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May 16, 2007

KANSAS FORESTRY TECHNICAL NOTE NO. KS-10

SUBJECT: ECS – Forestry – Conservation Tree/Shrub Plantings Suitability Groups, Windbreak Suitability Groups, and Plantings for Kansas

Purpose. To provide guidance for tree plantings and attributes

Effective Date. Effective upon receipt

This Kansas Forestry Technical Note is to be used for determining adapted trees/shrubs and associated attributes for conservation plantings. Attachment 1, Conservation Tree and Shrub Plantings Suitability Groups for Kansas; Attachment 2, Conservation Tree/Shrub Plantings and Attributes; and Attachment 3, Windbreak Suitability Groups are included.

This technical note is available on the electronic Field Office Technical Guide (eFOTG) under Section IV, Conservation Practices 612, Tree/Shrub Establishment; 380, Windbreak/Shelterbelt Establishment; 391, Riparian Forest Buffer; 311, Alley Cropping; 422, Hedgerow Planting; 650, Windbreak/Shelterbelt Renovation; and 666, Forest Stand Improvement. It can also be accessed on the Kansas Natural Resources Conservation Service Web site under Technical Resources.

(signed)

JEFFRY L. HART
State Resource Conservationist

Attachments

DIST: A, F

CONSERVATION TREE/SHRUB PLANTINGS SUITABILITY GROUPS FOR KANSAS

INTRODUCTION

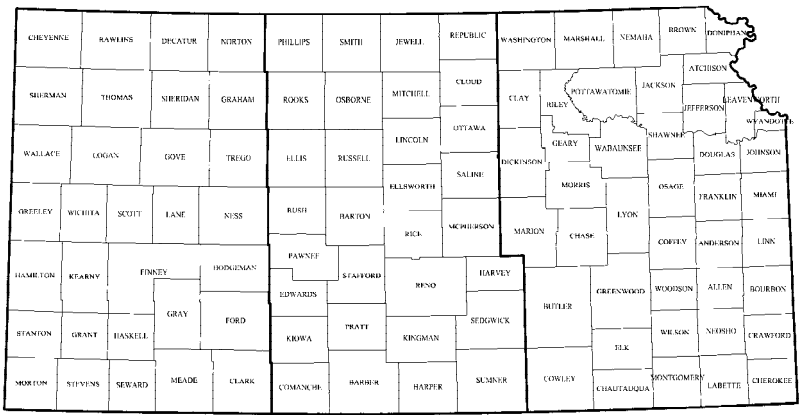
The purpose of this document is to provide guidance for tree and shrub adaptability based on soils. Each tree or shrub species has climatic and physiographic limitations. Within these parameters, a tree or shrub may be well or poorly adapted because of soil characteristics. Additionally, some introduced species may pose a problem because of spreading (by seed or root suckering) or displacing native species. Care should be taken to select materials adapted to the specific planting site and will address the identified resource concern. The species listed within the Conservation Tree/Shrub Plantings and Attributes (Attachment 2) are for conservation tree plantings. Refer to Kansas Forest Service (KFS) preferred tree lists located at http://www.kansasforests.org/pubs/community/index.shtml for Trees recommended for urban or landscape plantings

Windbreak Suitability Groups (Attachment 3) have been developed considering individual species performance under specific conditions of soil, climate, physiography, and management. These groups provide a guide for species best adapted for the soils within your county and for predicting height, growth, and effectiveness. They may be used when selecting woody plants for windbreaks, wildlife plantings, riparian buffers, reforestation, other environmental plantings, recreation, landscaping, wetland restoration or enhancement, and critical area plantings.

A number of attributes are included in the table for each species. These attributes were rated subjectively and assigned a relative value to further assist those unfamiliar with individual species characteristics or desirability for the intended use.

Explanation of Terms for Conservation Tree/Shrub Plantings and Attributes Table:
Species are grouped by plant type (shrubs, deciduous, and conifer) and arranged in alphabetical order by common name.

