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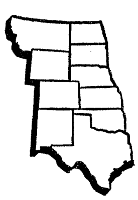
Fort Collins, Colorado 80521

Great Plains Agricultural Council
Publication No. 71

Provisional Tree and Shrub Seed Zones For the Great Plains

Richard A. Cunningham



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Richard A. Cunningham[1]

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Preface

This publication is sponsored by the Great Plains Agricultural Council. The Council is composed of Directors of the Agricultural Experiment Stations and Cooperative Extension Services of Colorado, Kansas, Montana, Nebraska, New Mexico, North Dakota, Oklahoma, South Dakota, Texas, and Wyoming, and representatives of 11 agencies of the U.S. Department of Agriculture directly concerned with advancement of agriculture in these States.

This system of seed zoning was developed as one of the initial activities of Technical Committee GP-13, a regional tree improvement project sponsored by the Research Committee of the Great Plains Agricultural Council. The committee consists of 29 members from various State and Federal agencies in the 10 Plains States.

The development of tree seed zoning for the Great Plains was heavily dependent upon the many helpful suggestions of several GP-13 members, and their assistance is gratefully acknowledged.

Publication of this paper was a joint effort of the Rocky Mountain Forest and Range Experiment Station, Fort Collins, Colorado, and The Rocky Mountain Region, Denver, Colorado. Copies may be obtained from either of these units of the Forest Service, U.S. Department of Agriculture.

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Introduction

Seed collection zones are subdivisions of land areas established to identify seed sources and to control the movement of seed and planting stock. Seed zones are needed for many species because of the genetic variation associated with their geographic distribution. Zone boundaries may be delineated from experimental data that identify genetic variation, or by analysis of the environmental factors that most likely acted as selective forces in creating such genotypic variation.

Why Seed Collection Zones are Necessary

Geographic variation within several tree and shrub species native to the Great Plains is well documented.

Significant variation in drought tolerance, height growth, and winter injury has been reported for *Fraxinus pennsylvanica* Marsh. by several investigators (Bagley 1970, Collins 1971, Meuli and Shirley 1937). In a provenance test of *Populus deltoides* Bartr. from 25 origins in the southern Great Plains, Posey (1969) detected significant variation among origins in growth rate, fiber length, and drought resistance. Conley et al. (1965) reported geographic variation among *Pinus ponderosa* Laws. seed sources from the northern Great Plains. After nearly 20 years' growth in north-central North Dakota, 10 origins varied considerably in survival, height and diameter growth, branching habit, and foliage density.

In a taxonomic study of *Juniperus* species in the Missouri River Basin, Van Haverbeke (1968) reported considerable intraspecies variation in a number of morphological traits for both *J. scopulorum* Sarg. and *J. virginiana* L., as well as evidence that the two species were hybridizing where their ranges overlapped.

Trees or shrubs grown from local seed are usually best adapted to conditions in that locality (Rudolf 1957). Although introduced races may sometimes be superior to local races, it is best to rely upon a local seed source whenever possible, unless a nonlocal seed source has proved superior in a comparative planting (provenance test).

In an area such as the Great Plains, where natural populations of trees are usually in small, widely scattered groves, it is often necessary to plant nonlocal races, since there are no local races available. For this reason, it is important to know whether the seed for a particular planting originated under conditions comparable to those of the planting site. One way to evaluate seed sources is to establish homogeneous seed collection zones, and identify each lot of seed used to produce planting stock by zone of origin. This procedure will also provide a means for checking field performance in relation to seed origin.

Criteria Used in Delineating Seed Zones

Since information on racial variation among tree and shrub species growing in the Great Plains is quite limited, a seed zoning system must be based primarily on criteria that are only speculative at this stage. After the system has been in use for a number of years, sufficient data should be available from outplantings to permit a reevaluation of the criteria used and the accuracy of the seed zone boundaries.

The USDA Forest Service made the first attempt at tree and shrub seed zoning in the Great Plains in its Prairie States Forestry Project (Engstrom and Stoeckeler 1941). Eleven zones were established in the entire Great Plains, based primarily on latitude. While this system was a step in the right direction, it has not been widely accepted or utilized by seed dealers or nurserymen in the Great Plains. Thus we must look to regions other than the Great Plains for examples of effective seed zoning.

California is divided into six physiographic and climatic regions, 32 subregions, and 85 seed collection zones (Buck et al. 1970). Criteria used in delineating the seed zone boundaries were latitude, elevation, and unusual climatic, topographic, or edaphic conditions that might affect tree growth.

In the Lake States, where topography is less important, Rudolf (1957) developed a series of zones on two temperature factors: (1) summation of normal average daily temperatures per year above 50° F, and (2) mean January temperature. He delineated 10 primary zones for Minnesota, and 8 each for Michigan and Wisconsin.

The forested areas of Arizona and New Mexico were divided into 10 physiographic-climatic regions; each were then subdivided into five to nine seed collection zones about 50 miles wide (Schubert and Pitcher 1973).

Seed collection zones in Ontario, Canada, are based on the site regions developed by Hills (1960). This system divides the Province into 12 regions based primarily on temperature and moisture; the regions are then subdivided into physiographic (landform) groupings differing in moisture, ecoclimate, and nutrients (Holst 1962).

In the Pacific Northwest, the Western Forest Tree Seed Council published maps in 1966 showing seed collection zones based on geographic zones and 500-foot elevation bands.[2]

These examples illustrate that a wide array of factors may be used in delineating seed collection zones. As part of an effort to determine the most reliable combination of environmental variables for delineating seed zones in the Great Plains, we surveyed nurserymen, tree planters, foresters, soil scientists, and geneticists working in the Plains. The criteria they most often suggested as being important for tree and shrub survival and growth were: adaptability to droughty sites, cold hardiness, and tolerance to adverse soil conditions. Primary climate and site factors that determine these criteria were chosen to form the base for the seed zoning system.

The soils of the Great Plains are described in detail in "Land Resource Regions and Major Land Resource Areas of the United States" (Austin 1972). Austin's map (fig. 1) delineating the major land resource regions and areas in the Great Plains was

[2] *Map, as revised 1973, is available from West. For. and Conserv. Assoc., Am. Bank Build., Portland, Oreg.*

