NORTH CENTRAL REGIONAL PLANTINGS OF WOODY ORNAMENTAL AND SHELTER PLANT INTRODUCTIONS[1]

A. F. Dodge[2]

INTRODUCTION

In an effort to more clearly define the behavior of familiar as well as new introductions of woody ornamentals when planted in the North Central Region, several state ornamental specialists met under the leadership of Prof. S. A. McCrory at South Dakota State College, Brookings, South Dakota, in January 1954. This group organized a regional performance study program within the framework of the state-federal North Central Regional Plant Introduction, New Crops program. In the spring of 1954, the Regional Station began forwarding woody ornamental and shelter plants of mutual interest to cooperating personnel at 21 trial sites in eight states.

This work is recognized by the several participating state agricultural experiment stations of the North Central Region, the Regional Plant Introduction Station, Ames, Iowa, and the New Crops Research Branch, Crops Research Division, of the Agricultural Research Service, U. S. Department of Agriculture, as necessary and contributing to a better understanding of the horticultural performance of new ornamentals introduced to the region. It is felt that the program has widespread implications over and above unrelated testing of plant material. For example, the propagator, the nurseryman, the plant-using public, and the academic horticulturist will derive such valuable information on the adaptation of these plants to the vicissitudes of continental climates and attendant soils. To date, 144 different trees and shrubs have been distributed of 30 cooperating trial planting sites in 12 states.

HISTORICAL BACKGROUND

Since colonial times, nurserymen on both sides of the Atlantic have been the continuing dominant force in the never-ending task of bringing together and testing newly found trees and shrubs for horticultural characteristics and adaptation to local climate, soils, and management. The success of this type of work depends on the plant sense, the technical skill, and the business acumen of the individual nurseryman.

Another means of assaying the trees and shrubs suited for a given locality is observing their performance in arboretum plantings. Carefully planned and maintained living collections offer an ideal opportunity for the evaluation of unusual or newly introduced material in comparison with the commonly used plants. Needless to say, a well developed arboretum offers untold educational and research opportunities.

---

[1]This study was conducted as a work plan under the North Central Regional Plant Introduction state-federal cooperative project NC-7 Title The Introduction, Multiplication, Preservation, and Testing of New and Useful Plants of Potential Value for Agricultural and Industrial Uses. Sub-Title of Work Plan: Woody Ornamental and Shelter Plants for the North Central Region. This work was supported in part by Regional research funds of the United States Department of Agriculture

[2]Horticulturist, Special Crops. Regional Plant Introduction Station, Iowa State University, Ames, Iowa

In an attempt to compile existing information on the behavior of ornamental plants, J. C. Loudon in 1834 sent out about 3000 inquiries or "Return Papers" to plantsmen in many countries, regarding the performance of trees and shrubs. Owners of arboreta or other plantings, nurserymen, gardeners, and foresters were asked to return information on the location, environment, and performance of the important trees and shrubs on their property or under their care. These data were included by location under "Statistics" for each species described by Loudon in his "Trees and Shrubs that Endure the Open Air in Great Britain and Ireland."

"Return papers" were received from cooperators in the British Isles, Western European countries, the Americas, Asia, Australia, and Polynesia. Loudon's monumental eight-volume work resulted in a renewed appreciation of plants and plantings and of the many introductions of that era with respect to ornamental values, hardiness at various locations, and reaction to different soils.

The United States Congress of 1862 strengthened American agriculture with the establishment of the United States Department of Agriculture and aid to the state Land Grant Colleges and Universities through the passage of the Morrill Act. As these institutions undertook their various tasks, it soon became evident that the research facilities and personnel of each organization complemented those of the other.

The Hatch Act, passed in 1887, authorized the federal support of state experiment station projects. Ten years later this support assisted Professor N. E. Hansen, South Dakota Experiment Station horticulturist, to initiate a series of plant explorations to the cold and dry parts of continental Russia and Siberia as an agent of the U.S. Department of Agriculture. He sought out hardy grasses, legumes, fruits, and ornamentals for the rapidly expanding agriculture in the northern prairie states where commonly used crop plants were damaged by the severe climate and alkaline soils. The plant materials collected by Dr. Hansen are listed in Inventory No. 1, Foreign Seeds and Plants, Imported by the Section of Seed and Plant Introduction, Division of Botany, U.S. Department of Agriculture, Washington, D.C., 1898. The Inventory clearly illustrates that vegetables, grasses, legumes, shrub fruits, tree fruits, oil seeds, novelties, and ornamentals were introduced from Eurasia where the climate was similar to that of North American prairies and plains.

Congress continued to support agricultural research, but passage of the Research and Marketing Act of 1946 permitted, for the first time, the organization of truly cooperative state-federal agricultural research activities on a regional basis. Four regional plant introduction stations were established to receive and propagate plant material introduced into the United States. These regional stations serve plant scientists by increasing, maintaining, and supplying viable seed and plants for their research studies. Also, each station is a center for compiling accumulated information on introductions for exchange among plant scientists. The North Central Regional Plant Intro-

duction Station at Iowa State University serves the 12 North Central states plus Alaska.

The United States Department of Agriculture New Crops Research Branch is responsible for the exploration, introduction, propagation, and evaluation of desired ornamental plant materials for research purposes. Recently much of this work has been in cooperation with the Longwood Gardens, Kennett Square, Pennsylvania.

Ornamentals having potential use in the North Central region are forwarded to the Regional Station at Ames and ultimately to experiment station specialists for research purposes. Items which merit regional trial are propagated at the Regional Station and distributed to cooperating trial sites upon request. Plant response to local conditions is ultimately included in the state reports on adaption, merit, disease reaction, use in breeding work, and any acceptance by the nursery industry. These data are compiled by the regional station and distributed to cooperating plant scientists.

In addition to the regional station research program just described, the United States Department of Agriculture has supported research on plant introductions at four United States Plant Introduction Stations. These stations, located at Glenn Dale, Maryland; Savannah, Georgia; Miami, Florida; and Chico, California, have a long record of success in supplying ornamental introductions to cooperating specialists in the nursery industry, at research institutions, and at the various arboreta.

METHODS AND MATERIALS

A woody ornamental subcommittee made up of cooperating state ornamental specialists guides the regional trial program by making periodic reviews of objectives and recommendations for additional materials to be included for trial. Each winter the Regional Station supplies state leaders with a list of available planting stock. Requests for planting material are made by state according to local needs. The planting, care, measurement, records, interpretation of plant behavior, and the reporting of results are major phases of regional trial work undertaken at each trial location by state cooperators.

For the most part, deciduous trees and shrubs have been included in these regional trials. A few broad-leaved evergreens have also been selected for study. Some of these plants were obtained as stock plants or liners for propagation, growing and distribution by the Regional Station. Other plants were donated by arboreta, by interested nurserymen, or by state experiment station horticultural departments. Still others were distributed as plant introductions obtained through the New Crops Research Branch, Beltsville, Maryland.

The members of the woody ornamental subcommittee, the regional trial state leaders, and state cooperators, as well as their locations (Table 1) are presentd by state.

These men have carried the burden of this testing program. Without their interest and continued effort there would be no regional testing program for ornamentals.

Table 1. Cooperating personnel[1] and location of trial sites for the North Central Region woody plant trials.

Alaska	No regional trials.
Illinois	H. R. Kemmerer★, Univ. of Ill., Dept. of Hort., Urbana J C. McDaniel†. Univ. of Ill., Dept of Hort., Urbana
Indiana	★. Temporarily not assigned †, Temporarily not assigned H. B. Weyland‡, Purdue Univ.. Dept. of Hort., Lafayette
Iowa	J. P. Mahlstede★, †, ‡, Dept. of Hort , Iowa State Univ., Ames
Kansas	R. A. Keen,★, †, Dept. of Hort., Kansas State Univ., Manhattan C. E Banbury‡, Branch Station, Colby W. W. Duitsman‡, Fort Hays Branch Station, Hays A. B. Erhart‡, Branch Station, Garden City T. B. Stinson‡, Branch Station, Tribune
Michigan	C. E Lewis★, †, Dept. of Hort., Mich. State Univ., East Lansing G. W. Parmelee‡, Beal-Garfield Bot. Garden, Mich. State Univ., East Lansing C. T. Black‡, Mich Conservation Dept., Rose Lake D. A. Carroll‡, Soil Consev. Serv., Plant Materials Center, Rose Lake
Minnesota	L. C. Snyder ★, †, Dept. of Hort., Univ. of Minn., St. Paul Deane A. Turner‡. Southern School of Agriculture, Waseca Wes H. Gray‡, West Central School and Expt. Statoin, Morris B. C. Beresford‡, Northwest Exp. Sta., Crookston N. H. Grimsbo‡, North Central Exp. Sta., Grand Rapids Herbert Hopen‡, Northeast Exp. Sta., Duluth
Missouri	R. E. Taven★, †, ‡, Dept. of Hort., Univ. of Missouri, Columbia
Nebraska	Glenn Viehmeyer★, †, North Platte Exp. Sta., North Platte Paul Ehlers‡. Box Butte Exp. Sta., Alliance Lionel Harris‡, Scottsbluff Exp. Sta., Mitchell J. H. Agar‡, Park Dept., Lincoln J. A. Churchich‡, Parks and Recreation Dept., Omaha C. A. Hutchison‡, Park Dept., Scottsbluff
North Dakota	D. G. Hoag★, †, Dept. of Hort., N. Dak. State Univ., Fargo T. S. Conlon‡, Dickinson Exp. Sta. Dickinson
Ohio	L. C. Chadwick★, †, ‡, Dept. of Hort., Ohio State Univ., Columbus
South Dakota	S. A. McCrory, Chairman★, Dept. of Hort., S. Dak. State College, Brookings W. G. Macksam†, ‡, Dept. of Hort., S. Dak. State College, Brookings W. R. Pringle‡, Central Substation, Highmore
Wisconsin	E. R. Hasselkus★, †, Dept. of Hort., Univ. of Wis., Madison G. Wm. Longenecker‡, University Arboretum, Madison

[1]Sub-committee members(★), state leader(†), and cooperators(‡) with their locations.