Kansas Tree/Shrub Zones



1. Suitability Group - A windbreak suitability value given to each soil that reflects soil productivity. Explanation of the Conservation Tree and Shrub Suitability Groups can be found in the National Forestry Manual, Section 537.22(1). Identify soil in the planting site to determine suitability group value. A designation of Not Suited (NS) means that the tree/shrub is not suited for that zone.

2. Average Height 20 Years - Heights represent expected performance of the individual plant species.

3. Growth Rate - Represented by a value relating to plant growth. F=Fast, M=Medium, S=Slow.

4. Native Species - N=Native to Kansas, I=Introduced to Kansas

5. Windbreak Value - H=High, M=Medium, L=Low. A general rating (H, M, L) of species for windbreaks rated on their ability to provide a useful component in the windbreak. An H rating would indicate that the trees or shrubs are capable of developing a row that is uniform, dense, or tall enough to provide the windbreak component for which it is planned.

6. Wildlife Value - A general rating of H, M, or L of a plant's composite of food and cover values for wildlife. Criteria include basal area, season of growth, longevity of fruit, and suitability for nests. Species with an H rating would provide food and cover for many wildlife species.

7. Lumber Products - Y=Yes, N=No. A rating of Y indicates that the species may have commercial value as timber.

8. Fuelwood Product - A Y rating indicates that the species has fuelwood value.

9. Drought Tolerance - The plant's capability to grow in droughty or dry soil conditions. H=Plant can withstand or has physiology to survive droughty periods, M=Some tolerance to drought or dry conditions, L=Little or no tolerance for dry soil conditions.

10. Soil Texture - Adaptation to different soil textures. 1=Fine textured soil, 2=Medium textured soil, 3=Coarse texture soils.

11. Soil Saturation - The plant's capability to grow in saturated soil conditions. H=Plant can withstand saturated soil conditions, M=Some tolerance to saturated conditions, L=Little tolerance of water-saturated soil, N=No tolerance to water saturation.

12. Salinity Tolerance - The plant's ability to tolerate soil salinity. H=Can tolerate high levels of salinity, M=Some tolerance to salinity, L=Little tolerance to salinity, N=No tolerance to salinity.

13. pH Range - The range in soil pH values that the plant species can be expected to grow successfully.

Soil Suitability Groups

Suitability Group 1

Description - These are deep, well drained to somewhat poorly, drained soils that receive beneficial moisture from favorable landscape positions, flooding, runoff from adjacent land, or they have beneficial a seasonal high water table during the spring. Soils within this group are generally fine sandy loam to silty clay loam.

Limitations - High pH will have an effect on the selection of species on some soils in this group. Competition from grass and weeds is the principal concern in establishing the managing trees and shrubs. Occasionally, somewhat poorly drained soils may have excessive water for some species.

Suitability Group 2

Description - Soils in this group are deep, poorly drained or very poorly drained, and excessively wet or ponded during the spring or overflow periods. Wetness limits the selection of species suitable for planting on these soils and may reduce the growth rate.

Limitations - Wetness, high pH, and drainage will have an effect on the selection of tree and shrub species for soils in this group. Competition from grass and weeds is the principal concern in establishing and managing trees and shrubs. Spring planting may be delayed because of wet conditions. Soil blowing is a concern on the sandy and organic soils.

Suitability Group 3

Description - Soils in this group are deep, well drained, loamy-textured soils with moderate and moderately slow permeability on uplands.

Limitations - Competition from grass and weeds is the principal concern in establishing and managing trees and shrubs on these soils. Water erosion is a concern on the gently sloping to moderately steep areas.

Suitability Group 4

Description - Soils are moderately deep to very deep and have loamy surface textures with clayey subsoils, have slow or very slow permeability, and occur on uplands.

Limitations - High clay content and water availability have an effect on the selection of tree and shrub species for these soils. Competition from grass and weeds is the principal concern in establishing and managing trees and shrubs. Water erosion is a concern on the gently sloping to moderately steep areas.