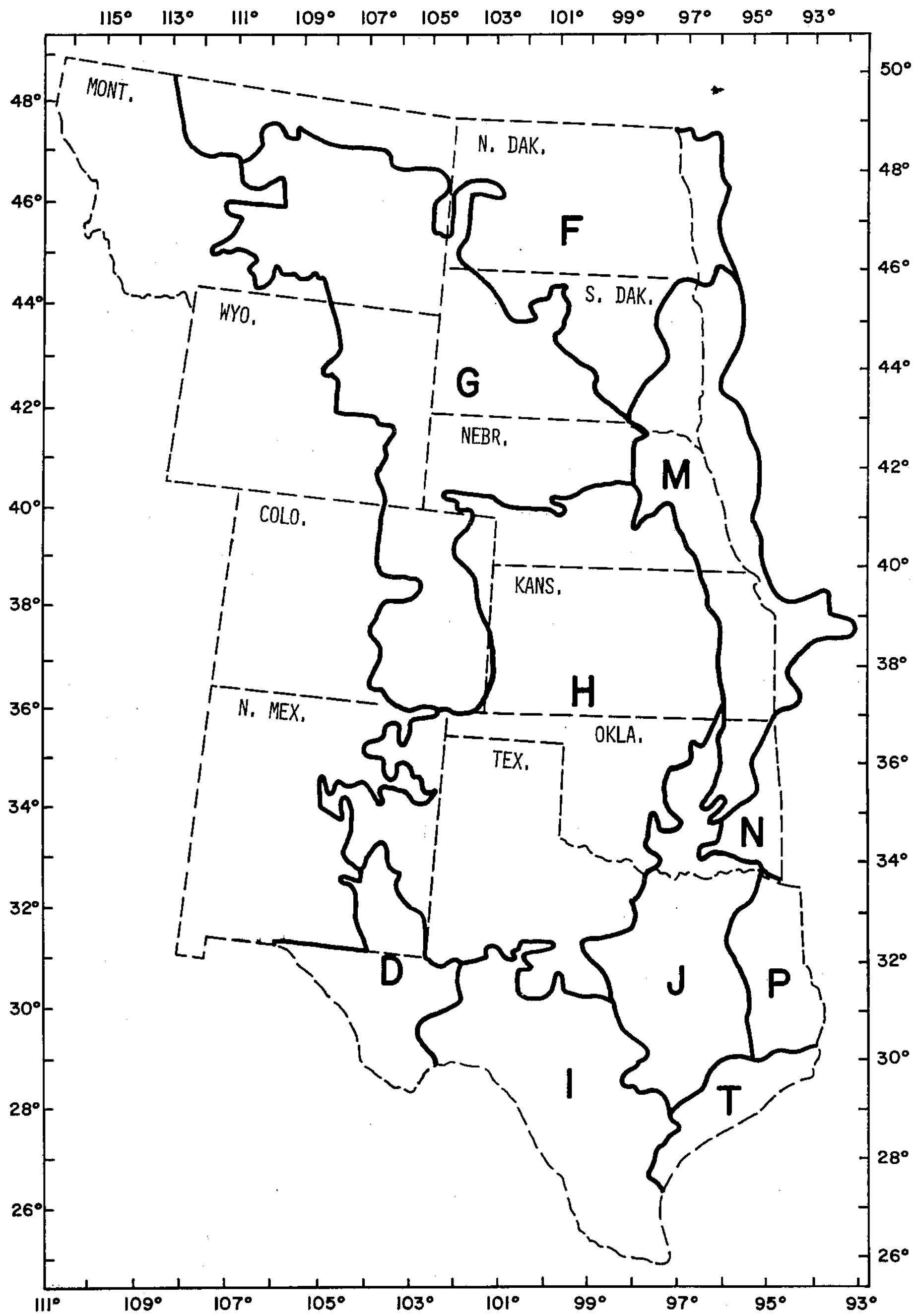

Figure 1.—Major land resource regions of the Great Plains (adapted from Austin 1972).

used as the base map for designating seed zones. Climatic data were taken from the "Climatic Atlas of the United States" (U.S. Department of Commerce 1968). The provisional seed zones were the result of superimposing the climatic data over the map of the major land resource areas (figs. 2, 3, 4).

Minimum winter temperatures were assumed to be the best measure of cold hardiness. Isopleths of mean January temperatures at 5-degree intervals were superimposed over the map of major land resource areas. This combination provided a good latitudinal division of many of the larger areas.

Isopleths of normal annual precipitation (4-inch intervals) were also superimposed over the land resource map. In most instances, longitudinal boundaries of the major land resource areas corresponded closely with isopleths of annual precipitation. The isopleths of annual precipitation were therefore used to subdivide the area only in instances where a seed zone would be larger than the 4-inch interval.

Boundaries of the seed zones were altered in some cases to make them conform to recognizable land features such as rivers, lakes, and highways. In several instances, several small major land resource areas were combined into one seed zone where differences among them were judged minor in their effect on tree growth and survival.

The proposed seed zones encompass an area somewhat larger than that normally considered the Great Plains, to provide at least a provisional system in those States with areas both within and adjacent to the Great Plains.

Numbering System for Seed Zones

The three- or four-digit designation (WXYZ) used in numbering the seed collection zones is a modification of the Soil Conservation Service's numbering system for the major land resource areas (Austin 1972). The major land resource areas are designated by two- or three-digit numbers in the XY and WXY positions. Division of the major land resource areas, which we designate as seed collection zones, are indicated by the digit in the Z position. Examples of this designation are:

Zone 552.—The 55 represents major land resource area 55 in the Northern Great Plains region. There is no thousand-digit in the W position. The **2** indicates seed collection zone 2 of land resource area 55.

Zone 1073.—Seed collection zone 3 in land resource area 107.

Land Resource Regions

The 10 land resource regions upon which this system of seed zoning is based (Austin 1972) are shown in figure 1. Regions D, M, P, and T are only partially within the area being considered, and therefore any references to these regions relate to individual land resource areas rather than the region as a whole. A brief description of each region follows.

D. Southern Desertic Basins, Plains, and Mountains (Seed Zones 421-422)

Broad desert basins and valleys range from 2,500 to 5,000 feet in elevation. Red Desert soils and Lithosols[3] are the dominant soils of the area. Annual precipitation averages 12 to 16 inches. Mean January temperatures range from 40° F in the north to 45° F in the south.

F. Northern Great Plains (Seed Zones 521-562)

Fertile soils and smooth topography characterize this region. Chernozems and Chestnut soils cover the western part. Other important soils are Lithosols on steep slopes, Solentz and Humic Gley soils on terraces and in depressions, and narrow bands of alluvial soils along major streams. Elevation varies from 1,000 feet in the east to 4,000 feet in the west.

Annual precipitation ranges from 10 to 24 inches; much of it falls during the growing season. Mean January temperature varies from 0° F in the north to 20° F in the south.

G. Western Great Plains (Seed Zones 581-700)

Unfavorable soils, strong slopes, or low moisture supplies make tree or shrub survival uncertain on all but the most favorable sites in this region. The topography rises from 2,000 feet elevation in the east to 6,000 feet in the west. Annual precipitation ranges from 11 to 24 inches, but fluctuates widely from year to year. Mean January temperatures vary from 10° F in the north to 40° F in the south.

[3] *For approximate equivalents of great soil groups, see appendix (table taken from Austin 1972, p. 81-82). In October 1973, the Soil Survey Staff prepared an interim publication for inservice use, "Preliminary abridged text—Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys," 330 p. USDA Soil Conserv. Serv., Wash., D.C.*

H. Central Great Plains
(Seed Zones 710-803)

Soils, topography, and climate are more favorable for tree growth in this region than in the Great Plains to the north and west. Elevation increases from 1,000 feet in the east to 5,000 feet in the southwest.

The important soils in the north are in the Chernozem and Chestnut groups. Reddish Prairie and Reddish Chestnut soils are extensive in the south. Lithosols on steep slopes, Regosols in deep sands, and alluvial soils on flood plains are common throughout the area.

Average annual precipitation is 20 to 30 inches over much of the region, but ranges from 15 to 35 inches. Precipitation increases from northwest to southwest. More rain falls in summer than in the rest of the year. Mean January temperatures range from 25° F to 45° F, and increase from north to south.

I. Southwestern Plateaus and Plains
(Seed Zones 811-833)

This region consists of the warmer part of the southern Great Plains. The moderate precipitation is accompanied by high temperatures so that precipitation effectiveness is low. Average annual precipitation is 20 to 30 inches over most of the region, but ranges from 15 to 35 inches; usually much of it falls in spring and autumn. Mean January temperatures range from 45° F to over 60° F.

Soils in the deeper coarse- and medium-textured materials are mostly in the Reddish Chestnut and Reddish Prairie great soil groups. Grumusols from limestones and marls and Lithosols and Calcisols in all kinds of parent material on hilly to steep slopes are also fairly extensive.

J. Southwestern Prairies
(Seed Zones 841-871)

This region consists of the prairies and timbered areas of eastern Texas and south-central Oklahoma. Average annual precipitation ranges from 25 to 42 inches. Mean January temperature is 35° F to 55° F.

Grumusols, Rendzinas, and Lithosols from limestone and chalks are the more extensive soils. Red-Yellow Podzolic soils, Planosols, and Reddish Prairie soils are also important groups.