Reporting of plant performance was unified by the preparation of a Species-Planting Site Report Form.[1] This Report Form provides for the survival record, performance record, recommendations for use based on the behavior of the trial plants, general opinion of the plant at the test site, and any factors which might govern the use of the plant in the area served by the trial. The Species-Planting Site Report Forms serve as the basis for five-year summaries for each accession. (This form is presented as Table 2).

REGIONAL TRIAL DATA

To date, five-year reports have been prepared on 40 accessions included in the early regional trial plantings. An examination of

[1]J. P Mahlestede, Iowa State University and L C Snyder, University of Minnesota assisted the author in preparation of this form and in organizing the content of the five-year reports derived from these data sheets.

these reports with respect to survival, plant losses, fifth-year shoot growth, condition of growth, plant size after five years on trial site, and suggested limits of planting in the region was undertaken for this meeting of the Plant Propagator's Society.

Survival

Survival data for a given accession are based on an inventory taken after the fifth winter at each trial site. The number of live plants is expressed as a percent of those planted. Grouping of the plantings having the same survival percent proved to be an effective way to summarize the regional survival performance of each accession on trial. For example, the survival data for 22 *Spiraea* x *vanhouttei* (Briot) Zabel (Van Houtte spirea) plantings clearly show (Figure 1) the success which attended the trial plantings of this species.

Table 2. SPECIES - PLANTING SITE REPORT FORM
NC Regional Woody Ornamental Trials

Cooperator ..... Planting Site ..... State .....

Species .....

A. SURVIVAL RECORD

No. of Plants Received ..... Date ..... No. of Plants Planted ..... Date .....

No. of Live Plants 1st Fall ..... No. of Live Plants after 1st Winter .....

No. of Live Plants after 2nd Winter ..... No. of Live Plants after 5th Winter .....

No. of Replants Received ..... Date ..... No. of Replants Planted ..... Date .....

No. of Live Replants 1st Fall ..... No. of Live Replants after 1st Winter .....

No. of Live Replants after 2nd Winter ..... No. of Live Replants after 5th Winter .....

B. PERFORMANCE RECORD

(1) Average of 5th year Apical Growth (inches) .....

(2) Average plant height end of 5th year (feet) .....

Variation: Tallest plant ..... Shortest plant .....

(3) Average plant spread end of 5th year (feet) .....

Variation: Broadest ..... Narrowest .....

C. RECOMMENDATIONS: (For the area represented by this planting site)

(1) Indicate A, B or C for each of the following whichever is applicable.
A-Recommended B-Recommended for trial only C-Unsatisfactory

..... Border Planting ..... Highway Planting ..... Ground Cover

..... Screen Planting ..... Shelterbelt Planting ..... Wild Life Planting

..... Specimen Planting ..... Windbreak Planting ..... Hedge Planting

..... Foundation Planting

(2) Statement regarding general opinion of plant performance on test site.

(3) Discuss good qualities and objections which might govern its use in the area represented by test site.

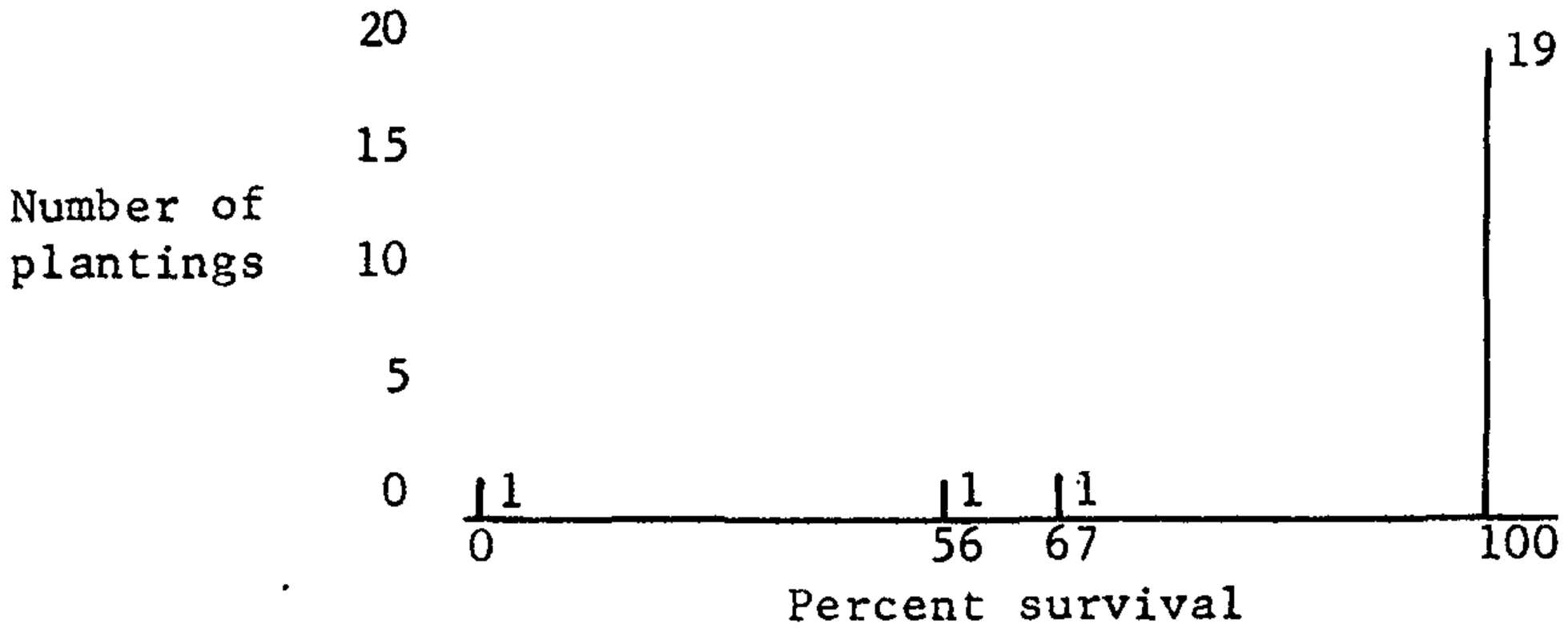

Fig. 1. Number of Van Houtte spirea plantings grouped by five-year survival percentage, North Central Regional woody plant trials.

Figure 1 indicates that only one planting failed completely. Hall the plants at another site and one-third of the plants at a third trial had failed in live years. Nineteen plantings were reported with 100-percent survival. The live-year survival record of the Van Houtte spirea trial plantings was successful.

When the survival data for the regional trial plantings of *Styrax japonica* Sieb. & Zucc. (Japanese snowbell) seedlings are arrayed in the same manner, (Fig. 2) the general failure of this species in trial plantings is apparent.

Species-planting site report forms showed that 19 plantings were devoid of all Japanese snowbell plants. Only three widely scattered plantings were reported to have live shrubs.

In the use of this method for summarizing survival data for each of the 40 accessions, three distinct groups of species were apparent. More than hall the trial accessions had survival records similar to

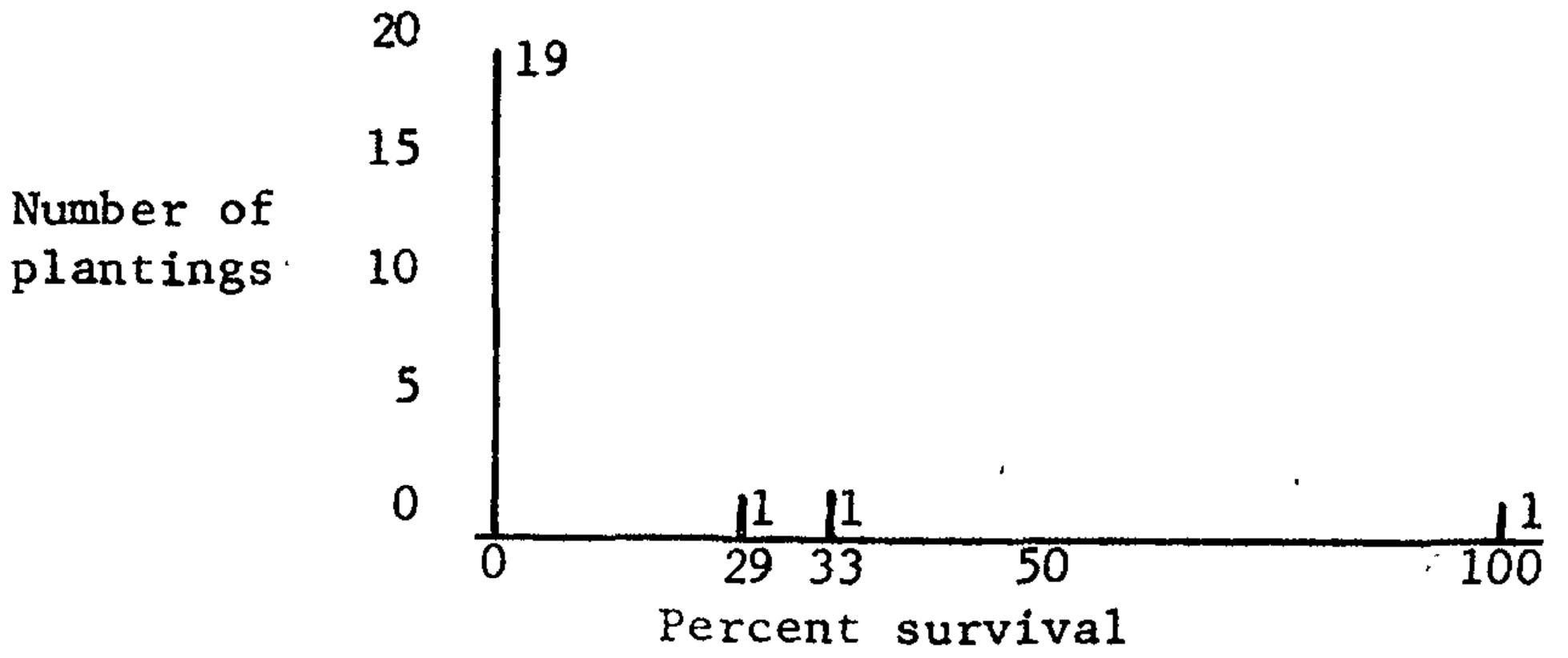

Fig. 2. Number of Japanese snowbell seedling plantings grouped by five-year survival percentage, North Central Regional woody plant trials.

that of Van Houtte spirea. This was termed the successful survival group. A small group with survival resembling that of Japanese snowbell was considered to be unsuccessful. A third, or intermediate survival group, had plantings with perfect survival and complete failure in approximately equal numbers.