Suitability Group 5

Description - Soils in this group are deep with loamy and sandy texture. This group typically includes soils that normally have adequate soil moisture.

Limitations - Competition from grass and weeds and abrasion from soil blowing are the principal concerns in establishing and managing trees and shrubs on these soils.

Suitability Group 6

Description - Soils are well drained, mostly loamy textures, and moderately deep over sand, gravel, bedrock, and other layers that can severely restrict root growth. Soils have low or moderate available water capacity.

Limitations - Droughtiness will have an effect on the selection of tree and shrub species for use on these soils. Competition from grass and weeds is the principal concern in establishing and managing trees and shrubs. Water erosion is a concern on gently sloping to moderately steep areas. Supplemental watering and/or weed fabric barrier may be needed for establishment.

Suitability Group 7

Description - Soils in this group are deep, excessively to moderately well drained, sandy in texture, typically have low or very low available water-holding capacity, and do not normally have adequate moisture.

Limitations - Drought conditions and abrasion from soil blowing are the principal concerns in establishing and managing trees and shrubs on these soils. Specialized site preparation (due to hummocky sand that is subject to blowouts) and specialized planting methods (vegetation between rows is normally left undisturbed) are needed to establish trees and shrubs. Supplemental watering and/or weed fabric barrier may be essential for successful establishment.

Suitability Group 8

Description - Soils are calcareous at or near the surface. They do not receive beneficial moisture from run-in, flooding, or seasonal high water tables.

Limitations - High calcium content and competition from grass and weeds are the principal concerns in establishing the managing trees and shrubs on these soils. Water erosion is a concern on gently sloping to moderately steep areas.

Suitability Group 9

Description - Soils are affected by salinity and/or sodicity.

Limitations - Concentrations of salt and/or restrictive layers will severely affect the establishment, vigor, and growth of trees and shrubs on these soils.

Suitability Group 10

Description - Soils have one or more characteristics such as soil depth, texture, drainage, available water capacity, slope, or salts which severely limit planting, survival, or growth of trees and shrubs.

Limitations - Soils are usually not recommended for farmstead and feedlot windbreaks, field windbreaks, and plantings for recreation and wildlife. However, onsite investigations may reveal that tree and shrub plantings can be made with special treatments (hand-planting, scalp planting, specialized site preparation, drainage, or other specialized treatments). The selection of species must be tailored to the soil conditions existing at each site. **Limiting conditions and the specialized treatments required to overcome these limitations must be documented on the planting plan.**