M. Central Prairies and Loess Drift Hills
(Seed Zones 1021-1122)

Fertile soils and favorable climate make this region more suitable for tree survival and growth than almost any other region in the Great Plains. Annual precipitation is 25 to 35 inches over much of the region, but ranges from 20 inches in the extreme north to 45 inches in the south. Mean January temperature varies from 10° F in the north to 40° F in the south.

Chernozems are dominant in the north, while Brunizems are the major soils in the central area. Planosols are prevalent in the south. Alluvial and Humic Gley soils are common on flood plains.

N. Ouachita Mountains
(Seed Zone 1191)

This region is characterized by steep mountains and narrow stream valleys with steep gradients. Elevation varies from 300 feet on the lowest valley floors to 2,700 feet on the highest mountain peaks. Lithosols and rough stony land occupy most of the steep slopes throughout the area. Red-Yellow Podzolic soils are on the gentle slopes of ridgetops, benches, foot slopes, and old stream terraces.

Annual precipitation averages 44 to 56 inches. Mean January temperatures vary from 42° F to 45° F.

P. Gulf Rolling Plain
(Seed Zones 1331-1332)

This region of gently sloping to rolling plains varies in elevation from 100 to 300 feet, with small areas approaching 500 feet. Red-Yellow Podzolic soils are dominant throughout the region.

Annual precipitation averages 46 to 56 inches, with most of it falling in winter and spring. Mean January temperature varies from 45° F in the north to 55° F in the south.

T. Gulf Coast Prairies
(Seed Zones 1501-1502)

This region consists of the nearly level low parts of the Gulf Coastal Plains. Elevation ranges from sea level to about 200 feet along the interior margin. Grumusols, Planosols, and Low-Humic Gley soils, all from calcareous clays and marls, are the dominant soils.

Annual precipitation averages from 26 inches in the west to 56 inches in the east. Mean January temperature varies from 55° F to 60° F.

Putting the Seed Collection Zones to Use

To be effective, the zones should be used by all agencies collecting and using tree and shrub seeds within the Great Plains region. Use of the zones not only will provide valuable information about the origin of the seed used to produce planting stock, but will also enable the consumer to select planting stock with adequate survival and growth potential.

Tree and shrub species not native to the Great Plains have been planted extensively in the region for many years. Many of these plantings are now bearing seed and, though often of unknown origin, are the only local source of seed available for these species. Seed collected from these plantings of untested exotics should be used with caution, since these populations have not been subjected to the long-term selection pressures of cold, drought, insects, and diseases that have resulted in locally adapted races of native species.

Plantings of exotic species that have attained at least three-fourths of their life expectancy and appear healthy and are growing vigorously may be used as seed sources with reasonable assurance they will produce planting stock adequately adapted to the seed zone in which the parent trees are growing.

This scheme for seed zoning is designed to make the process of identifying seed sources easier for the nurseryman. When seed is collected it should be labeled accurately as to origin, in as much detail as possible. Often this means specifying section, township, and range. In several States this information is mandatory under seed labeling laws. When the seed is planted by nurserymen, however, only the seed collection zone number need be used in identifying a particular lot of seedlings. Thus several different seed sources might be grown together in one lot of seedling stock, which would be designated as having been grown from seed of a particular seed collection zone. This procedure should vastly reduce the number of seed lots that must be kept separate in the nursery, but would still provide valuable information about the seed source.

This seed collection zoning system is provisional at this time. When sufficient information on racial variation within several tree and shrub species growing in the Great Plains is available, the system will be revised as necessary to reflect any changes suggested by analysis of such data.

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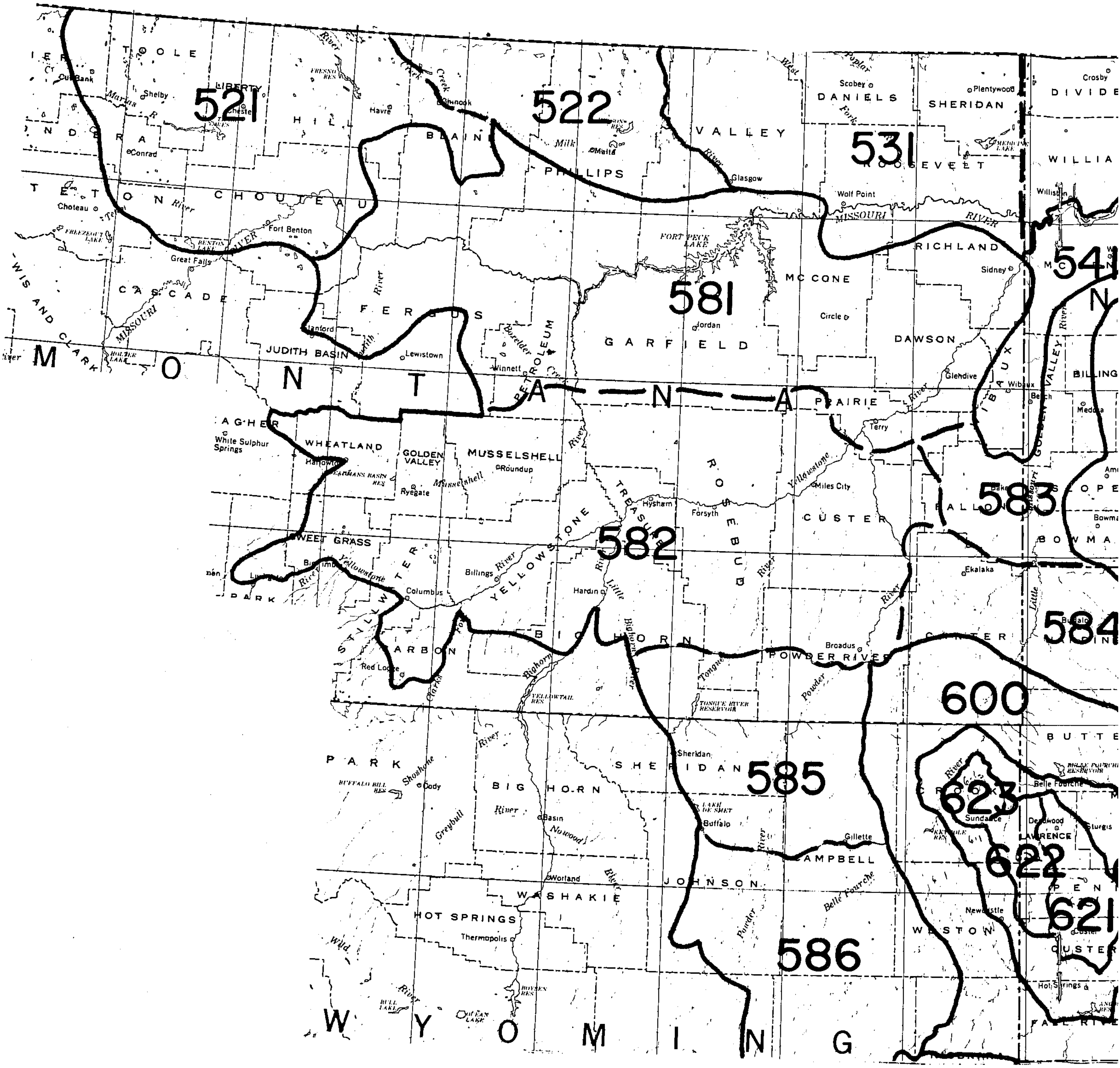
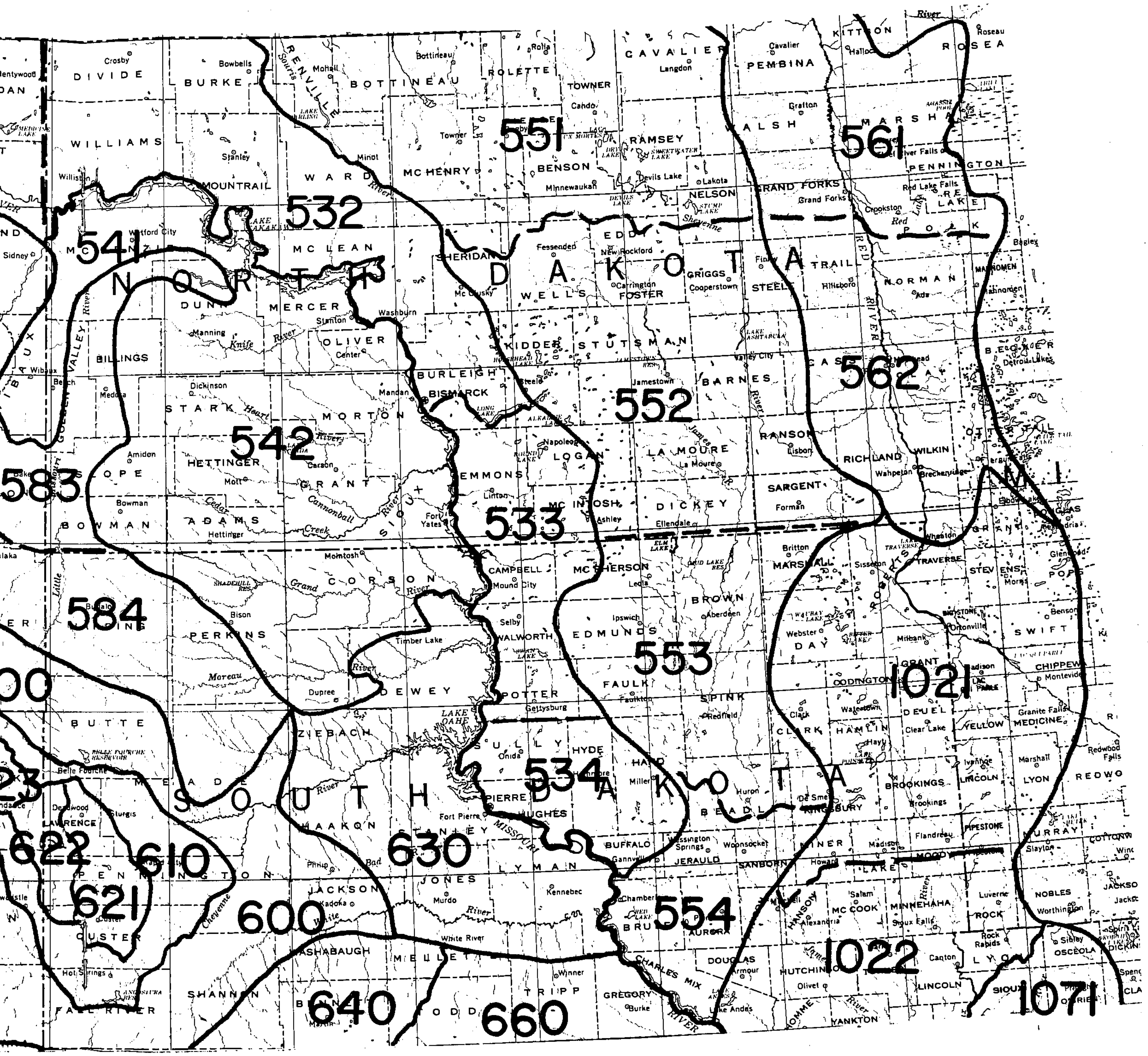