For each of these three survival groups — successful, intermediate, and unsuccessful — the average number of plantings with perfect five-year survival, the average number of plantings which failed, the ratio of plantings with perfect survival to those which failed, and the number of accessions per group are presented in Figure 3.

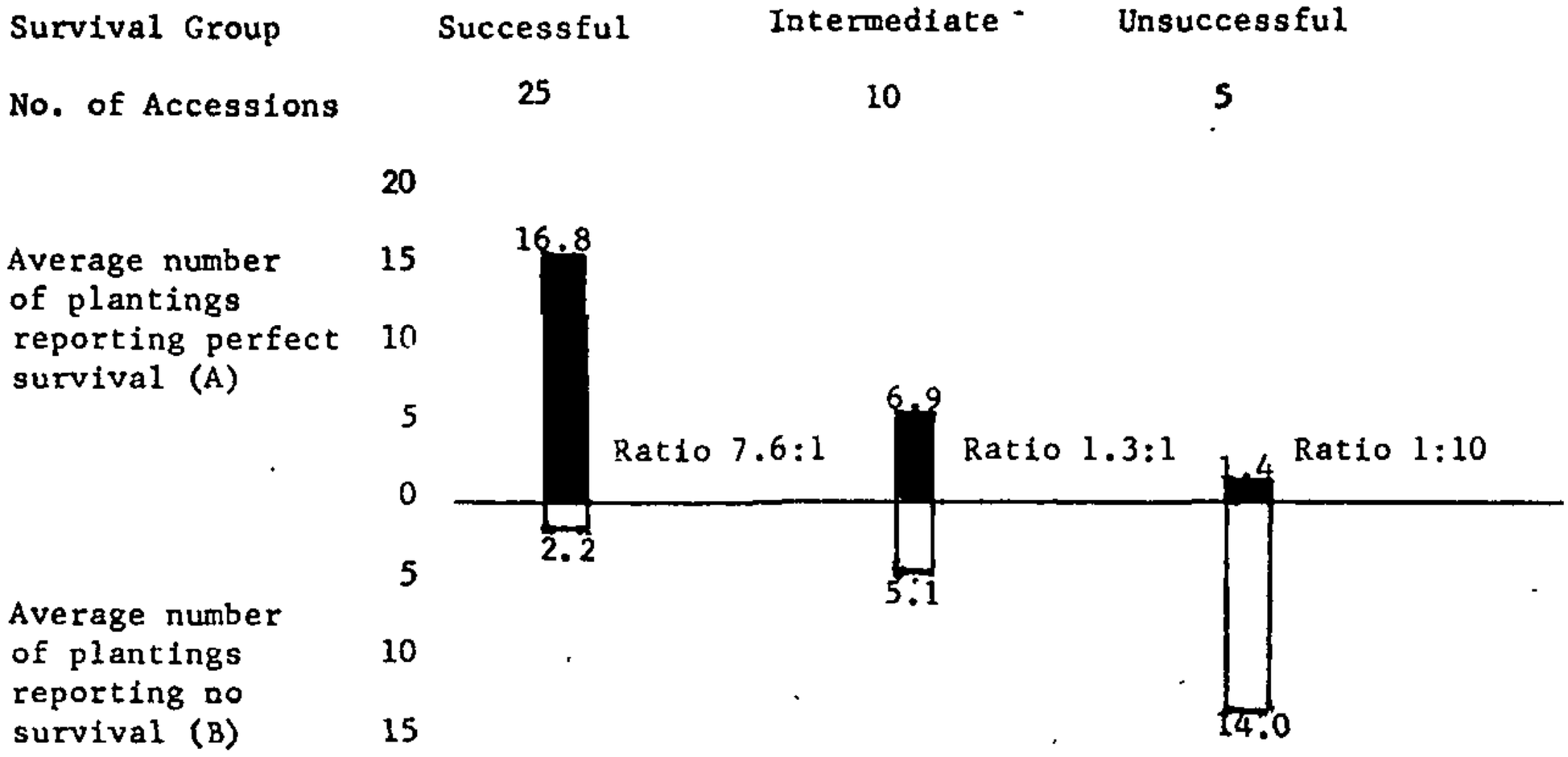

Fig 3. Forty North Central Regional trial accessions divided into three survival groups. Included for each group are the number of accessions, the average number of plantings with perfect five-year survival (A), the average number of plantings with no five-year survival (B), and the ratio of A:B.

The names of the various trees and shrubs comprising each of the three survival groups (Fig. 3) are as follows:

Group I. Successful (25)
Caragana pygmaea (L.) DC.
Cornus racemosa Lam.
Cornus stolonifera var. coloradensis (Koehne) Schneid.
Cotoneaster lucida Schlecht.
Euonymus bungeanus Maxim.
Euonymus nana var. turkestanica (Dieck) Krisht.
Forsythia ovata Nakai
Forsythia x 'Arnold Dwarf'
Gleditsia triacanthos fma. inermis (L.) Zabel 'Beatrice'
Gleditsia triacanthos fma. inermis (L.) Zabel 'Moraine'
Gleditsia triacanthos fma. inermis (L.) Zabel 'Sunburst'
Ligustrum amurense Carr. 'Amur River North'
Ligustrum vulgare L. P.I. 107630
Lonicera x bella 'Albida' Zabel
Physocarpus opulifolius var. nanus (Kirchn.) Zabel
Populus x robusta (Simon-Louis) Schneid.

Rhus trilobata Nutt. ex Torr. & Gray
Ribes diacanthum Pall.
Rosa rugosa 'Hansa' Thunb.
Rosa spinosissima var. altaica (Willd.) Bean
Rubus deliciosus Torr.
Spiraea x vanhouttei (Briot) Zabel
Ulmus x 'Fremont'
Ulmus pumila L. (Chinkota)
Viburnum lentago L.

Group II. Intermediate (10)
Acer ginnala Maxim.
Cercis canadensis L. (Minn. Seedlings)
Cotoneaster apiculata Rehd. & Wils.
Deutzia x lemoinei ex Bois
Euonymus nana Bieb.
Ligustrum vulgare L. P.I. 26767
Pyrus ussuriensis Maxim.
Ulmus carpinifolia Gled. 'Christine Buisman'
Ulmus pumila L. (common)
Ulmus pumila L. (Dropmore)

Group III. Unsuccessful (5)
Berberis julianae Schneid.
Euonymus kiautschovica Loes.
Hypericum prolificum L.
Platanus acerifolia (Ait.) Willd.
Styrax japonica Sieb. & Zucc.

Plant Losses

In addition to the survival count taken after the fifth winter, trial plantings were inventoried three other times: i.e., at the end of the first growing season, after the first winter, and after the second winter. From these stand counts the cumulative losses were obtained for these intervals after planting. Representative species taken from the three categories outlined under Survival (Fig. 3) are presented as the cumulative number of plants lost in relation to time after planting.

The losses sustained by trial plantings of *Ligustrum amurense* 'Amur River North' and *Ligustrum vulgare* P.I. 107630 are charted (Fig. 4) as typical of the group having successful survival.

Ligustrum vulgare P.I. 107630 was introduced from Yugoslavia in 1934 by Edgar Anderson while on the Arnold Arboretum Balkan Expedition. It was thought to possess considerable cold and drought hardiness which apparently is an attribute of this plant introduction.

The 'Amur River North' privet has been extensively used as a hedge material in the west central states of the North Central Region. It is used as far north as the Twin Cities, Minnesota, but has not proved satisfactory at Brookings, South Dakota.

