

# URBAN TREE CULTIVAR EXCHANGE PROGRAM OF THE NETHERLANDS AND THE UNITED STATES<sup>1</sup>

by Henry D. Gerhold, David F. Karnosky, and Hans M. Heybroek<sup>2</sup>

**Abstract.** A program has been developed for exchanging urban tree cultivars and related technical information between The Netherlands and the United States. We discussed with Dutch experts the need for a program, and possible activities in selection of trees, breeding, propagation, performance testing, and evaluation. We also examined experimental plantations, young trees in commercial nurseries, and mature trees in cities.

An initial list contains more than 40 cultivars that may be considered for importation into the U.S. The list should be expanded in the future through a more extensive search, and by periodic additions of new cultivars when these are developed through selection and breeding. Decisions to import and test trees should be made only after careful review by scientific and commercial experts. Because valuable information on urban trees is available in both countries, a systematic exchange of information should be organized using simple, inexpensive procedures.

The process for selecting cultivars to import, propagate, test, evaluate, and distribute to commercial nurseries needs to be developed further in each country. In The Netherlands the design of procedures is well advanced. Potential cooperators in the U.S. need to agree upon responsibilities and activities promptly if the exchange program is to succeed.

Several important tree species planted in cities have foreign origins, e.g., London plane tree, little-leaf linden, and Norway maple in the United States, and flowering crabapples and black locust in The Netherlands. To be successful, introductions must survive climatic extremes and adverse urban environments, be suited for nursery production, and prove useful for man's purposes.

Past introductions have been largely opportunistic and disorganized, without thorough selection among or within species. Trees with special appeal were imported by enterprising nurserymen and others interested in plants, sometimes with great perception, but often without success. An

exploration trip in 1959 by Frederick G. Meyer (1963), sponsored by the U.S.D.A. Agricultural Research Service, brought over 1,200 horticultural cultivars or species to the U.S., including many trees from The Netherlands, Belgium, and Germany. Most of these were more suited for parks and home gardens, rather than for street trees.

A formal exchange program in urban forestry between The Netherlands and the United States was initiated in 1981 by the U.S.D.A. Forest Service with support from the U.S.D.A. Office of International Cooperation and Development. It is part of the cooperation in agricultural science and technology between the U.S. Department of Agriculture and the Dutch Ministry of Agriculture.

In 1982 two of us (Gerhold and Karnosky) were asked by the U.S. Forest Service to consult with Dutch experts (coordinated by Heybroek) in preparation for exchanging tree cultivars selected for city environments, performance testing and evaluation, and exchanging related information.

## Results of the 1982 Exchange Program

In June 1982 the authors held discussions with various Dutch Experts and examined many trees in nurseries, cities, arboreta, and experimental plantations. This report:

- 1) summarizes our discussions and observations in The Netherlands,
- 2) identifies desirable Dutch cultivars and types of information to be exchanged, and
- 3) recommends how U.S. cooperators can organize to select, import, propagate, test,

<sup>1</sup> Supported by U.S.D.A. Forest Service and Office of International Cooperation and Development. Pennsylvania Agricultural Experiment Station Journal Series No. 6588.

<sup>2</sup> Professor of Forest Genetics, School of Forest Resources, The Pennsylvania State University, University Park, PA 16802; Director, NYBG Institute of Urban Horticulture, Cary Arboretum, Millbrook, NY 12545; and Tree Breeder, 'Dorschkamp' Research Institute for Forestry and Landscape Planning, Wageningen, The Netherlands.

evaluate, and distribute cultivars to producers; and to exchange information about them.