Figure 2.—Provisional seed zones for the Northern Great Plains.



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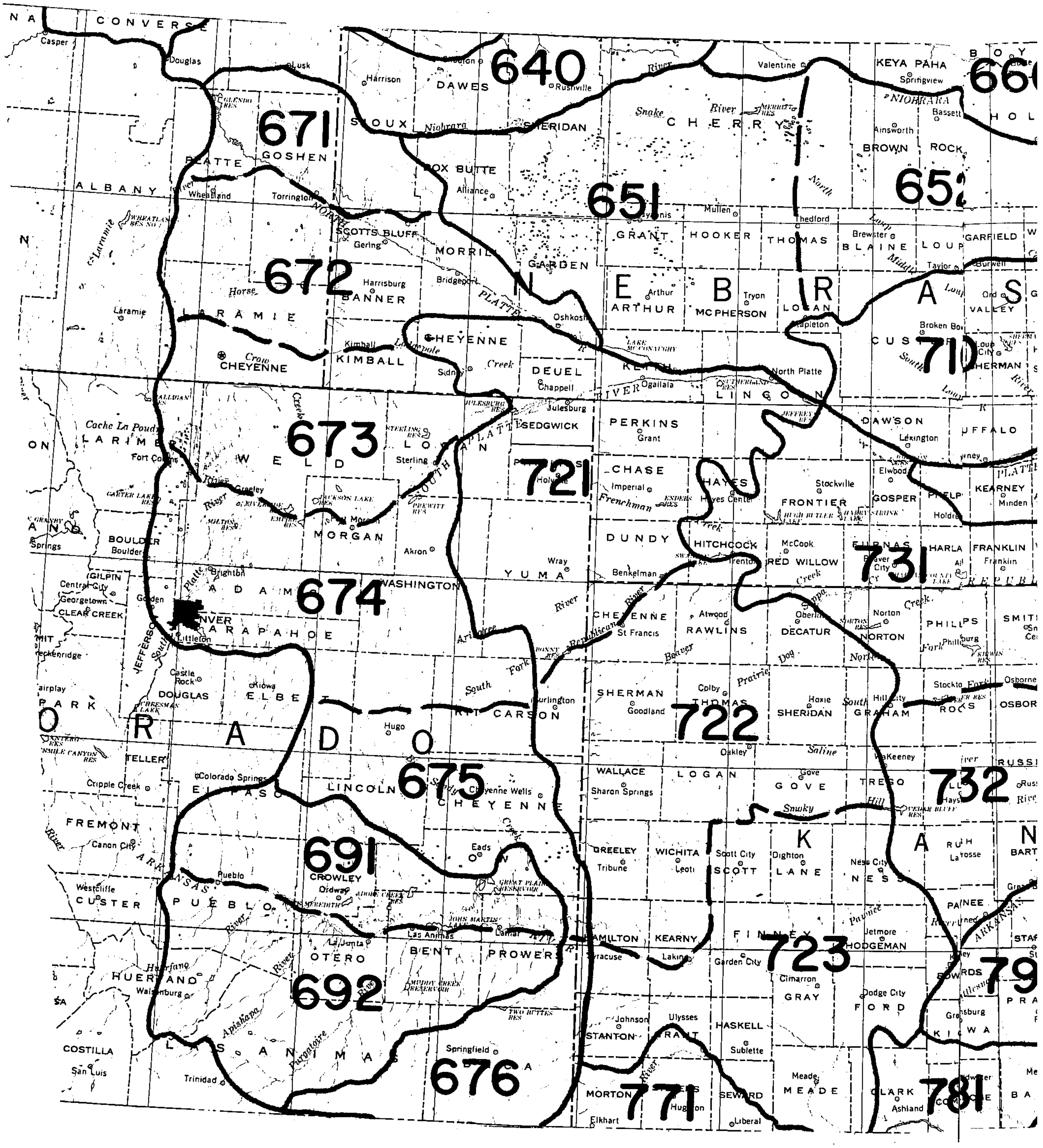
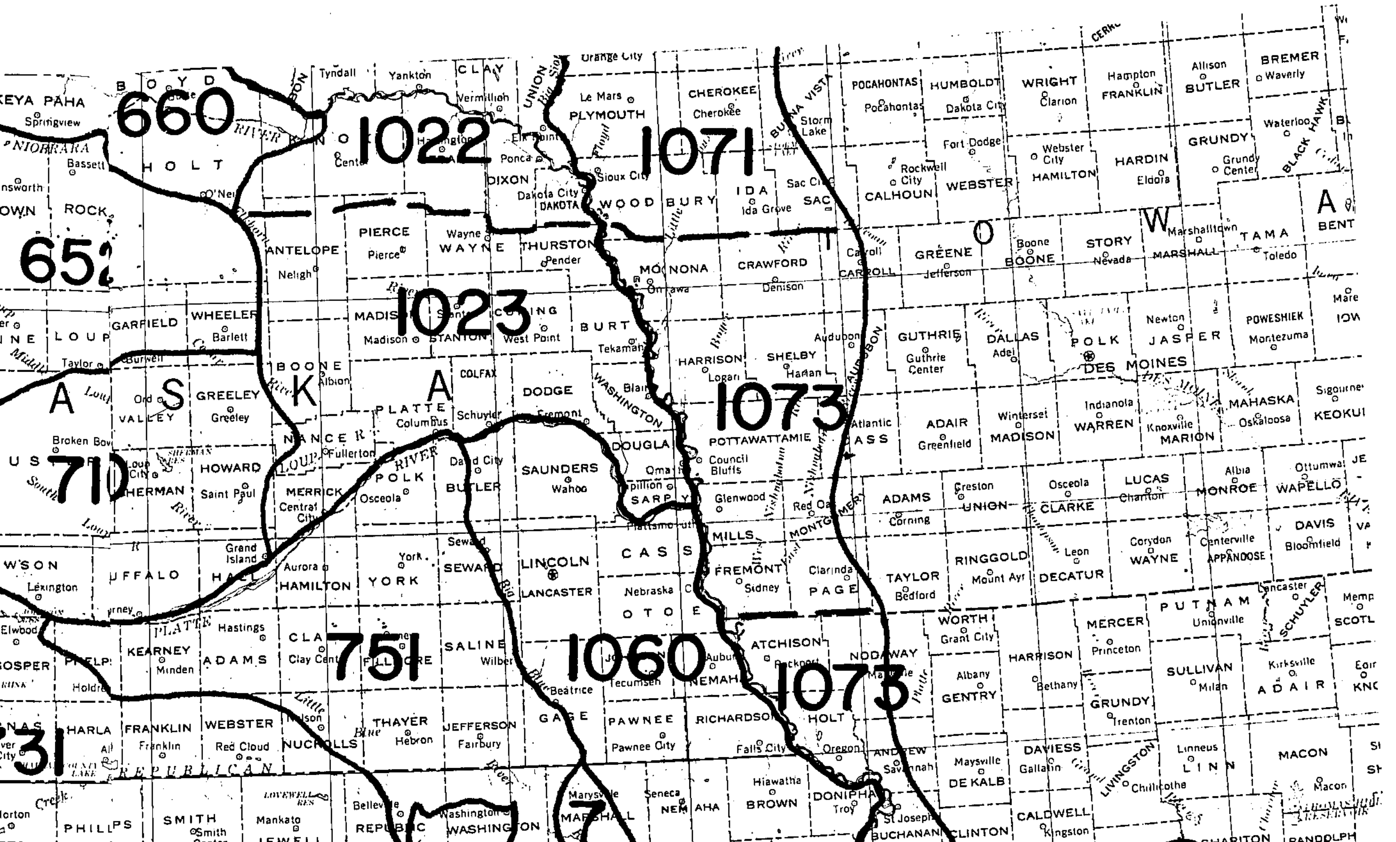