Obviously the significant difference in the losses which these two accessions sustained in regional trials occurred during the first grow-

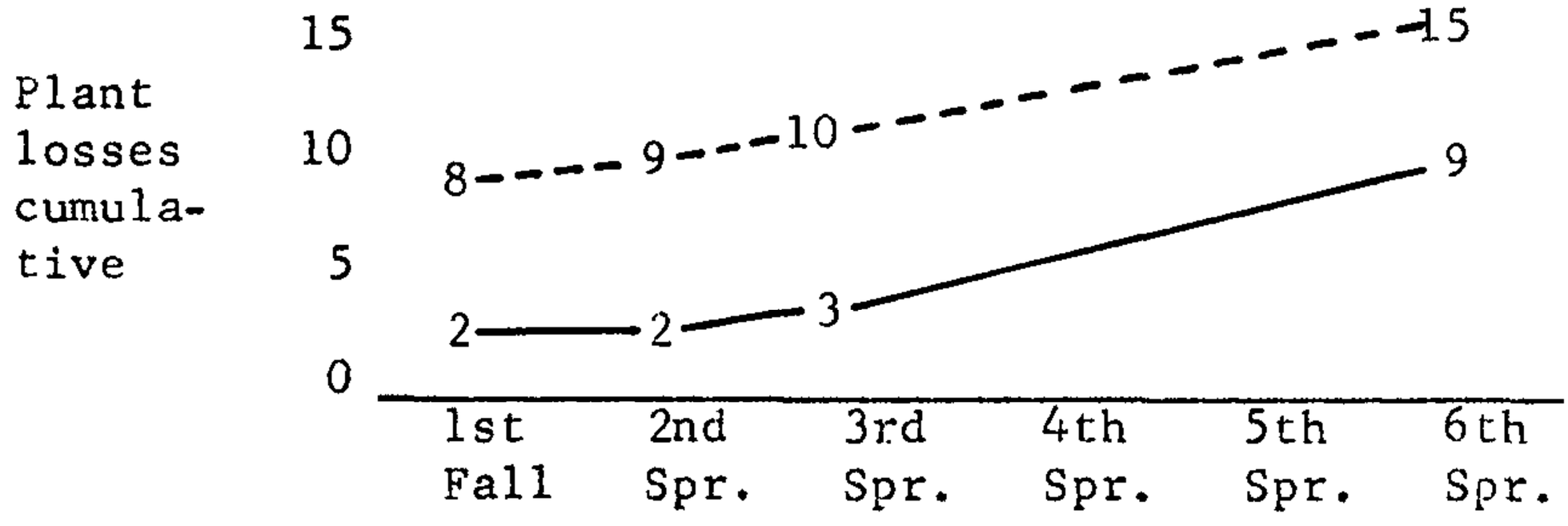

Fig. 4. Cumulative plant losses for two privet accessions (high survival group), North Central Regional Woody Plant Trials.

ing season. Subsequent losses for both are similar. Whether the first season losses of 'Amur River North' reflect an abnormal condition of the planting stock, rough handling, or the response to adverse site conditions is not known. Some of these plantings were made in locations outside the area where privet is usually planted.

The plant losses for representative accessions in the intermediate survival group are shown in Figure 5. Ligustrum vulgare P.I. 26767

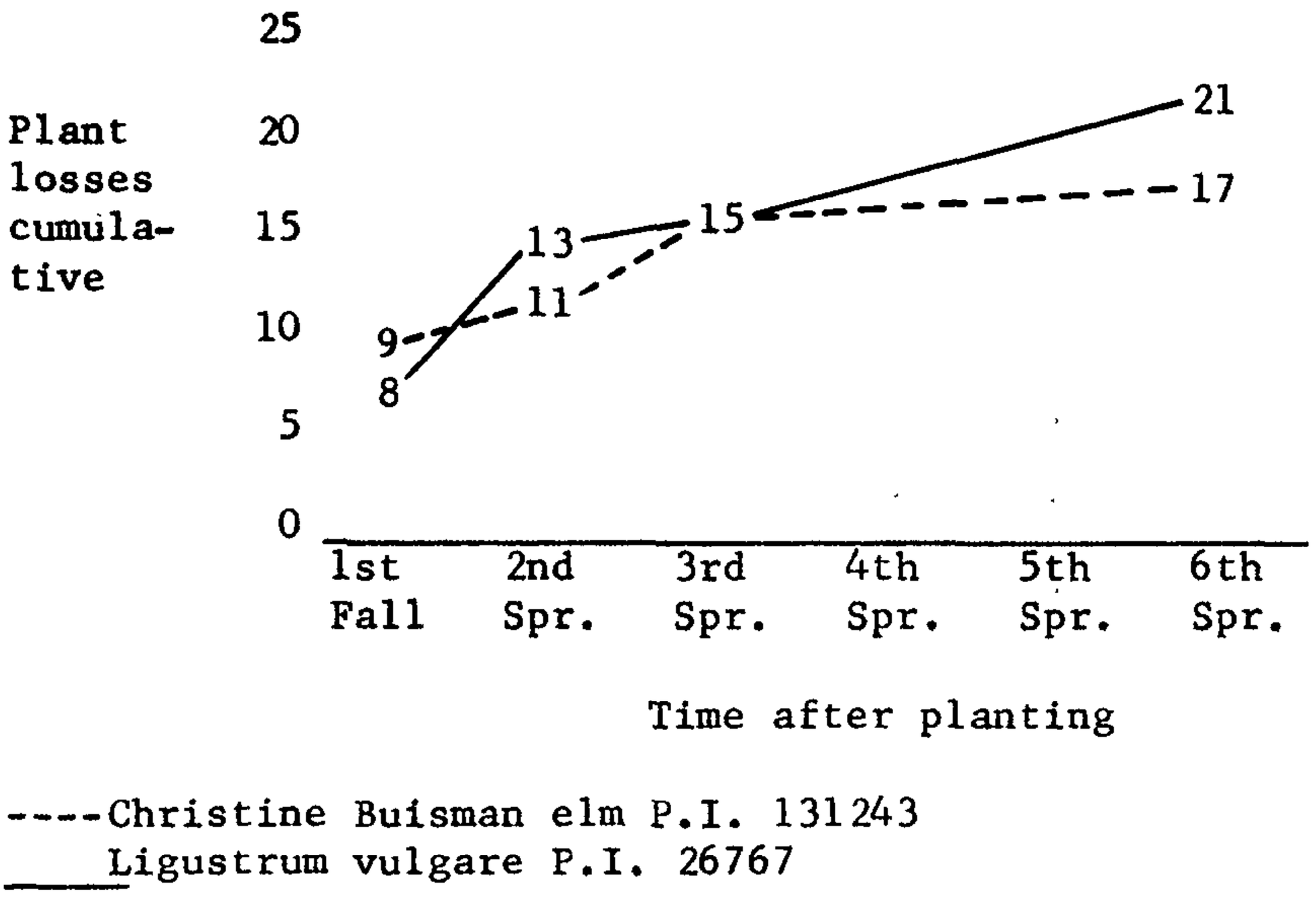

Fig. 5. Cumulative plant losses for two accessions (Intermediate Survival group), North Central Regional Woody Plant Trials.

and *Ulmus carpinifolia* Gled. 'Christine Buisman' P.I. 131243 were chosen from this group of 10 trial species.

Ligustrum vulgare P.I. 26767 was introduced by F. N. Meyer, U.S.D.A. plant explorer, in 1910 from a dry rocky mountainside near Sebastopol in the Crimea. Thirteen of the 21 plants of this accession reported lost on regional trial sites failed to survive the first year. In other words, more than half these losses resulted in the year immediately following planting.

The loss pattern for the 'Christine Buisman' elm was similar. More than half the plants reported dead were observed to fail during the first year after planting. The 'Christine Buisman' elm was introduced as P.I. 131243 in December 1938. All propagators in the Region are still concerned as to just how far north and west this disease-tolerant shade tree will prove satisfactory.

Seedling Japanese snowbell plantings referred to in Figure 2 were chosen to represent the third group, the unsuccessful survival group. The regional trial losses of this Asian shrub are plotted against time after planting in Figure 6.

First-season losses, 18 plants, were heavy. Thirty-four plants failed to survive the first winter. Thus, fifty-two Japanese snowbell seedlings were lost by the end of the first full year of trial. During the second 12-month trial period, eight more plants died. At the end of the fifth year, 66 plants of the original 71 were dead.

Fifth Year Shoot Growth

Fifth-year shoot growth measurements for *Cornus stolonifera* var. *coloradensis* (Koehne) Schneid., Colorado redosier dogwood, repre-

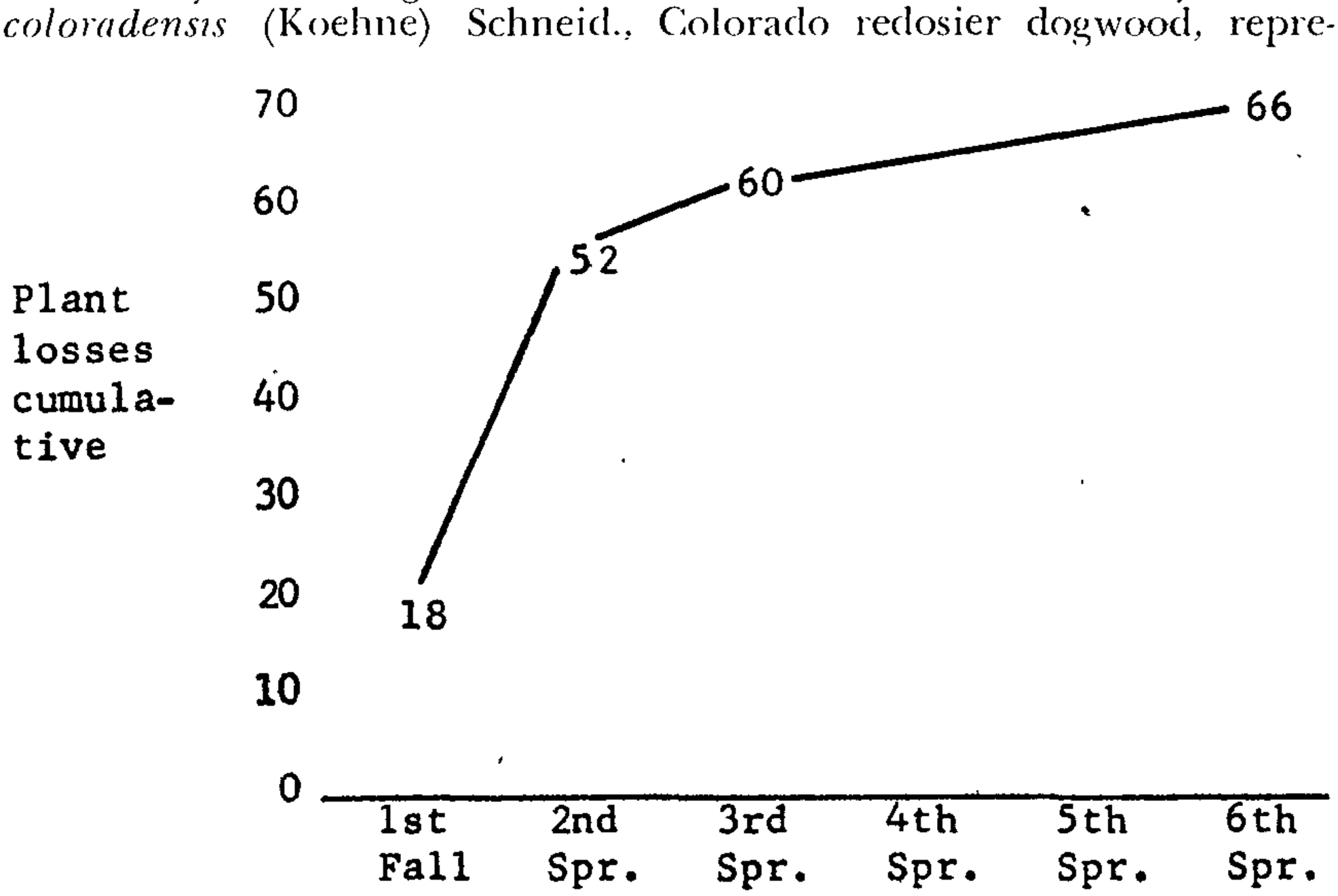

Fig. 6. Cumulative plant loss for Japanese snowbell seedlings (unsuccessful survival group), North Central Regional Woody Plant Trials.