Conservation Tree/Shrub Plantings and Attributes

Tree/Shrub	Suitability Group			Average Height (feet) 20 yrs.			Attributes						Soil Adaptation				
Adapted Species	1. Eastern Zone	1. Central Zone	1. Western Zone	2. Eastern Zone	2. Central Zone	2. Western Zone	3. Growth Rate	4. Native Species	5. Windbreak Value	6. Wildlife Value	7. Lumber Products	8. Fuelwood Product	9. Drought Tolorance	10. Texture	11. Soil Saturation	12. Salinity Tolerance	13. pH Range
Shrubs																	
Blackhaw	1, 3-6	NS	NS	6-8	NS	NS	S	N	L	H	N	N	M	1, 2	N	N	4.8-7.5
Buttonbush	1, 2	1, 2	1, 2	12-15	8-12	6-8	M	N	L	M	N	N	M	1,2,3	H	L	5.3-8.5
Cherry, Choke	1, 3-8	1, 3-7	1, 3-7	12-14	10-12	6-10	F	N	H	H	N	N	H	1,2,3	M	H	5.2-8.4
Cherry, Sand (Prunus besseyii)	1, 3	1, 3	1, 3	4-6	4-6	4-6	S	N	M	H	N	N	H	2, 3	N	N	5.9-7
Cotoneaster, Peking	1, 3-6	1, 3-6	1, 3-6	6-10	6-8	5-7	M	I	H	H	N	N	H	1,2,3	N	H	5.5-7.5
Currant, Golden	1, 3-8	1, 3-8	1, 3-8	3-5	3-5	3-5	M	N	H	H	N	N	H	2	N	N	6-8
Dogwood, Redosier	1, 3-5	1, 3-5	1, 3-5	6-8	6-8	6-8	F	I	M	M	N	N	L	1,2,3	H	M	4.8-7
Dogwood, Roughleaf or Gray	1, 3-6	1, 3-5	1, 3-5	6-8	6-8	6-8	F	N	H	M	N	N	H	1, 2	L	L	4.5-7.5
Elderberry	1, 3	NS	NS	5-7	NS	NS	F	N	L	H	N	N	M	2	N	N	5-7
Euonymus, Eastern Wahoo	1, 3-4	1	NS	6-8	6-8	NS	M	N	L	M	N	N	M	1,2,3	N	N	6.1-7.8
Euonymus, Winterberry	1, 3-5	1, 3-5	NS	12-18	12-16	NS	F	I	H	L	N	N	M	1,2,3	N	L	4.7-7.5
Forsythia	1, 3-5	1, 3-5	1, 3-5	6-8	6-8	6-8	F	I	M	M	N	N	M	1,2,3	N	L	4.7-7.5
Hazel, American (hazelnut)	1, 3-5	NS	NS	3-5	NS	NS	M	N	L	H	N	N	L	2, 3	M	N	5-7
Honeysuckle, Freedom 1/	NS	NS	1-6,8,9	NS	NS	6-8	F	I	H	H	N	N	M	1,2,3	N	N	6-7.5
Indigobush (Amorpha fuiticosa)	2	2	2	4-6	4-6	4-6	M	N	L	L	N	N	L	1,2,3	M	M	5-8.5
Lilac	1, 3-5	1, 3-5	1.3-5,9	8-10	8-10	6-8	S	I	H	M	N	N	H	1,2,3	N	L	5.8-7.8
New Mexico Forestiera	NS	NS	1, 3-6	NS	NS	6-8	M	N	H	H	N	N	H	1,2,3	N	M	5-7.5
Peashrub (Caragana), Siberian	1, 3-5	1, 3-5	1, 3-5	12-14	10-12	6-10	F	I	H	M	N	N	H	2, 3	L	M	6-9
Plum, American	1,3-6,8	1, 3-5	1, 3-5	8-10	6-8	6-8	M	N	H	H	N	N	M	2, 3	M	L	5-7
Plum, Sandhill	1,3-7,9	1,3-5,7	1,3-5,7	6-8	6-8	4-6	M	N	H	H	N	N	H	2, 3	L	L	5-7.5
Russian Almond	NS	1, 3-6	1, 3-6	NS	3-5	3-5	M	I	H	M	N	N	H	1,2,3	N	N	5-7.5
Saltbush, Fourwing	9	9	1,3-7,9	6-8	4-6	4-6	S	N	H	H	N	N	H	1,2,3	N	H	6.6-9
Sumac, Fragrant	1, 3-8	1, 3-8	1, 3-8	5-8	5-8	4-7	M	N	H	H	N	N	H	1,2,3	L	L	5-8

