prune just after flowering but before fruit set
Conifers
White Spruce
(*Picea glauca*)

Black Hills is a variety - Dry sites
Smaller and narrower than other spruces

Don’t plant Black hills if you have blue spruce problems
Norway Spruce
(Picea abies)

Fastest growing spruce
“Blue Collar” windbreak tree

Lower branches can have mower damage – best to spray and mulch around
Concolor Fir
(*Abies concolor*)

Well drained soils
Does great in western Iowa

Double leader issues
Eastern Red Cedar

(*Juniperus virginiana*)

Native “Ugly”
Good Wildlife
Wide Range of Sites
Hard to transplant large stock
White Cedar
(Thuja occidentalis)

Moist sites, Good winter color
Wind and winter burn,
Branch breakdown
Rabbits and deer love it!
Techny is a good hardy cultivar – Don’t plant
green giant or the columnar types
White Pine
*(Pinus strobus)*

Native to Iowa-NE Iowa
Retains only 1-year’s needles
Susceptible to winter damage (Wind and Ice)
Deer will browse it
Hardwoods
Black Walnut

(*Juglans nigra*)

- Several cultivars selected for nut production
- Easy cracking vs. Total production vs. Survival
- 30’ x 30’ spacing
- Prefers moist soils
- Full sun
- Edible nuts (*squirrels and mice!*)
- Disease issues (anthracnose)
- Juglone issues
  - (don’t plant a garden nearby)
Kentucky Coffee Tree

*Gymnocladus dioicus*

- Native has Pods
- Expresso is Podless cultivar
- 15’ x 15’ spacing to 30’ x 30’
- Wide range of soils
- Full sun
Shagbark Hickory  
(Carya ovata)

- 15’ x 15’ spacing to 30’ x 30’
- Prefers moist well-drained soils
- Full sun
- Edible nuts (squirrels and mice!)
- Associates with Oaks
Bur Oak
2-3 yr acorn crop interval
Age 35

Red Oak
3-5 yr acorn crop interval
Age 25

Swamp White Oak
3-5 yr acorn crop interval
Age 20

White Oak
4-10 yr acorn crop interval
Age 20
Ironwood
(Ostrya virginiana)

- Intermediate size tree
- Wide range of soils
- Tolerates deer, shade etc
Chestnut
(Castenea mollisima)

- Easy cracking vs. Total production vs. Survival – Cultivar dependent!
- Badgersett hybrids for northern Iowa locations
- Several varieties for southern Iowa
-20’ x 20’ spacing, final spacing 40’x40’
- Well-drained soils critical
  - Dry, sandy, gravelly soils fine
- pH 5.5-6.5
- Full sun
- Edible nuts (squirrels and mice!)
Maple (Acer Spp.)

Sugar & Black Maple

Well drained sites
- East of 35 sugar
- West of 35 black

Silver Maple

Wider range of soils
Planting Stock

Bare Root Stock

Container grown vs. Containerized
Tree Spade

Container Grown

Bag grown
When to Plant?

Bare Root Stock - Spring, before bud break; soil temps at 50 degrees
Container Grown & Potted - spring, early summer, early fall
B&B – spring, early summer, early fall
   Remember that bigger trees take longer to overcome transplanting shock
   - 1 year per inch of caliper

Plantings in mid-summer, late fall and winter are more prone to failure
Annual Cycle of Root, Leaf & Stem Growth

Spring Root Growth

Leaf & Stem Growth

Fall Root Growth

32°F  50°F  50°F  32°F
Planting container grown trees & large bare root trees

2-3X pot / root ball diameter
• Remove Pot
• Remove Wire
• Remove Burlap
• If roots are pot bound cut them with utility knife
  • Resets the roots “memory”
Poorly Drained

Well Drained

slope soil up to cover portion of rootball above grade

root collar should be level or slightly above surrounding grade

grade

grade

3 x rootball diameter

2 to 3 x rootball diameter
Remove pots-plastic and fiber
Avoid mulch adjacent to tree trunk
Water after planting
During first year, water 10-14 days.
Use lots of water

For thin-barked trees:
Wrap in Oct-Nov.
Remove Mar-Apr.
Another reason to wrap the stem
Welcome to the ISU Forestry Extension Bulletin

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Upcoming Field Days

- Program Schedules

133 Tri-State Forest Stewardship Conference
Talks Available Here (2009-2015)

Looking for a Certified Applicator to Treat for (Emerald Ash Borer)

- Read this short article
- Then follow this link to find or verify an applicator

2015 AgroForestry Conference Presentations Now Available as PDF’s and recordings!

Trees of Iowa

- Iowa Christmas Tree Growers Association
- MSU Christmas Tree Pest Manual
- MSU Christmas Tree Nutrient Website
- Iowa Beekeepers Association

Link to Air Photos

Link to Campus Tree Map

2014 Master Woodland Managers class info
Common Trees & Shrubs of Iowa

- American Basswood
- American Elm
- American Hazelnut
- American Hornbeam
- American Mountain Ash
- Apple
- Ashes
- Austrian Pine
- Balsam Fir
- Balsam Poplar
- Black Haw Viburnum
- Blackjack Oak
- Black Locust
- Black Maple
- Black Oak
- Black Spruce
- Black Walnut
- Black Willow
- Blue Ash
- Boxelder
- Bur Oak
- Butternut
- Canada Plum
- Canada Yew
- Catalpa
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