**Organizations and Groups.** The five main organizations or groups involved in selecting and evaluating tree cultivars in The Netherlands are:

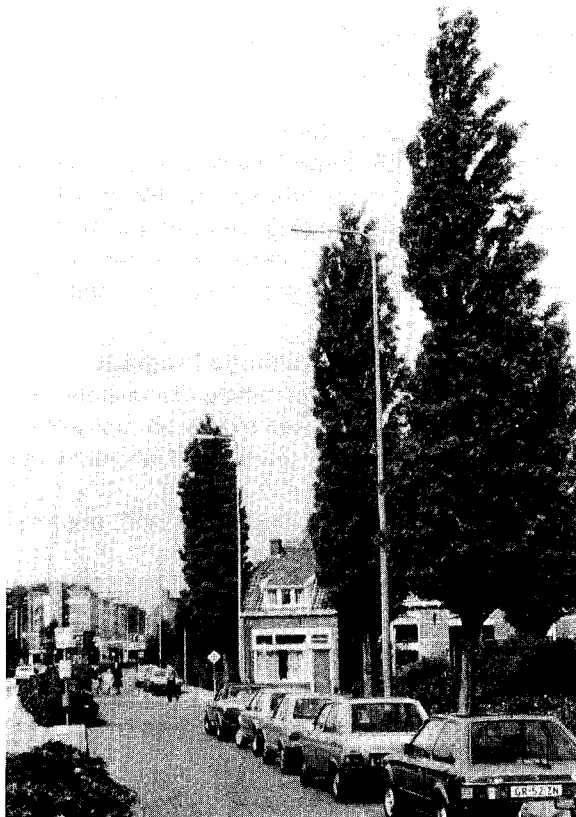
- 1) "De Dorschkamp" Research Institute for Forestry and Landscape Planning (De Dorschkamp)
- 2) Research Station for Arboriculture at Boskoop (Boskoop)
- 3) General Netherlands Inspection Service for Arboricultural Produce (NAKB)
- 4) commercial nurserymen
- 5) City tree managers

De Dorschkamp and Boskoop, under the Ministry of Agriculture, coordinate urban forestry research in The Netherlands. De Dorschkamp, which also conducts forestry research, studies trees both inside and outside the city limits, i.e., trees along

roadways and in recreation areas in rural landscapes, as well as the trees growing in city parks and along streets. Boskoop handles research and extension for the entire nursery trade in ornamental trees and shrubs, roadside trees, and forest trees. The research of De Dorschkamp is directed towards consumers, that of Boskoop towards producers of trees.

The Dorschkamp Research Institute for Forestry and Landscape Planning in Wageningen, directed by Mr. A.J. van der Poel, conducts research on silviculture, breeding, forest protection, economics, and landscape planning. Scientists there who select and test hardwood tree cultivars include H. M. Heybroek (elms), E.C. Jansen (several broadleaved species), and R. Koster (poplars and willows). J. Kopinga and J. van der Burg are studying the cultural methods of caring for amenity trees.

The Research Station for Arboriculture in



1. Many Dutch cultivars selected for city conditions could be used in appropriate climatic zones of the United States.



2. Several promising Dutch cultivars have been imported and are being tested at The Pennsylvania State University.

Boskoop, directed by Mr. W. J. Bosch, conducts research in arboriculture and nursery crop management. Founded by nurserymen, it later received partial support from the government. Research areas include propagation, cultivation, breeding, crop protection, soils, and economics. Mr. van Opstal is studying plant selection and cultural problems of urban trees, in what is termed "Urban Green." The Station also disseminates research results through extension work, especially to commercial growers.

The NAKB, directed by Mr. G. Elzenga at the Hague, is a semi-official service under the Ministry of Agriculture and financially supported by tree nurserymen. Its main goal is to promote the growing of true-to-type, healthy nursery stock of good quality and of selected origin. It establishes standards and requirements, produces virus-free propagating materials, and inspects and certifies plant materials in commercial nurseries. The NAKB has nurseries at several locations, including the broadleaved tree nursery at Flevopolder that propagates stock for distribution to nurserymen. All trees grown by nurserymen, in species listed for street planting and forestry, must be certified by NAKB. In addition, NAKB handles voluntary certification of many ornamental trees.