Figure 3.—Provisional seed zones for the Central Great Plains.


660
1022
1071
652
1023
1073
710
751
1060
1073
731
7
6
1
740
732
752
790
762
1121
781
801
1122
BOYD
KEYA PAHA
HOLT
ROCK
LOUP
GARFIELD
WHEELER
ANTELOPE
PIERCE
WAYNE
THURSTON
DIXON
PLYMOUTH
CHEROKEE
WOODBURY
IDA
SAC
POCAHONTAS
HUMBOLDT
WRIGHT
FRANKLIN
BUTLER
BREMER
WEBSTER
HAMILTON
HARDIN
GRUNDY
CALHOUN
MONONA
CRAWFORD
CARROLL
GREENE
BOONE
STORY
MARSHALL
TAMA
BURT
STANTON
CUMING
HARRISON
SHELBY
AUDUBON
GUTHRIE
DALLAS
POLK
JASPER
POWESHIEK
DES MOINES
GREELEY
VALLEY
PLATTE
COLFAX
DODGE
WASHINGTON
POTTAWATTAMIE
CASS
ADAIR
MADISON
WARREN
MARION
MAHASKA
KEOKUK
SHERMAN
HOWARD
MERRICK
NANCE
POLK
BUTLER
SAUNDERS
DOUGLAS
SARPY
MILLS
MONTGOMERY
ADAMS
UNION
CLARKE
LUCAS
MONROE
WAPELLO
BUFFALO
HALL
HAMILTON
YORK
SEWARD
LANCASTER
CASS
OTOE
FREMONT
PAGE
TAYLOR
RINGGOLD
DECATUR
WAYNE
APPANOOSE
DAVIS
KEARNEY
ADAMS
CLAY
FILLMORE
SALINE
JOHNSON
NEMAHA
ATCHISON
NODAWAY
WORTH
HARRISON
MERCER
PUTNAM
SCHUYLER
SULLIVAN
ADAIR
PHELPS
HARLAN
FRANKLIN
WEBSTER
NUCKOLLS
THAYER
JEFFERSON
GAGE
PAWNEE
RICHARDSON
HOLT
GENTRY
GRUNDY
DAVIESS
ANDREW
LIVINGSTON
LINN
MACON
PHILLIPS
SMITH
JEWELL
REPUBLIC
WASHINGTON
MARSHALL
NEMAHA
BROWN
DONIPHAN
BUCHANAN
CLINTON
DE KALB
CALDWELL
CARROLL
CHARITON
RANDOLPH
ROOKS
OSBORNE
MITCHELL
CLOUD
CLAY
RILEY
POTTAWATOMIE
JACKSON
ATCHISON
JEFFERSON
LEAVENWORTH
PLATTE
CLAY
RAY
HOWARD
BOONE
RUSSELL
LINCOLN
OTTAWA
DICKINSON
GEARY
WABAUNSEE
SHAWNEE
DOUGLAS
JOHNSON
JACKSON
LAFAYETTE
SALINE
COOPER
ELLSWORTH
SALINE
MORRIS
OSAGE
FRANKLIN
MIAMI
CASS
JOHNSON
PETTIS
MONITEAU
BARTON
RICE
MCPHERSON
MARION
CHASE
LYON
COFFEY
ANDERSON
LINN
BATES
HENRY
BENTON
MORGAN
MILLER
PAWNEE
STAFFORD
RENO
HARVEY
BUTLER
GREENWOOD
WOODSON
ALLEN
BOURBON
VERNON
ST CLAIR
HICKORY
CAMDEN
EDWARDS
PRATT
KINGMAN
SEDGWICK
ELK
WILSON
NEOSHO
CRAWFORD
BARTON
CEDAR
POLK
DALLAS
LACLEDE
KIOWA
BARBER
HARPER
SUMNER
COWLEY
CHAUTAUQUA
MONTGOMERY
LABETTE
CHEROKEE
JASPER
DADE
GREENE
WEBSTER
WRIGHT
LAWRENCE
CLARK
COMANCHE
KANSAS CITY
KANSAS RIVER
MISSOURI RIVER
REPUBLICAN
PLATTE
NIOBRARA