senting the successful survival group were made by cooperators. There was no indication that any tender plants existed among the plantings of this native shrub. Average shoot growth reports summarized in Table 3 came from 13 locations.

Table 3. Average fifth-year shoot growth of Colorado redosier dogwood regional trial plants.

Location	Growth (in.)	Location	Growth (in.)
Ames, Iowa	5	Morris, Minn.	7
Grand Rapids, Minn.	5	Madison, Wis.	7
Rose Lake, Mich.	5	Waseca, Minn.	8
Fargo, North Dakota	6	Dickinson, N. Dak.	8
North Platte, Nebr.	6	Excelsior, Minn.	12
Brookings, S. Dak.	7	Crookston, Minn.	13
Highmore, S. Dak.	7		

Not only does the Colorado redosier dogwood appear to have many fine attributes, including good survival, region-wide hardiness, attractive bark color, moderate leaf size, recurring flowers, foliage to the ground, and no suckers, but regional trial data for this shrub (Table 3) suggest that stem growth is confined or moderate in amount.

The fifth-year shoot growth data for the Lemoine deutzia should also be considered. This shrub represents the intermediate group with respect to survival. Cooperator fifth-year shoot growth reports for this shrub have been grouped (Table 4) as to whether or not the plants were adapted to the planting site. Plants at a given location which proved to be tender, chlorotic, or both, were considered unadapted.

Table 4. Average fifth-year shoot growth of adapted and unadapted plantings of Lemoine deutzia by trial location, together with notes on plant condition.

Location	Growth (in.)	Notes on Plant Condition
Adapted		
Columbia, Mo.	4	Does very well
Madison, Wis	5	Hardy, vigorous growth
Brookings, S. Dak.	7	Has done well
Twin Cities, Minn.	8	Hardy
Lincoln, Nebr.	10	Slight dieback at tips
Ames, Iowa	10	Grows well
Manhattan, Kansas	10	Some leaf scorch
Unadapted		
Hays, Kansas	3	Chlorosis — dry
Scottsbluff, Mitchell, Nebr.	4	Chlorosis — winter kill (dry)
North Platte, Nebr.	12	Not winter hardy
Crookston, Minn.	24	Severe chlorosis — not hardy
Grand Rapids, Minn.	25	Killed back 2 winters

The Lemoine deutzia is an example of a shrub which fails to perform successfully in western and northern trial locations in the region.

The plantings of Japanese snowbell seedlings, representing the unsuccessful-survival group, resulted in finding only two hardy plants among 23 trial plantings. One of these plants is located at East Lansing, Michigan, while the other seemingly hardy shrub is one of three planted at Lincoln, Nebraska. All three plants of this planting are alive. Two are tender (Fig. 7) and suffer cold damage each year. The third plant flowers, fruits, and maintains live twigs without evident dieback (Fig. 8). Fifth-year shoot growth of the two normal plants averaged 9½ inches.

Through arrangements with the Department of Horticulture, University of Nebraska, the hardy seedling at Lincoln Nebraska, is being propagated for future regional trial planting.

Average Plant Size after Five Years (Height-Spread in Feet)

The five-year North Central regional trial reports of the Colorado redosier dogwood indicate a range in size of plants from 3.3 x 4 feet on eroded sandy soil to 6-8 x 6.5-10 feet on more fertile sites. This

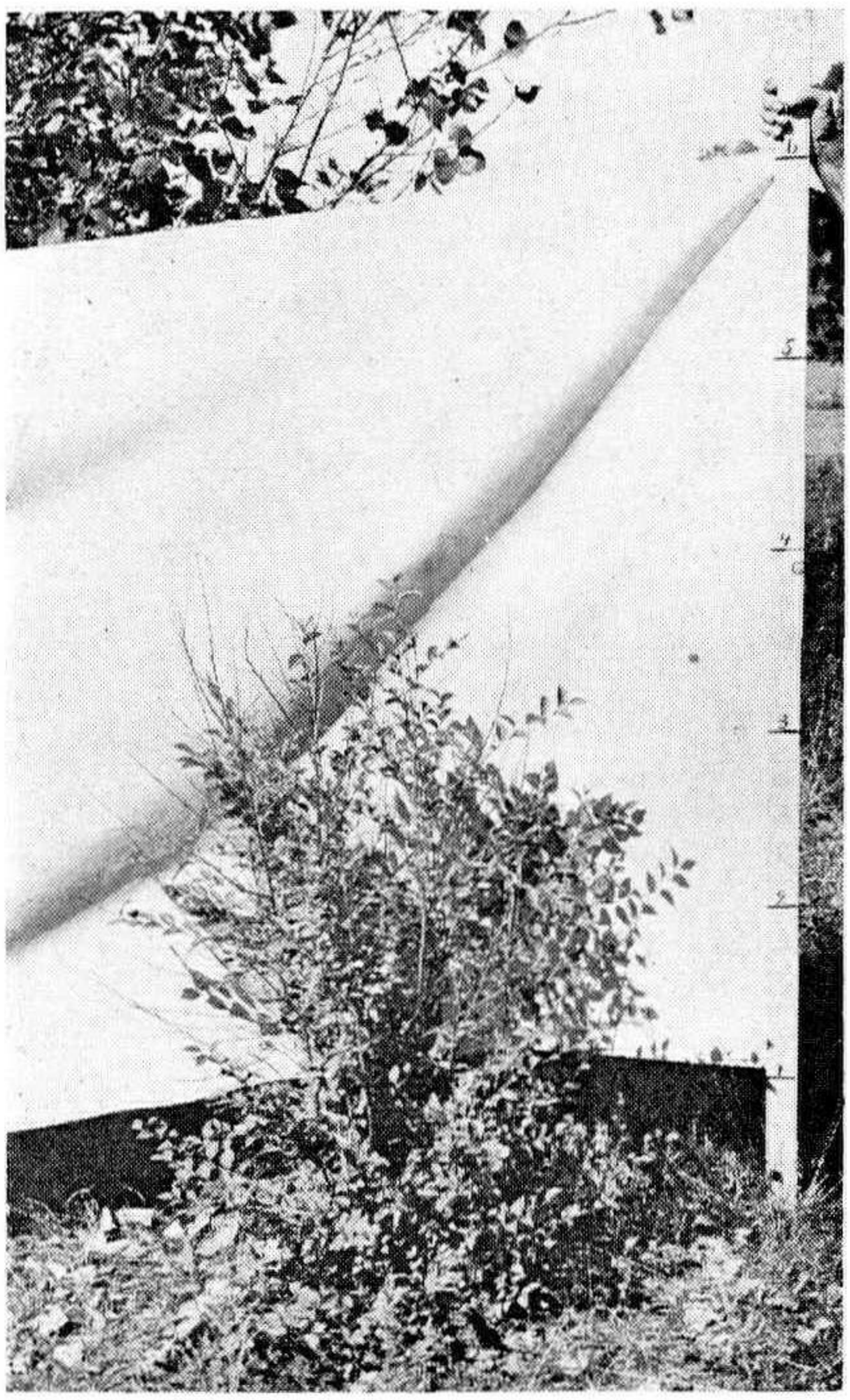

Fig. 7. One of two *Styrax japonica* seedlings showing poor stature and extensive dead tissue associated with tenderness. University of Nebraska, Dept. of Horticulture, photo.

Fig. 8. Hardy *Styrax japonica* seedling with good stature, little or no injury. Univ. of Nebraska, Dept. of Horticulture, photo.

medium-large shrub has horticultural merit and superior regional trial performance which recommend it to the propagator for increased ornamental use throughout the region.

The Lemoine deutzia trial plantings apparently were adversely affected by several site factors, such as drought, heat, various dormant season conditions, and chlorosis associated with alkali accumulations in certain soils. The resulting size of plants at various trial sites are presented in Table 5 for comparison. The locations of these plantings are grouped as adapted and unadapted.

Table 5. Average five-year height-spread measurements (feet) of Lemoine deutzia in adapted and unadapted trial locations.

Location	Size (feet)
Adapted	
Columbia, Missouri	4 x 5
Madison, Wisconsin	3 x 3.5
Brookings, South Dakota	3.5 x 3
Twin Cities, Minnesota	3 x 3
Lincoln, Nebraska	3.5 x 4
Ames, Iowa	3.6 x 3
Manhattan, Kansas	4.2 x 3
Unadapted	
Hays, Kansas	4 x 3
Mitchell, Nebraska	2 x 2
North Platte, Nebraska	3 x 3
Crookston, Minnesota	2 x 2
Grand Rapids. Minnesota	4.1 x 3.6
Duluth, Minnesota	1.75 x 1

Trial plant size information on the Japanese snowbell is limited. Only two hardy plants were measured. These plants averaged 5.5 feet in height and 4.5 feet in spread after five years on the trial site.