About 3,000 private nurseries in The Netherlands occupy 6,300 hectares (15,500 acres). One of the largest and best known growers of landscape and city trees is the Royal Nursery Van Der Bom in Oudembosch, where over 2,500 plant varieties are grown. The private nurserymen commonly select new plant material, as in the U.S. They support the NAKB by annual fees, purchase of propagating materials, and certification fees.

Dutch city foresters play an important role in evaluating the performance of trees in urban areas. Larger cities have city foresters with traditional roles as in the U.S., but also others who conduct research, e.g., Mr. Albert Hoekstra in Amsterdam.

Two other Dutch urban forestry organizations are OBIS (Research on Trees in the City Environment) and VHB (The Society of Directors of Municipal Plantation Services). OBIS is a small working group of researchers and municipal arborists that reports to VHB, which includes city

foresters from about 200 of the larger cities and towns.

**Sources and Exchange of Information.** Much of the practical knowledge about urban trees exists only in the minds of various experts in both countries. For example, H. A. J. van Haaren of De Dorschkamp, H. van der Laar in Boskoop, and A. Versprille of NAKB have accumulated a wealth of information about cultivar identification, propagation, and performance over a range of planting sites. Similarly, nurseryman Peter van der Bom can cite thousands of details from memory. In city parks departments, managers such as A. Hoekstra (Amsterdam) and F. J. Fontaine (Eindhoven) have evaluated most species and cultivars planted along streets and boulevards, in pavements, sidewalks, tree lawns, and parks. Some of this information has been shared with associates. But other knowledge has not been recorded, and their successors will be destined to rediscover it by trial and error.

Fortunately, some information gained from experience has been published. Taxonomy and descriptions of most native and exotic trees in The Netherlands, including cultivars, appear in "Nederlandse Dendrologie" (Boom 1975). More detailed descriptions and evaluations of cultivars in 29 broadleaved and 7 coniferous genera are in 18 issues of "Dendroflora" (Nederlandse Dendrologische Vereniging 1964-1981). Some nursery catalogs contain descriptions and lists of trees suitable for various planting situations; e.g., the elegant "Darthuiser Vademecum" (Ilsink *et al.* 1978), aimed at landscape architects. Peter van der Bom, in a paper for *Dendroflora*, describes about 80 tree cultivars imported from the U.S. and grown in The Netherlands. More specialized research is reported in scientific journals and annual reports of research institutes indexed in "Agricultural Science in the Netherlands" (International Agricultural Center 1982-1984).

It would be desirable to exchange information about urban tree cultivars more systematically, both that in print and that from performance tests. Printed information could be exchanged simply, if a key person in each country were designated to send accumulated literature references of abstracts periodically to his counterpart, who

would distribute them to a national mailing list. Possibly the *Journal of Arboriculture* and *Dendroflora* could be involved in this function. The information system required for performance testing is discussed later.

**Desirable Trees Available.** In searching for desirable urban cultivars, we examined trees in research nurseries, test plots, commercial nurseries, display gardens, and roadside plantings in and around cities, including Amsterdam, Bennekom, Ede, Eindhoven, Hilversum, Oudenbosch, and Wageningen. Table 1 lists popular tree cultivars that are propagated vegetatively in The Netherlands, and gives recent production figures. Table 2 lists some trees that do very well in Dutch urban areas and that have potential for use in the United States.

The Dutch nursery trade is highly advanced in methods for ensuring true-to-type trees for forestry and landscape use. Identities of commercially important cultivars are continually checked, and distribution of high quality propagating materials is carefully controlled by NAKB.

While some European selections probably will grow well in the U.S., *all imported trees should be thoroughly tested in their intended environments* before being recommended. No one can predict just how a selection will perform in a new country. For example, 'Chanticleer' callery pear, 'Scanlon' red maple, and pin oak seedlings from the U.S. have grown very well in The Netherlands, but not

some other red maples, sweetgum, and sugar maple.

**Introduction of Cultivars.** As new trees enter commercial production, whether from importation, selection, or breeding programs, wise decisions should be made about their production in nurseries and deployment in cities. Large investments over many years are required to mass-produce and market new varieties, before they become profitable. Tree planting in cities also represents a long-term investment, and benefits will depend on wise choices, based on reliable information about eventual size, appearance, health, and longevity.