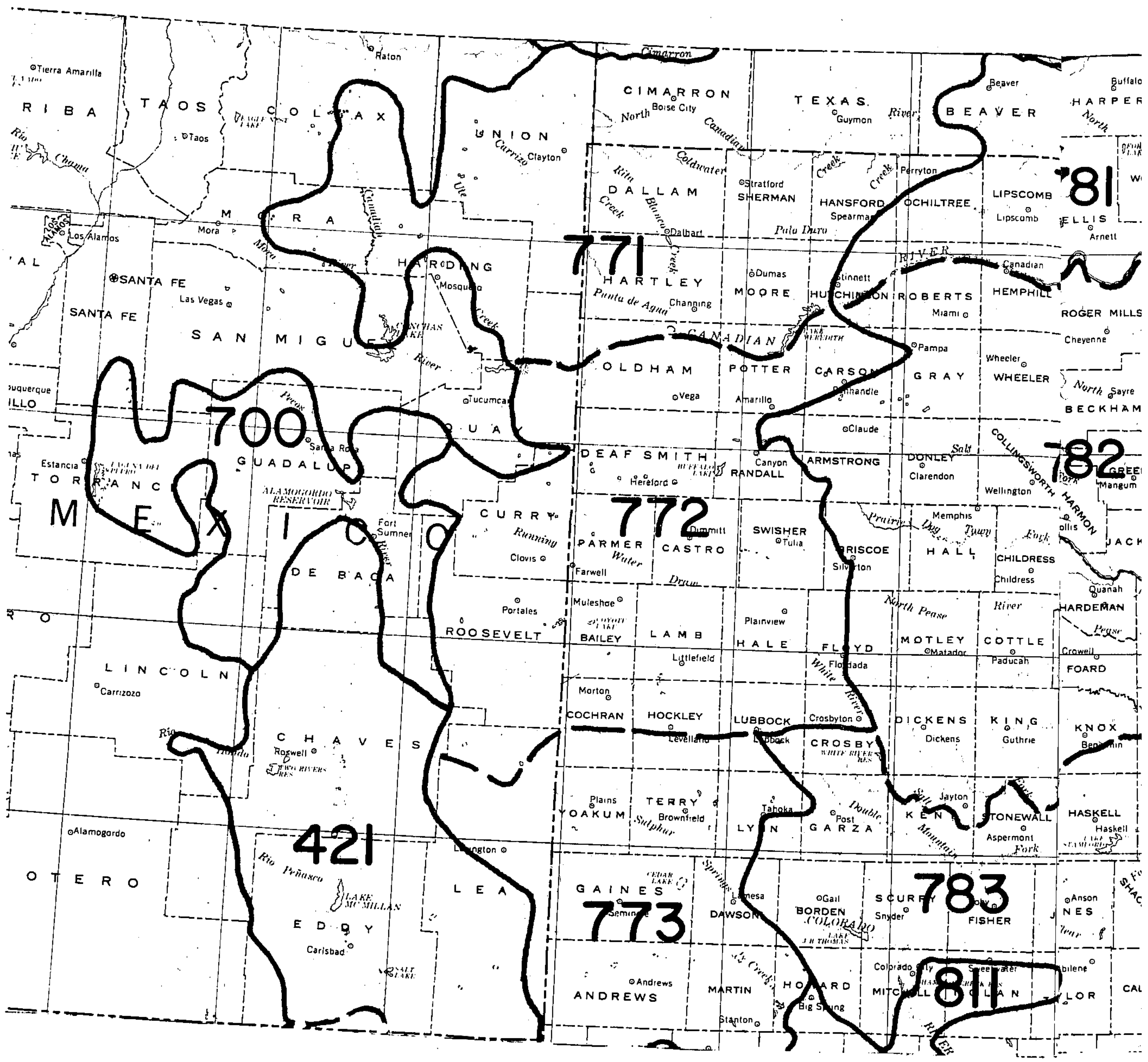
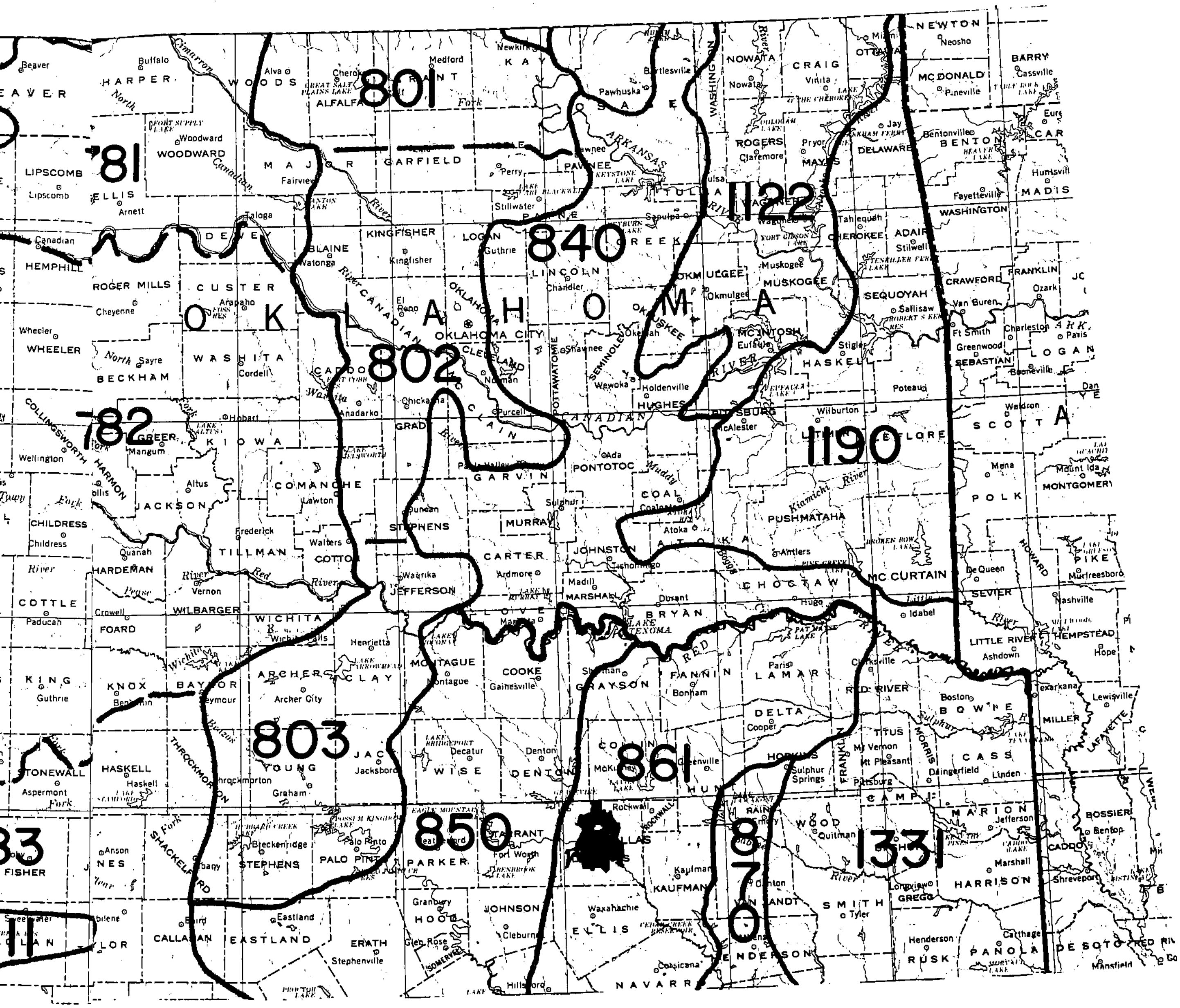


Figure 4.—Provisional seed zones for the Southern Great Plains (map 1).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1122
O K L A H O M A
802
782
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803
861
850
870
1331