Suggested Northern and Western Limits of Planting

By taking into account the survival reports, the fifth-year reports on shoot growth, the condition of the plant on each site, and the plant development after five years, it is possible to estimate where the plant might be successfully used in the region. Such estimates are indicative, but of necessity, tentative. A longer period will be required for an adequate trial of most species, particularly trees, to determine accurately the limits for successful use. The five-year regional trial data suggest that the Colorado redosier dogwood (Fig. 9) may be used to illustrate a species which apparently can be planted with success throughout the region. Other species with good five-year adaptation reports include *Lonicera* x *bella 'Albida'* Zabel (Fig. 10) and *Ribes diacanthum* Pall. Plantings of these species could be expected to show good survival and virtually no winter damage. Their growth

would be moderate to good on most sites with little drought injury or damage from moderate alkali soils.

The majority of the species in the successful survival group were found to perform satisfactorily over less of the region than the three shrubs just noted. Certain rosaceous plants, such as the two shrub roses tested, the Boulder raspberry (Fig. 11) and the Hedge cotoneaster (*Cotoneaster lucida* Schlecht) were noticeably affected by alkali soil areas and by the conditions in the southwestern part of the region. Another trial plant, Nannyberry (*Viburnum lentago* L.), also reacted unfavorably to alkali and drought. (See Fig. 12.) Still others, the budded thornless honeylocusts for instance, are more tolerant to alkali soils, but may be more subject to winter injury (Fig. 13.) Thus within the successful survival group considerable differences were noted among species in the suggested limits of recommended planting.

The Lemoine deutzia trial reports indicate a lack of hardiness to drought and winter conditions. Furthermore, this species was observed to be subject to chlorosis due to the presence of alkali soils on certain trial sites. The detrimental factors indicated will apparently limit the use of this floriferous shrub in the region (Figure 14).

Other trial accessions in this intermediate-survival group might be expected to be used with varying success, depending on the inherent ability of the species to react to local environmental factors.

Plants which appear in the unsuccessful survival group may be expected to perform satisfactorily over a relatively small part of the region. Plants of this group are of particular interest to the ornamental specialist. New introductions of a species under trial are a potential source of hardiness. Needed hardiness may also be found in exceptional individuals of a seedling population. In either case, the actual worth of any new material can only be properly assessed through propagation and inclusion in a regional trial planting program similar to that underway in the North Central Region.

SUMMARY

1. In 1954, state experiment station ornamental horticulturists of the North Central Region organized a tree and shrub trial planting program in cooperation with the North Central Regional Plant Introduction Station and the New Crops Research Branch, Agricultural Research Service, U.S. Department of Agriculture.

2. Since 1959, five-year reports on each succeeding year's regional trial planting have been prepared. More than five years will be needed to evaluate completely trials of most trees and shrubs.

3. Forty tree and shrub accessions, for which five-year reports had been prepared, were grouped according to survival as successful, intermediate, and unsuccessful. The average number of trial plantings with 100-percent survival was used as a basis for this grouping.

4. Performances of several regional trial items with respect to survival, plant losses, shoot growth, height and spread, and suggested

limits of successful planting in the region are presented.

5. Two introductions of the common privet, P.I. 26767 and P.I. 107630, were noted to differ with respect to survival and first-season losses. The trial response of the commercial 'Amur River North' privet was compared with the two common privet introductions.

6. The Japanese snowbell seedling trial reports revealed a general failure to survive. The trial planting at Lincoln, Nebraska contained one hardy plant and two tender plants. The hardy shrub is being propagated for further regional trial planting.

7. Regional trial planting of new ornamental and shelter plants is a practical approach to the age-old problem of adaptation evaluation. This technique is one step in an orderly sequence of processes through which the performance of each accession is observed and documented.

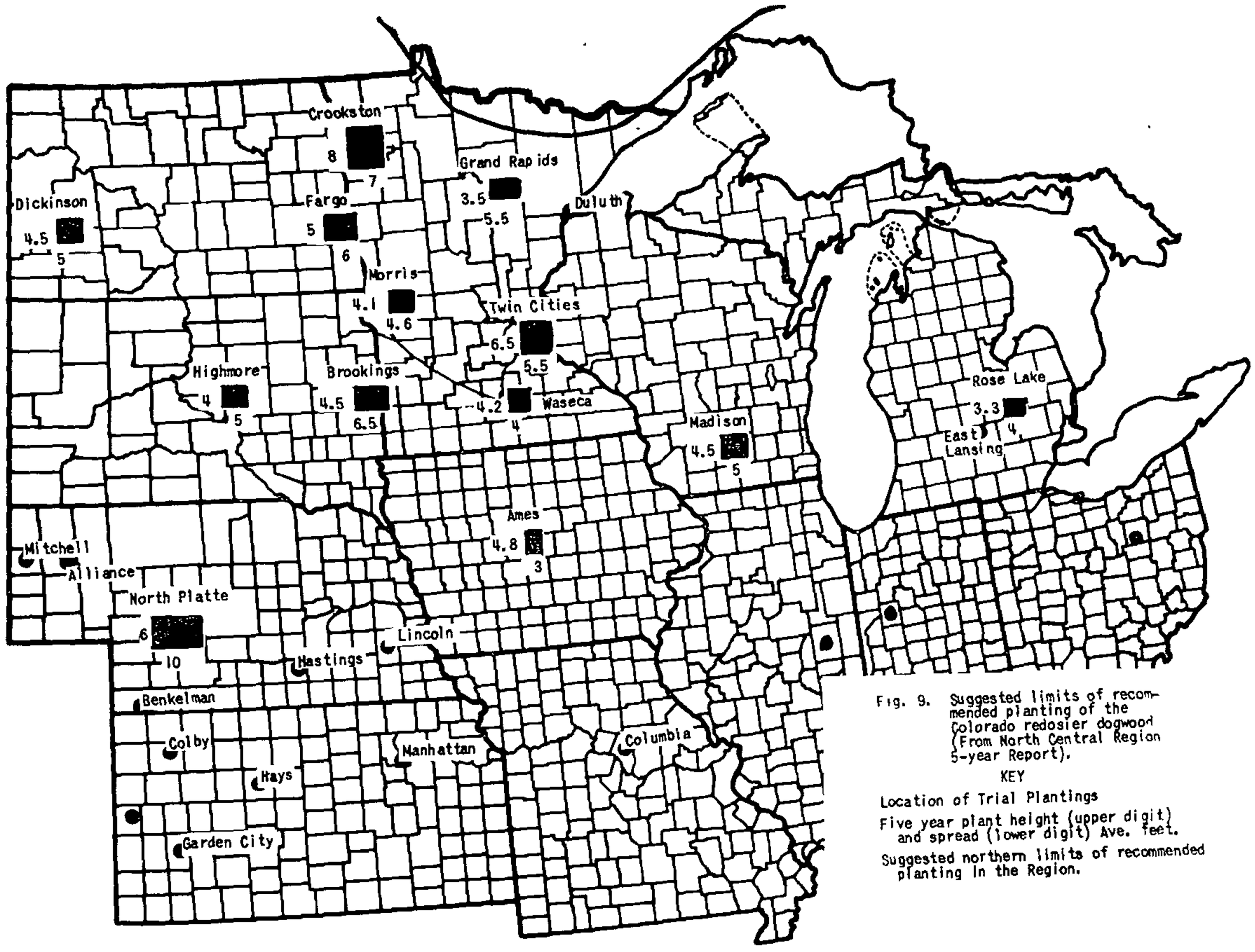

Fig. 9. Suggested limits of recommended planting of the Colorado redosier dogwood (From North Central Region 5-year Report).

KEY

Location of Trial Plantings

Five year plant height (upper digit) and spread (lower digit) Ave. feet.

Suggested northern limits of recommended planting in the Region.