Conservation Tree/Shrub Plantings and Attributes

Tree/Shrub	Suitability Group			Ave. Height (feet) 20 yrs.			Attributes						Soil Adaptation				
Adapted Species	1. Eastern Zone	1. Central Zone	1. Western Zone	2. Eastern Zone	2. Central Zone	2. Western Zone	3. Growth Rate	4. Native Species	5. Windbreak Value	6. Wildlife Value	7. Lumber Products	8. Fuelwood Product	9. Drought Tolorance	10. Texture	11. Saturation	12. Salinity Tolerance	13. pH Range
Deciduous Trees																	
American Hop Hornbeam	1	NS	NS	13-18	NS	NS	S	N	L	M	N	Y	L	2, 3	L	N	4-7.4
Ash, Green	1-5	1, 2	1, 2	28-32	24-28	24-26	F	N	H	M	Y	Y	M	1,2,3	H	L	5-8
Baldcypress	1-5	1, 2	1, 2	15-20	15-20	15-18	M	I	L	M	Y	Y	M	1,2,3	H	N	4.5-6
Basswood, American	1-5	NS	NS	26-30	NS	NS	M	N	M	M	Y	Y	M	2, 3	L	N	4.5-7.5
Birch, River	1, 2	NS	NS	35-50	NS	NS	F	N	L	L	Y	Y	L	1, 2	L	L	3-6
Catalpa, Northern	1, 3-6	1, 3-6	1, 3-6	26-28	26-28	24-26	F	I	M	H	Y	Y	H	2, 3	M	L	5.3-7
Cherry, Black	1	NS	NS	26-30	NS	NS	F	N	L	M	Y	Y	M	2, 3	N	N	5-7.5
Coffeetree, Kentucky	1, 3-6	1, 3-6	1, 2	26-28	26-28	24-26	M	N	M	M	Y	Y	M	1,2,3	M	M	4.8-7.5
Cottonwood, Eastern	1, 2	1, 2	1, 2	55-65	50-60	45-55	F	N	H	H	Y	Y	M	1,2,3	H	L	5.5-7.5
Elm, Lacebark	1, 3-8	1, 3-8	1, 3-5	24-28	22-26	20-24	F	I	H	M	N	Y	H	1,2,3	N	N	4.8-7
Elm, Siberian	NS	NS	1, 3-8	NS	NS	25-28	F	I	H	L	Y	Y	M	1,2,3	N	N	5.5-8
Hackberry	1-5	1-5	1	28-30	26-28	29-26	F	N	H	H	Y	Y	H	1,2,3	M	M	4.5-8
Hawthorn	1, 3-6	1, 3-6	1, 3-6	20-24	20-24	18-22	M	N	M	H	N	Y	H	1, 2	N	N	4.5-7.2
Hickory	1-5	NS	NS	24-30	NS	NS	S	N	M	H	Y	Y	M	1,2,3	M	N	4-7.4
Honeylocust	3-8	3-8	3-8	30-36	28-32	26-28	F	N	H	M	Y	Y	H	1,2,3	H	L	6-8
Locust, Black	3-8	3-8	NS	26-30	24-26	NS	F	N	M	M	N	Y	M	1,2,3	L	N	4.8-7.5
Maple, Silver	1-3	1, 2	NS	36-38	32-36	NS	F	N	M	M	Y	Y	M	1,2,3	H	L	4-6.5
Maple, Sugar	1, 3-5	NS	NS	24-30	NS	NS	S	N	M	M	Y	Y	L	2, 3	L	N	3.7-7.5
Mulberry, Red/White 2/	1-6	1-8	1-8	20-22	20-22	18-20	M	N/I	H	H	Y	Y	H	1,2,3	M	M	5-8
Oak, White	1	NS	NS	24-28	NS	NS	S	N	H	H	Y	Y	M	2, 3	L	N	4.5-6.8
Oak, Black	1, 3-6	NS	NS	26-30	NS	NS	M	N	M	H	Y	Y	M	1,2,3	L	N	4.5-6.8.
Oak, Bur	1-8	1-8	1-5	24-28	24-26	24-26	S	N	H	H	Y	Y	H	1,2,3	H	L	4.5-8
Oak, Chinquapin	1, 3-6	1, 3-6	NS	24-28	22-26	NS	M	N	M	H	Y	Y	H	2	N	N	6.5-8
Oak, English	3-5	1, 3-5	1, 3-5	40-60	40-60	30-50	M	I	M	H	Y	Y	M	1, 2	M	L	4.5-7
Oak, Northern Red	1, 3-5	1	NS	60-75	55-70	NS	M	Y	M	H	Y	Y	M	1, 2	M	N	4.5-6.5