Introduction of a new cultivar into the planting practices of a country usually requires the following steps:

**Selection.** In selecting the most promising candidates for introduction, several kinds of information are required:

- cultivars available in the donor-country, and their characteristics,
- kinds of trees that are most needed in the recipient country,
- theoretical principles of plant introduction, and practical results of previous attempts.

Theoretical selections based on matching of climates sometimes have been unsatisfactory, while some introductions even from areas with non-matching climates have been successful. A team of experienced specialists probably can



3. Improved urban tree cultivars are being developed in The Netherlands through selection, breeding, propagation, and testing.



4. New clones that are successful in nursery trials are tested in Dutch cities for tolerance of urban stresses, and to define their proper niche.

make the best possible judgments. They need broad experience and knowledge about genetic variation of trees, nursery production, and urban tree care practices.

*Importation and initial propagation.* This step may seem technically simple, but is not. Anyone who has tried, knows that many things can go wrong during collection of plant materials, packing, storage, certification, shipping, fumigation, quarantine, rootstock choice, propagation, and maintaining correct identities. Repeated importations and years of propagation may be needed. For some genera, propagation by specialized nurserymen under contract may be required.

*Early testing.* A brief test may eliminate many unsuitable cultivars early and concentrate the costly long-term testing on the best cultivars. Large differences in health, growth, and shape of trees may be found by planting in one or a few near-optimum environments. The Dorschkamp has devised a short-range test for newly selected cultivars. Well-grown trees planted at 2 X 2 m, 2 replicates of 3 trees per clone, under optimum soil conditions and cultural conditions are repeatedly evaluated by a committee of experienced plantmen, nurserymen, and city foresters. After four to six years, the test is concluded.

*Defining the niche and performance testing.* This phase, equivalent to the Dutch "gebruiks-waardeonderzoek," defines geographic limits and suitable local site conditions under which a cultivar can grow satisfactorily. Trees must be tested under stresses common to cities, which requires cooperation by tree managers in cities throughout the region(s) proposed for new cultivars.

The commercial niche also needs to be defined. A new cultivar must fit into the production and marketing practices of nurseries. New cultivars compete with others already in the trade. To succeed, the new cultivar must be adapted commercially as well as biologically, with a clear advantage over earlier cultivars for *some* purpose or on *some* sites.

Accurate information about tree performance in cities can be obtained from cooperative performance tests and evaluations (Gerhold and Sacksteder 1982). The Dutch plan to use STRETEST, a cooperative performance testing system developed for street trees in the U.S.

(Sacksteder and Gerhold 1979), modified for local conditions by OBIS. The Arboricultural Research Institute, the Forestry Research Institute, and several city parks departments have already committed personnel and funds to begin performance testing. Mssrs. Hoekstra, Kopinga, and van Opstal are the leaders. In the U.S. METRIA, The Metropolitan Tree Improvement Alliance, has made plans for a Cultivar Testing Project using STRETEST (Karnosky *et al.* 1982). Many city arborists and researchers are ready to cooperate, but there is no financial support yet.

Performance tests will be most useful in each city involved. Results can also apply to nearby cities, and perhaps to a lesser extent to other countries. As knowledge accumulates annually, reliability of predicted performance will improve, thus reducing risks to nurserymen and city arborists. Testing of imported cultivars should include tests in arboreta, nurseries, and cities. In arboreta, trees can be screened for appearance traits, climatic adaptation, and susceptibility to diseases and insects. In nurseries propagation and production characteristics are checked, and enough trees produced for city tests. In cities, they are compared with competing cultivars already in use, using STRETEST. Testing in arboreta and nurseries should begin at the same time, to obtain results as early as possible.

As testing and evaluation get underway, close coordination of Dutch and U.S. programs will be desirable. Test designs, measurement procedures, data formats, analytical methods, and evaluation criteria should be standardized to the extent that is practical. Correspondence and meetings between OBIS and METRIA can provide this.