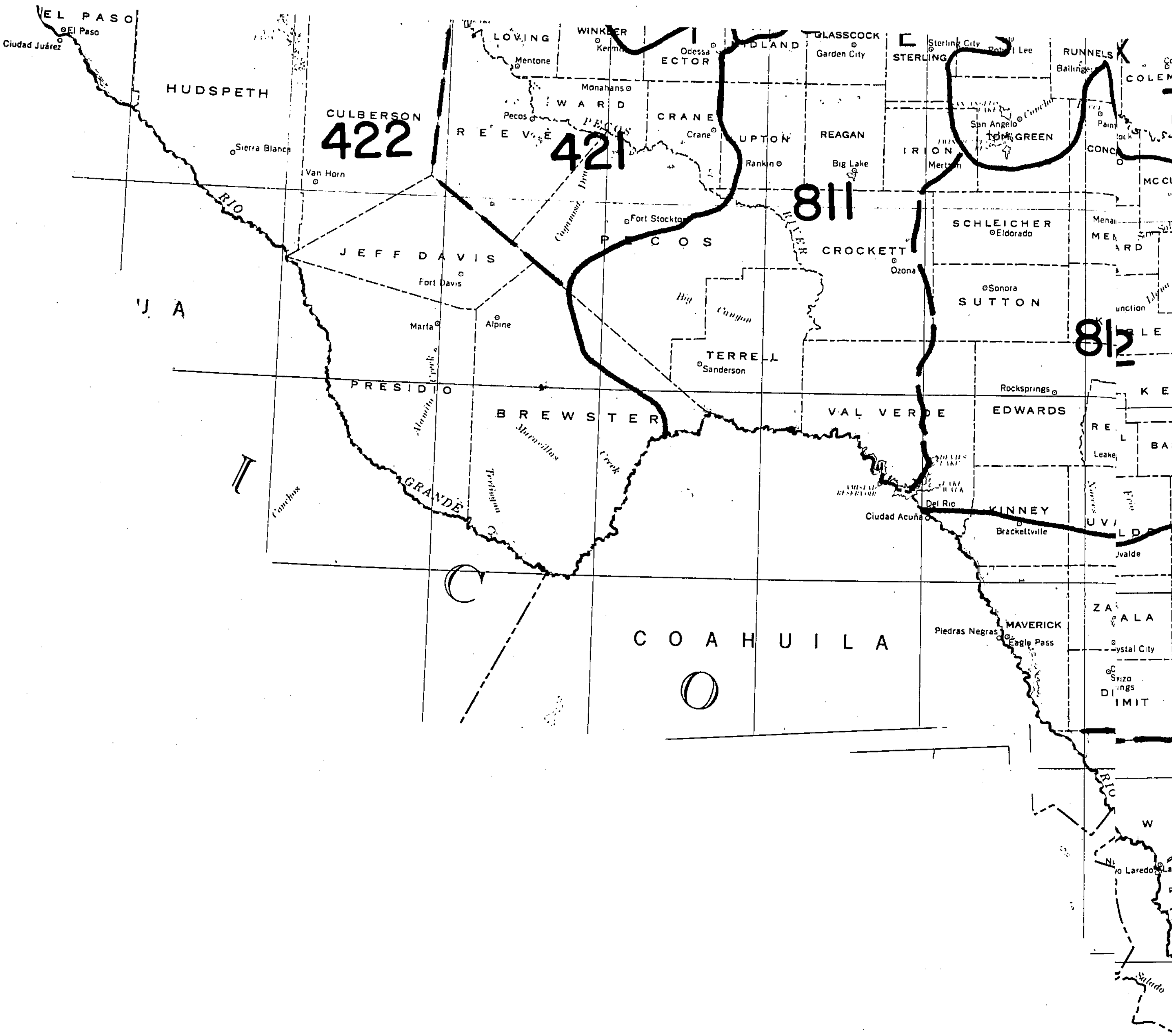
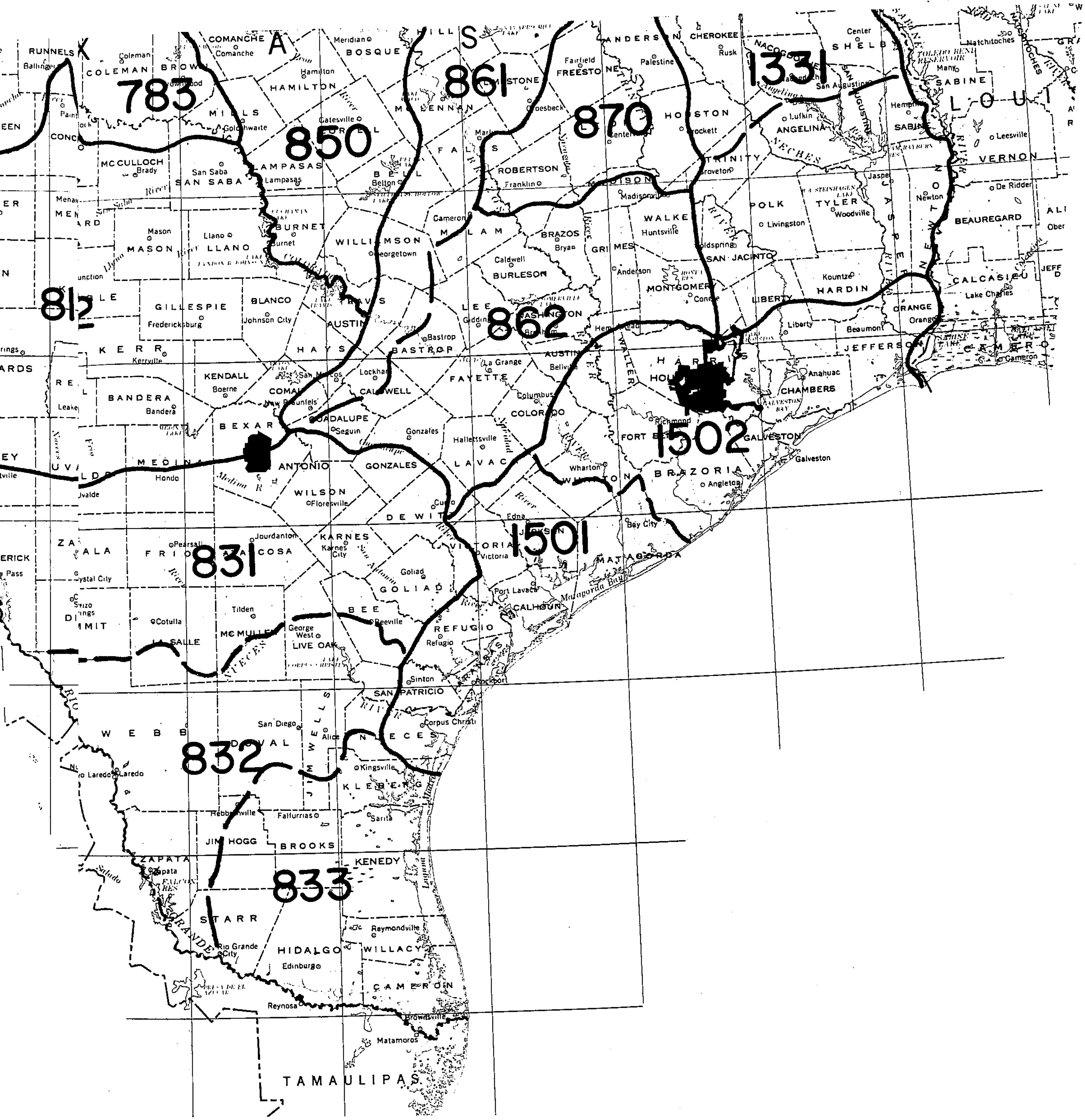


Figure 4.—Provisional seed zones for the Southern Great Plains (map 2).