Conservation Tree/Shrub Plantings and Attributes

Tree/Shrub	Suitability Group			Ave. Height (feet) 20 yrs.			Attributes						Soil Adaptation				
Adapted Species	1. Eastern Zone	1. Central Zone	1. Western Zone	2. Eastern Zone	2. Central Zone	2. Western Zone	3. Growth Rate	4. Native Species	5. Windbreak Value	6. Wildlife Value	7. Lumber Products	8. Fuelwood Product	9. Drought Tolorance	10. Texture	11. Saturation	12. Salinity Tolerance	13. pH Range
Oak, Pin	1-5	1, 2	NS	26-28	24-26	NS	F	N	H	H	Y	Y	M	1, 2	Y	N	4.5-6.5
Oak, Sawtooth	1, 3-5	1, 3-5	NS	26-30	24-28	NS	M	I	H	H	N	Y	M	1,2,3	N	N	4.9-7.0
Oak, Shumard	1, 3-5	1, 3-5	NS	26-30	24-28	NS	M	N	H	H	Y	Y	M	1,2,3	N	N	5.5-7.5
Oak, Swamp White	1-5	1	NS	24-28	24-26	NS	F	N	H	H	Y	Y	M	1,2,3	M	N	4.3-6.5
Osage Orange	1-9	1-9	1-9	18-22	18-22	16-20	M	I	H	M	N	Y	H	2, 3	M	L	4.5-8
Pawpaw	1, 2	1, 2	NS	18-22	15-18	NS	M	N	L	M	N	N	L	2, 3	L	N	5.1-7.2
Pecan	1-5	NS	NS	26-30	NS	NS	S	N	M	H	Y	Y	M	1,2,3	H	N	4.5-7.5
Persimmon	1, 3-5	NS	NS	20-25	NS	NS	M	N	H	H	Y	Y	M	1,2,3	N	L	4-7
Redbud, Eastern	1, 3-6	1, 3-5	1, 3	14-18	10-14	7-10	M	N	M	M	N	N	M	1, 2	N	N	4.5-7.5
Soapberry, Western	1, 3-6	1, 3-6	1, 3-6	22-28	22-26	18-22	M	N	M	M	N	Y	H	2, 3	N	N	5-7
Sycamore, American	1, 2	1, 2	NS	32-36	30-34	NS	F	N	L	M	Y	Y	M	2, 3	H	N	4.9-6.5
Walnut, Black	1, 3	1	1	26-28	24-26	18-22	M	N	H	H	Y	Y	M	2	N	N	5.5-7.5
Willow	1, 2	1, 2	1, 2	25-30	22-28	18-22	F	N	L	M	Y	Y	L	2.3	H	N	6-8
Conifer Trees																	
Arborvitae, Oriental	1-5	1-5	NS	15-20	14-18	NS	F	I	H	M	N	N	M	1,2,3	N	M	4.7-6.8
Juniper, Chinese	1, 3-7	1, 3-7	1, 3-7	15-20	15-20	15-20	F	I	N	M	N	N	M	1,2,3	N	Y	4.8-8
Juniper, Rocky Mountain	NS	NS	1, 3-9	NS	NS	14-18	M	I	H	H	N	N	H	2,3	N	N	5-8
Pine, Austrian	1, 3-7	1, 3-7	1, 3-5	24-28	20-24	18-22	M	I	H	M	N	N	M	2	N	Y	6.5-7.5
Pine, Eastern White	1, 3-5	NS	NS	30-34	NS	NS	F	I	H	M	Y	N	L	2	N	N	4-6.5
Pine, Ponderosa	1, 3-8	1, 3-8	1, 3-8	18-22	16-20	14-18	M	I	H	M	Y	N	H	2,3	N	N	6-7
Pine, Southwestern White	1, 3-5	1, 3-5	1, 3-5	18-22	16-20	14-18	M	I	H	M	N	N	H	2,3	N	Y	5-7.5
Redcedar, Eastern	1, 3-9	1, 3-9	1, 3-9	14-18	12-15	10-12	M	N	H	H	Y	N	H	1,2,3	N	N	4.7-8

Footnote:
1/ Freedom Honeysuckle is a introduced shrub that can become invasive in some locations.
2/ White mulberry is a introduced tree that can become invasive in some locations.