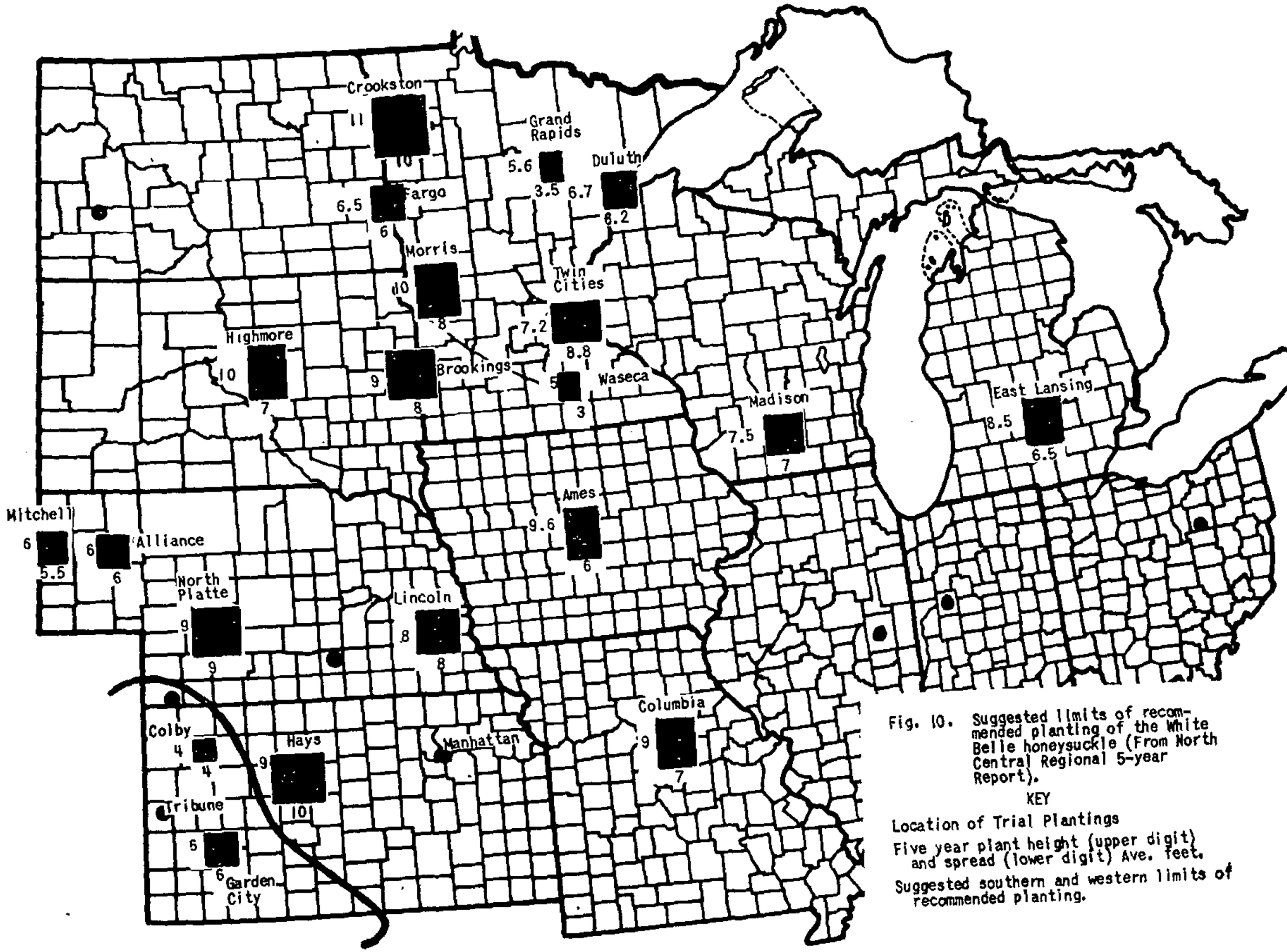

Fig. 10. Suggested limits of recommended planting of the White Belle honeysuckle (From North Central Regional 5-year Report).

KEY

Location of Trial Plantings

Five year plant height (upper digit) and spread (lower digit) Ave. feet.

Suggested southern and western limits of recommended planting.

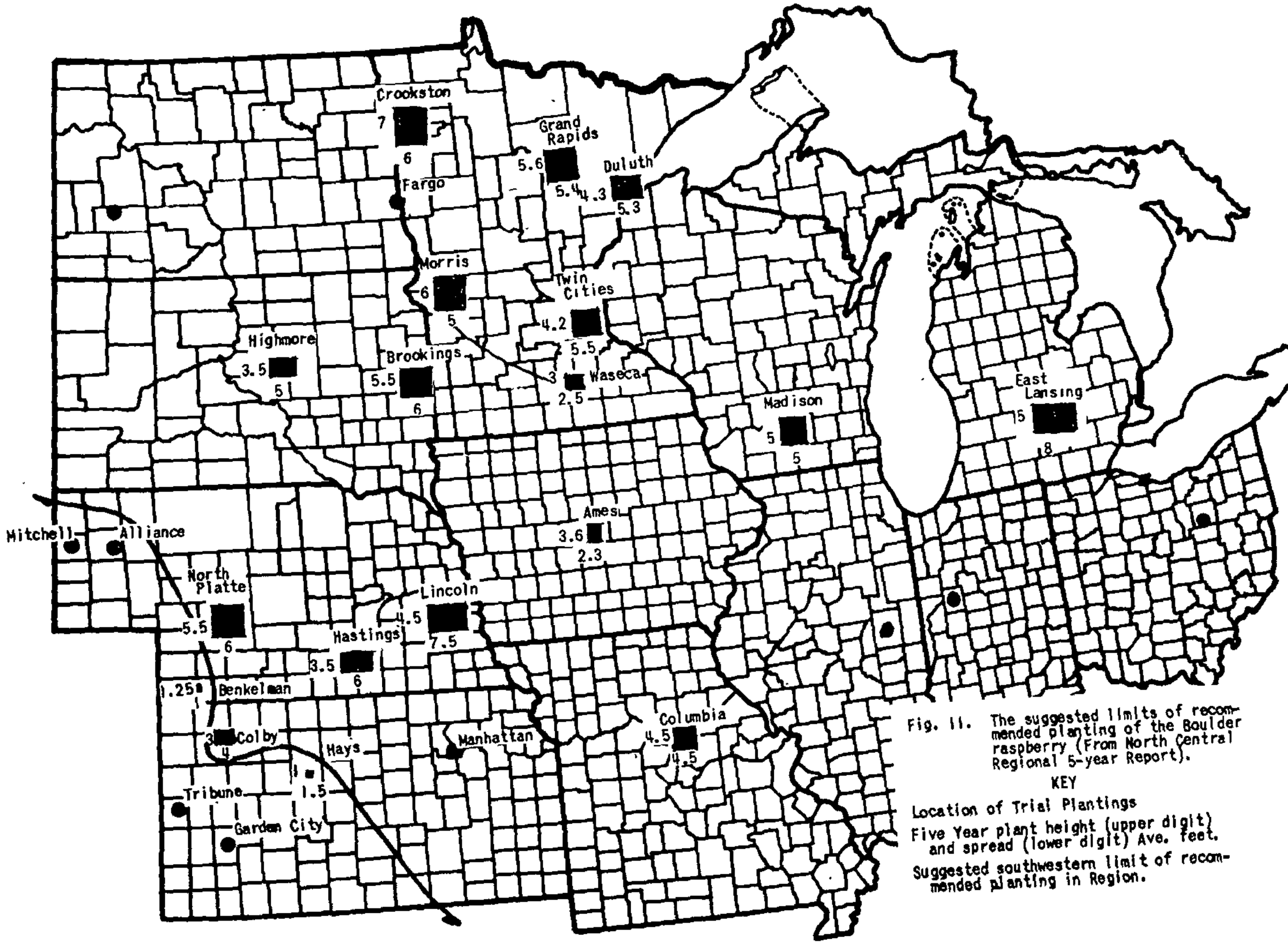

Fig. 11. The suggested limits of recommended planting of the Boulder raspberry (From North Central Regional 5-year Report).

KEY

Location of Trial Plantings

Five Year plant height (upper digit) and spread (lower digit) Ave. feet.

Suggested southwestern limit of recommended planting in Region.

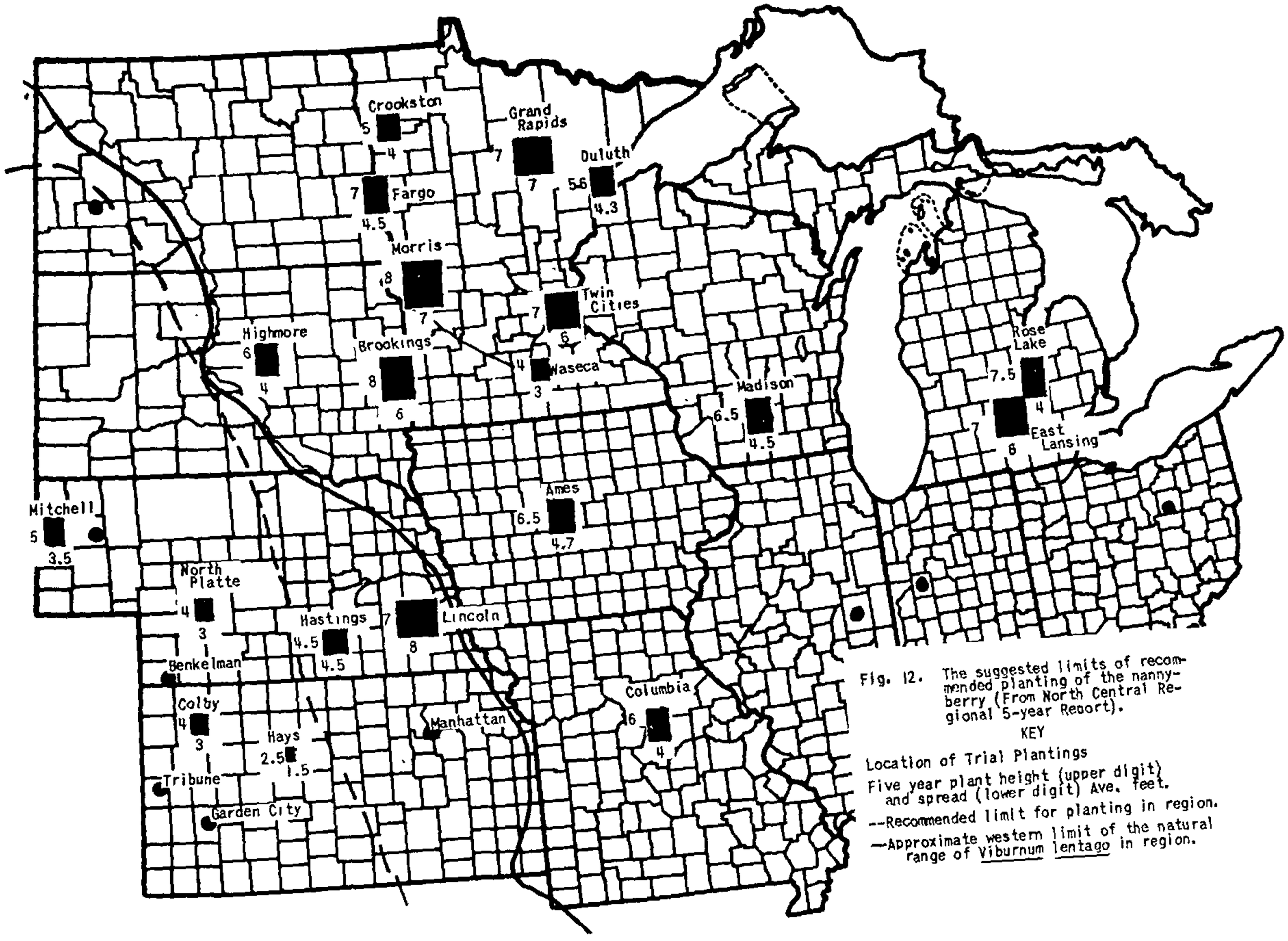

Fig. 12. The suggested limits of recommended planting of the nannyberry (From North Central Regional 5-year Report).