*Practical utilization.* When test results show a cultivar has sufficient promise, it should be made available for mass production. Any proprietary rights of the owners of cultivars must be considered, along with responsibilities of the organizations that import and test them, and interests of the producers. Proprietary rights have been acquired on only a few of the clones in Table 2. The importing agency, not being the owner of the material, in most cases cannot legally withhold release of any cultivar. Despite any legal and ethical problems, these parties do have common

**Table 1. Tree cultivars propagated vegetatively in the Netherlands; number of trees certified by NAKB in winter 80-81 for sale in the Netherlands or for export.**

Obligatory inspection, poplars and others	Number of trees **
<i>Populus alba</i> 'Raket'	5,453
<i>P. balsam</i> —hybrids 'Androscoggin,' 'Oxford,' 'Rochester,' 'Geneva'	26,614
<i>P. canescens</i> 'De Moffart,' 'Limbricht,' 'Witte van Haamstede,' 'Bunderbos,' 'Tatenberg,' 'Enninger,' 'Haaren,' 'Schijndel'	88,568
<i>P. X euramericana</i> 'Zeelands,' 'Robusta,' 'Flevo,' 'Dors- kamp,' 'Spijk,' 'Florence Biondi,' 'Agathe F,' 'Heidemij,' 'Marilandica,' 'Berolinesis,' 'Gelrica,' 'Harff,' 'Serotina'	162,715
<i>P. deltoides</i> X <i>trichocarpa</i> 'Donk,' 'Barn'	10,702
<i>P. nigra</i> 'Woltersen,' 'Vereecken,' 'Brandaris,' 'Schoorldam,' 'Terwolde,' 'Loenen'	41,255
<i>P. trichocarpa</i> 'Blom,' 'Heimburger,' 'Fritzi Pauley'	9,065
Poplars, total	344,372
<i>Acer pseudoplatanus</i> 'Negenia,' 'Rotterdam,' 'Erectum'	38,763
<i>Fraxinus excelsior</i> 'Westhof's Glorie,' 'Eureka,' 'Altena,' 'Atlas,' 'Geesink'	108,092
<i>Salix alba</i> 'Belders,' 'Liempde,' 'Drakenburg,' 'Het Goor,' 'Barlo,' 'Lichtenvoorde,' 'Tinaarlo,' 'Lieveelde,' 'Rockanje,' 'Calva'	89,620
mixed clones for forestry purposes	37,562
<i>Tilia</i> 'Koningslinde,' 'Zwarte linde'	11,144
<i>Ulmus</i> 'Lobel,' 'Plantyn,' 'Groeneveld,' 'Commelin,' 'Dodoens,' 'Vegeta,' others	32,827
Others, total	320,008