WINDBREAK SUITABILITY GROUPS

SOIL SERIES	GROUP
Abbyville	1
Abilene	3
Aksarben	3
Albion	6
Angelus	1
Anselmo	5
Apperson	4
Arisburg	4
Armo	8
Armster	4
Arvada	9
Atchison	8
Attica	5
Avans	3
Baileyville	4
Balta	3
Bankard	5
Basehor	10
Bates	6
Bavaria	9
Bayard	5
Belfon	3
Belvue	1
Bendena	10
Benfield	4
Benkelman	1
Bethany	4
Bigbow	3
Bippus	3
Bismarckgrove	3
Blackwood	3
Blanket	4
Blazefork	4
Boel	1
Bogue	4
Bolivar	6
Bourbonais	1
Brazilton	4
Bremer	2
Brewer	4
Bridgeport	1
Brownell	10
Bucyrus	3

SOIL SERIES	GROUP
Buhler	9
Burchard	3
Butler	4
Buttermilk	9
Calco	2
Campus	8
Canadian	1
Canina	3
Canlon	10
Canyon	10
Carbika	2
Carey	3
Carlson	3
Carr	1
Caruso	1
Carway	2
Carwile	1
Case	8
Cass	1
Catoosa	6
Chase	1
Cherokee	4
Chilllicothe	3
Church	10
Clairemont	1
Clareson	6
Clark	8
Clarksville	6
Cleora	1
Clime	8
Colby	8
Collinsville	10
Colo	1
Coly	8
Contrary	3
Corbin	3
Corinth	8
Cozad	1
Craft	1
Crete	4
Crisfield	5
Dale	1
Dalhart	5

SOIL SERIES	GROUP
Darlow	9
Darnell	10
Darr	5
Deepwater	3
Dennis	4
Detroit	1
Dillhut	5
Dillwyn	1
Dix	10
Dorrance	10
Drummond	9
Dwight	9
Dwyer	7
Edalgo	4
Elandco	1
Elkader	8
Elmer	9
Elmont	3
Els	1
Elsmere	1
Eltree	3
Englund	4
Eram	4
Eudora	1
Eva	5
Farnum	3
Feterita	2
Fiat	4
Florence	6
Forgan	3
Funmar	3
Geary	3
Gerald	4
Gerlane	1
Gibbon	1
Girard	2
Glenberg	1
Goessel	4
Goshen	1
Gosport	4
Grainola	6
Grant	3
Grigston	1

WINDBREAK SUITABILITY GROUPS

SOIL SERIES	GROUP
Grundy	4
Gymer	4
Haig	4
Hamburg	8
Happyditch	1
Harney	3
Hastings	3
Haverson	3
Haxtun	3
Hayes	5
Haynie	1
Hector	10
Hedville	10
Heizer	10
Hepler	1
Hobbs	1
Holder	3
Holdrege	3
Hord	1
Humbarger	1
Imano	1
Inavale	1
Irwin	4
Ivan	1
Jamash	10
Jansen	6
Judson	1
Kahola	1
Kanima	10
Kanza	2
Kaskan	1
Kaski	1
Keith	3
Kenesaw	3
Kennebec	1
Kenoma	4
Kim	8
Kimo	1
Kimst	3
Kingfisher	6
Kingman	2
Kingsdown	5
Kipson	10