KEY

Location of Trial Plantings

Five year plant height (upper digit) and spread (lower digit) Ave. feet.

--Recommended limit for planting in region.

—Approximate western limit of the natural range of Viburnum lentago in region.

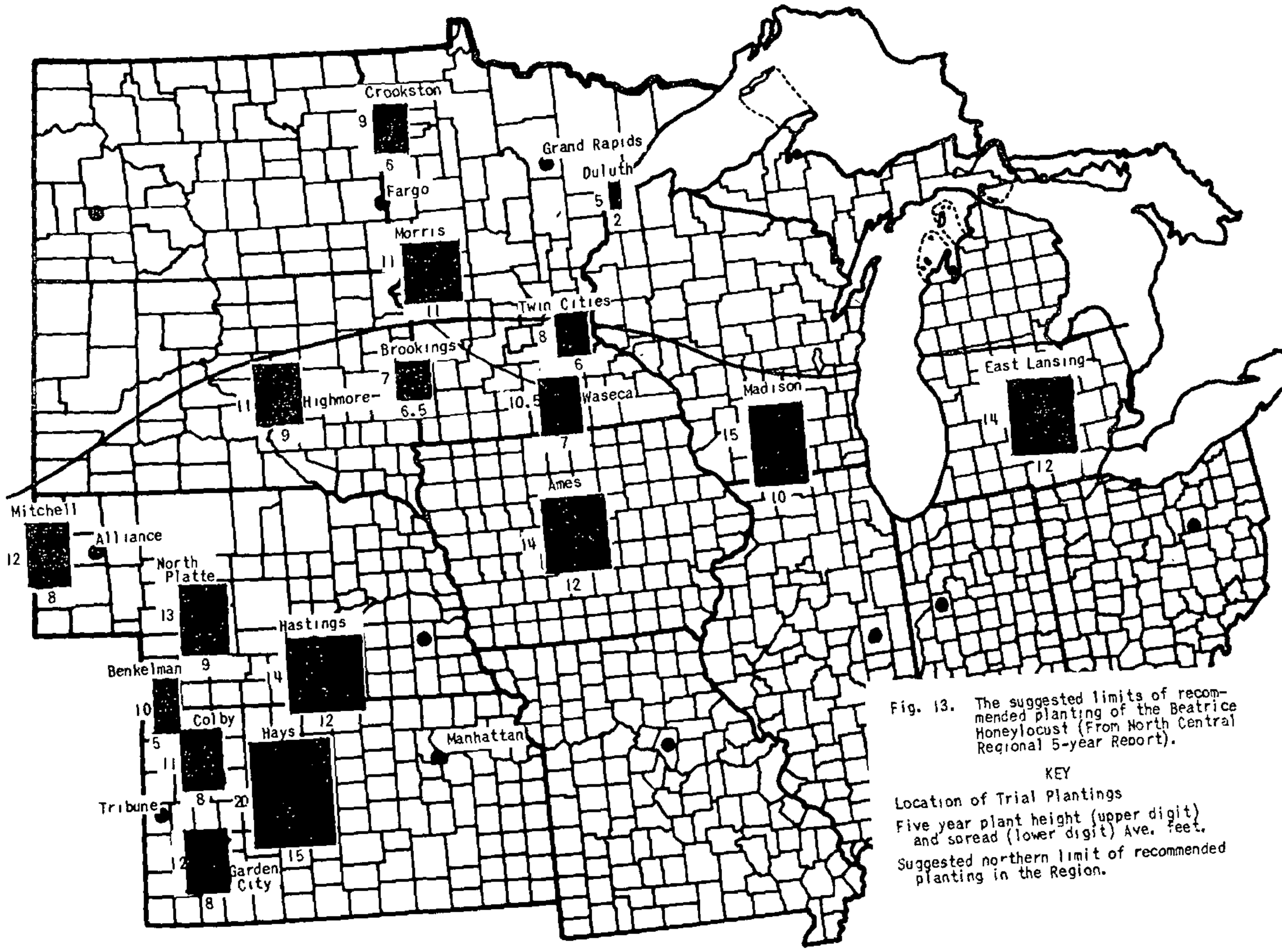

Fig. 13. The suggested limits of recommended planting of the Beatrice Honeylocust (From North Central Regional 5-year Report).

KEY

Location of Trial Plantings

Five year plant height (upper digit) and spread (lower digit) Ave. feet.

Suggested northern limit of recommended planting in the Region.

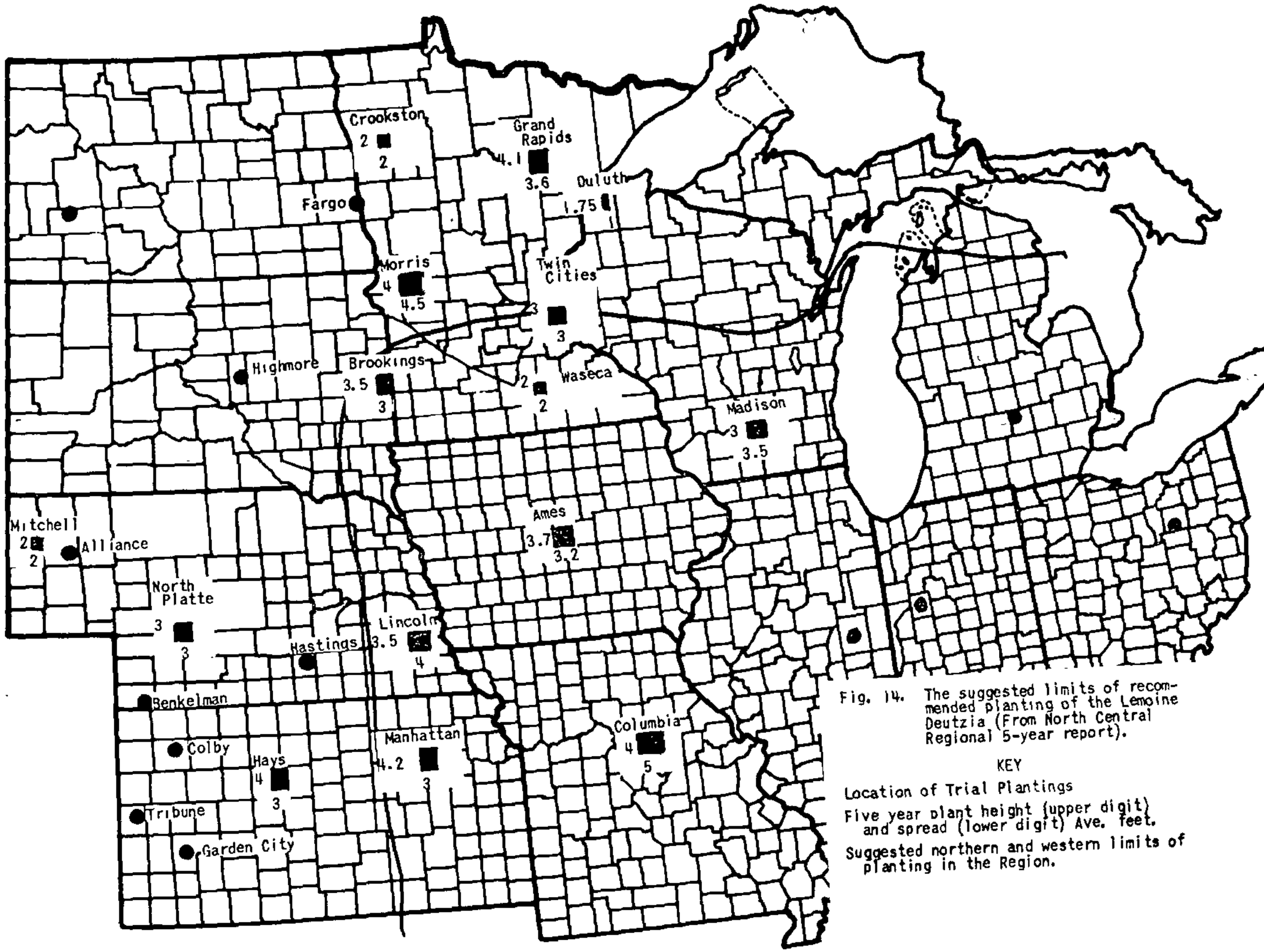

Fig. 14. The suggested limits of recommended planting of the Lemoine Deutzia (From North Central Regional 5-year report).

KEY

Location of Trial Plantings

Five year plant height (upper digit) and spread (lower digit) Ave. feet.

Suggested northern and western limits of planting in the Region.

MODERATOR ROLLER: Thank you, Mr. Dodge, for an informative and interesting presentation.

Now we have come to the end of our time and this concludes the technique sessions of the program. I would like to thank the gentlemen on this afternoon program for the kind cooperation and very worthy efforts.

Meeting adjourned for business session.

SATURDAY EVENING SESSION

Twelfth Annual Banquet. Mr. Carl E. Kern, Wyoming Nursery, Cincinnati 15, Ohio was presented the Plant Propagators Award. The evening was concluded with an excellent speech by Mr. Fred Smith, Management Consultant, Cincinnati, Ohio. His topic was "The Best Is Yet To Be."