783
850
861
870
1331
812
862
1502
1501
831
832
833
RUNNELS
COLEMAN
Coleman
COMANCHE
Comanche
Meridian
BOSQUE
Hamilton
HAMILTON
MILLS
Goldthwaite
Gatesville
CORYELL
LIMESTONE
FREESTONE
Fairfield
Palestine
CHEROKEE
Rusk
Center
SHELBY
Natchitoches
Many
SABINE
San Augustine
Hemphill
Leesville
VERNON
Lufkin
ANGELINA
Crockett
HOUSTON
TRINITY
Groveton
MC CULLOCH
Brady
San Saba
SAN SABA
LAMPASAS
Lampasas
Belton
BELL
FALLS
ROBERTSON
Franklin
MADISON
Madisonville
POLK
Livingston
TYLER
Woodville
Jasper
Newton
De Ridder
BEAUREGARD
Mason
MASON
Llano
LLANO
BURNET
Burnet
WILLIAMSON
Georgetown
Cameron
MILAM
BRAZOS
Bryan
GRIMES
Anderson
WALKER
Huntsville
Coldspring
SAN JACINTO
Caldwell
BURLESON
MONTGOMERY
Conroe
LIBERTY
Liberty
HARDIN
Kountze
CALCASIEU
Lake Charles
ORANGE
Orange
Beaumont
JEFFERSON
GILLESPIE
Fredericksburg
BLANCO
Johnson City
TRAVIS
AUSTIN
LEE
Giddings
WASHINGTON
Bastrop
BASTROP
KERR
Kerrville
HAYS
La Grange
FAYETTE
AUSTIN
Bellville
WALLER
HARRIS
Anahuac
CHAMBERS
Cameron
KENDALL
Boerne
San Marcos
COMAL
New Braunfels
Lockhart
CALDWELL
Columbus
COLORADO
BANDERA
Bandera
BEXAR
GUADALUPE
Seguin
Gonzales
Hallettsville
Richmond
FORT BEND
GALVESTON
Galveston
MEDINA
Hondo
ANTONIO
GONZALES
LAVACA
Wharton
WHARTON
BRAZORIA
Angleton
Uvalde
WILSON
Floresville
Cuero
DE WITT
Edna
JACKSON
Bay City
MATAGORDA
Pearsall
FRIO
Jourdanton
ATASCOSA
KARNES
Karnes City
VICTORIA
Victoria
Goliad
GOLIAD
Port Lavaca
CALHOUN
Matagorda Bay
Cotulla
LA SALLE
Tilden
MC MULLEN
George West
LIVE OAK
BEE
Beeville
REFUGIO
Refugio
Sinton
SAN PATRICIO
Rockport
San Diego
DUVAL
Alice
JIM WELLS
NUECES
Corpus Christi
Kingsville
KLEBERG
WEBB
Laredo
Hebbronville
Falfurrias
JIM HOGG
BROOKS
Sarita
KENEDY
ZAPATA
Zapata
STARR
Rio Grande City
HIDALGO
Edinburg
Raymondville
WILLACY
CAMERON
Reynosa
Brownsville
Matamoros
TAMAULIPAS
RIO GRANDE

Appendix

TABLE 2.—*Approximate equivalents of great soil groups of the modified 1938 Yearbook classification in the classes in Soil Taxonomy (from Austin 1972, p. 81-82)*

1938 classification [1]	Soil Taxonomy [2]	
Great soil groups	Most nearly corresponding taxa	Less common corresponding taxa
Alluvial soils	Fluvaquents Fluvents Fluventic subgroups of Inceptisols.	
Alpine Meadow soils	Cryaquods	Cryaquolls. Cryumbrepts.
Ando soils	Dystrandepts	Other great groups of Andepts.
Bog soils	Histosols	Histic subgroups of Aqualfs, Aquepts, and Aquolls.
Brown soils	Borolls (aridic subgroups) Ustolls (aridic subgroups) Xerolls (aridic subgroups) Aridisols (mollic subgroups)	Aridic Haploborolls. Durixerolls.
Brown Forest soils	Eutrochrepts	Haploxerolls. Hapludolls.
Brown Podzolic soils	Entic Haplorthods Entic Fragiorthods Cryandepts	Dystrochrepts. Fragiochrepts.
Brunizems (Prairie soils)	Udolls Argixerolls (typic subgroups) Haploxerolls (typic subgroups)	Udic Argiustolls.
Calcisols	Mollisols (calcic great groups) Aridisols (calcic great groups)	Ustochrepts. Xerochrepts.
Chernozem soils	Borolls (udic subgroups) Ustolls (udic subgroups)	Haploxerolls. Mollic Eutroboralfs. Boralfic Argiborolls.
Chestnut soils	Borolls (typic subgroups) Ustolls (typic subgroups)	Xerolls.
Desert soils	Aridisols (mesic and frigid families).	
Gray-Brown Podzolic soils	Udalfs	Aeric Ochraqualfs. Hapludults.
Gray Wooded soils	Boralfs	
Ground-Water Podzols	Aquods	Haplohumods.
Grumusols	Vertisols	Haplaquepts (vertic subgroups). Haplaquolls (vertic subgroups). Rendolls.
Humic Gley soils	Umbraqualfs Aquolls Humaquepts	Andaquepts. Haplaquepts (mollic subgroups). Ochraqualfs (mollic subgroups). Paleaquults (umbric subgroups).
Lithosols	Orthents (lithic subgroups) Psamments (lithic subgroups)	Lithic subgroups of Alfisols, Aridisols, Inceptisols, Mollisols, and Ultisols.
Low-Humic Gley soils	Aquents Aquepts Aquults	Aqualfs. Paleaquults. Psammaquents.
Noncalcic Brown soils	Xeralfs	Xerochrepts.

See footnotes at end of table.

TABLE 2.—*Approximate equivalents of great soil groups of the modified 1938 Yearbook classification in the classes in Soil Taxonomy*—Continued

1938 classification [1]	Soil Taxonomy [2]	
Great soil groups	Most nearly corresponding taxa	Less common corresponding taxa
Planosols	Albaquults Albaqualfs Albolls	Fragiaquults. Paleaquults.
Podzols	Orthods	Haplohumods. Dystrochrepts. Fragiochrepts.
Red Desert soils	Aridisols (thermic and hyperthermic families).	
Reddish-Brown Lateritic soils	Humults Rhodudults	Rhodic Paleudalfs. Rhodic Paleudults.
Reddish-Brown soils	Haplustalfs Paleustalfs Ustollic Haplargids	Aridic Argiustolls (thermic and hyperthermic families). Aridic Calciustolls (thermic and hyperthermic families). Aridic Haplustolls (thermic and hyperthermic families).
Reddish Chestnut soils	Haplustalfs Paleustalfs Typic and Aridic Argiustolls (thermic and hyperthermic families).	(warm) Haplustolls.
Reddish Prairie soils	Ustolls (udic subgroups, thermic and hyperthermic families). Paleudolls (thermic and hyperthermic families).	Eutrandepts.
Red-Yellow Podzolic soils	Udults	Paleudalfs. Haplustalfs (ultic subgroups). Paleustalfs (ultic subgroups).
Regosols	Great groups of Psamments Orthents (not lithic)	Grossarenic Paleudults. Xerochrepts.
Rendzina soils	Rendolls	Hapludolls. Eutrochrepts.
Sierozems	Aridisols (mollic great groups, mesic and frigid families).	Aridic subgroups of Mollisols.
Solonchak soils	Salorthids Calciaquolls	Halaquepts. Aquic Calciustolls.
Solonetz soils	Natric great groups	Natric subgroups.
Sols Bruns Acides	Dystrochrepts Fragiochrepts Haplumbrepts	Udorthent. Xerumbrept.
Subarctic Brown Forest soils	Cryochrepts	Cryoborolls.
Yellowish-Brown Lateritic soils	Umbrihumults Haplumbrepts	

[1] Concepts of great soil groups are those given in the 1938 Yearbook of Agriculture pp. 996–1001 as modified in Soil Sci. 67: 117–126, 1949, and as modified in other publications and correlations prior to 1960.
[2] Soil Survey Staff, Soil Taxonomy. In preparation.*

*In October 1973, the Soil Survey Staff prepared an interim publication for inservice use, "Preliminary abridged text—Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys," 330 p., USDA Soil Conserv. Serv., Wash., D.C.