SOIL SERIES	GROUP
Kirkland	4
Kiro	2
Kisiwa	2
Knoco	10
Knox	3
Konawa	5
Konza	4
Krier	9
Kuma	3
Labette	4
Ladoga	3
Ladysmith	4
Lancaster	6
Langdon	7
Lanton	1
Las	1
Las Animas	1
Lautz	2
Leanna	2
Lebo	6
Lebsack	1
Lela	4
Leshara	1
Lesho	1
Likes	7
Limon	1
Lincoln	1
Lofton	4
Longford	3
Lubbock	3
Lucien	10
Lula	3
Mahone	5
Mangum	1
Mansic	8
Mansker	8
Manter	5
Manvel	8
Marshall	3
Martin	4
Mason	1
Matfield	6
Mayberry	4

SOIL SERIES	GROUP
Mayes	4
McCook	1
McCune	1
McLain	1
Meadin	10
Mento	9
Midway	10
Milan	3
Minco	3
Minnequa	8
Missler	3
Monona	3
Morrill	3
Muir	1
Munjor	1
Muscotah	1
Nalim	3
Naron	5
Nash	6
Nashville	6
Ness	10
Netawaka	8
New Cambria	1
Newtonia	3
Nibson	10
Nickerson	1
Ninnescah	2
Niotaze	6
Nixa	6
Nodaway	1
Norge	3
Nowata	6
Nuckolls	3
Obaro	6
Okemah	4
Olmitz	3
Olpe	6
Onawa	1
Onawet	2
Optima	7
Ortello	5
Osage	2
Oska	6

WINDBREAK SUITABILITY GROUPS

SOIL SERIES	GROUP
Ost	3
Otero	5
Owens	10
Padonia	4
Palermo	3
Parsons	4
Pawnee	4
Paxico	10
Penden	8
Penolosa	4
Penrose	10
Piedmont	4
Platte	1
Pleasant	10
Plev	2
Plevna	2
Pohocco	3
Pond Creek	3
Port	1
Potter	10
Poxmash	6
Pratt	7
Prue	3
Punkin	9
Quinlan	10
Radley	1
Razor	8
Reading	1
Reinach	1
Renfrow	4
Richfield	3
Ringo	4
Rosehill	4
Rossville	3
Roxbury	1
Ruella	8
Ryus	1
Saltcreek	3
Saltine	9
Sarben	5
Sarpy	1
Satanta	3
Saxman	7

SOIL SERIES	GROUP
Schamber	10
Secesh	1
Sharpsburg	3
Shelby	3
Shellabarger	5
Shidler	10
Shore	3
Sibleyville	6
Simeon	10
Smithland	1
Smokyhill	1
Smolan	4
Sogn	10
Solomon	2
Solvay	1
Spearville	4
Spelvin	3
St. Paul	3
Steedman	4
Steinauer	8
Stephenville	6
Stoneburg	6
Stonehouse	7
Sulco	3
Summit	4
Sutphen	4
Sweetwater	9
Tabler	4
Talihina	10
Taloka	4
Tamaha	4
Taver	4
Thurman	7
Timken	10
Tivin	7
Tivoli	7
Tobin	1
Tonti	6
Travessilla	10
Tully	3
Turon	5
Tuttle	10
Twobutte	10

SOIL SERIES	GROUP
Uly	3
Ulysses	3
Valent	7
Valentine	7
Vanoss	3
Verdigris	1
Vernon	4
Vinland	10
Voda	3
Vona	5
Vorhees	3
Wabash	2
Waben	6
Wagonbed	8
Wagstaff	6
Wakeen	8
Waldeck	1
Waldron	1
Wamego	6
Wann	1
Warnut	2
Wathena	1
Waurika	4
Welda	3
Wells	3
Wellsford	10
Westview	3
Willowbrook	2
Woodson	4
Woodward	8
Wymore	4
Wynona	1
Yaggy	2
Yahola	1
Zaar	4
Zella	3
Zellmont	6
Zenda	1
Zook	2