*Voluntary inspection*

<i>Acer platanoides</i> 'Royal Red,' 'Emerald Queen,' 'Crimson King,' 'Elsrijk,' 'Drummondii,' 'Globosum,' 'Schwedleri'	13,313
<i>Aesculus</i> 'Baumanni,' 'Briotii,' <i>carnea</i> , 'Pyramidalis,' 'Astrosanguinea,' others	1,529
<i>Betula</i> <i>jacquemontii</i> , <i>nigra</i> , <i>ermanii</i> , <i>pendula</i> 'Tristis,' <i>pendula</i> 'Youngii,' others	1,561
<i>Fraxinus</i> 'Raywood,' 'Diversifolia,' 'Jaspidea,' 'Zundert,' others	6,255
<i>Malus</i> 'Royalty,' 'Profusion,' 'John Downie,' 'Hopa,' 'Almey,' 'Linset,' 'Makamik,' 'Golden Hornet,' 'Wintergold,' 'Eleyi,' floribunda, 'Hillieri,' 'Van Eseltine,' <i>sieboldii</i> , 'Prof. Sprenger,' 'Cheal's Weeping,' 'Aldenhamensis,' others	56,838
<i>Prunus</i> <i>virginiana</i> 'Shubert,' <i>serrulata</i> 'Kwanzan,' <i>padus</i> 'Colorata,' <i>padus</i> , <i>serrulata</i> 'Amanogawa,' <i>serrulata</i> 'Kiku-Shidare-sakura,' 'Pink Perfec- tion,' <i>padus</i> 'Commutata,' 'Watereri,' <i>avium</i> 'Plena,' others	30,032
<i>Robinia</i> <i>pseudoacacia</i> 'Appalachia,' 'Bessoniana,' 'Sandraudiga,' 'Semperflorens,' 'Pyramidalis,' <i>ambigua</i> 'Decaisneana,' others	2,597
<i>Sorbus</i> <i>aria</i> 'Magnifica,' <i>arnoldiana</i> 'Schouten,' 'Joseph Rock,' <i>thur-</i> <i>ingiaca</i> 'Fastigiata,' <i>hybrida</i> 'Gibbsii,' <i>vilmorinii</i> , <i>intermedia</i> 'Brouwers'	2,240
<i>Tilia</i> <i>cordata</i> 'Erecta,' 'Greenspire,' <i>euchlora</i> , <i>platyphyllos</i> , <i>tomentosa</i> 'Brabant,' others	5,986
<i>Ulmus</i> <i>glabra</i> 'Exoniensis,' <i>carpinifolia</i> 'Dampieri,' 'Sarniensis,' 'Hoershol- miensis,' others	3,560
Voluntary inspection, total	123,911
Grand Total	788,291

\* Source: NAKB 1981. Statistiek veldkeuring en waarmarking seizoen 1980-1981. The Hague, 17 pages.

\*\* Cultivars within a group listed by decreasing numbers.

**Table 2. Trees of potential utility in the United States that were checked during the 1982 exchange program visit.**

<i>Genus — Species — Cultivar</i>	<i>Location</i>	<i>Comments</i>
<i>Acer lobelii</i> (seedling)	Belmonte Arboretum	Upright branching
<i>Acer pseudoplatanus</i> 'Corstorphinens'	NAKB	— —
" " 'Erectum'	Eindhoven	Upright branching
* " " 'Erythrocarpum'	NAKB	Large red seeds
" " assorted clones	De Dorschkamp	Jansen's selections
<i>Acer saccharinum</i> 'Elegant'	Oudenbosch	Broadly upright, fall color
" " assorted clones	De Dorschkamp	Jansen's selection
* <i>Ainus glutinosa</i> 'Laciniata'	**	Good tree for wet soils and in pavements
<i>Betula jacquemonti</i> (seedlings)	Ede	White bark, growing well in open pavement
* <i>Carpinus betulus</i> 'Columnaris'	Hilversum	More columnar than 'Fastigiata'
<i>Carpinus japonica</i> 'Select'	Royal van der Bom Nursery	— —
<i>Cercidiphyllum japonicum</i> 'Select'	Royal van der Bom Nursery	— —
<i>Cornus controversa</i> (seedling)	Driebergen	Large tree
<i>Fagus sylvatica</i> assorted clones	De Dorschkamp	Jansen's selections
<i>Fraxinus excelsior</i> 'Eureka'	Eindhoven	Rapid growth
<i>Fraxinus excelsior</i> 'Jaspidea'	**	Pyramidal crown
<i>Fraxinus excelsior</i> assorted clones	De Dorschkamp	Jansen's selections
<i>Fraxinus oxycarpa</i> 'Flame'	Wageningen	— —
" " 'Wallstonii'	Eindhoven	Foliage clustered
<i>Fraxinus pennsylvanica</i> 'Velutina'	Royal van der Bom Nursery	Two clones may be included
" " 'Zundert'	Eindhoven	Good crown form
" " assorted clones	De Dorschkamp	Jansen's Selections
<i>Liquidambar styraciflua</i> 'Aurora'	Royal van der Bom Nursery	Leaves turn yellow during summer
<i>Phellodendron amurense</i> ½ sib seedlings	Royal van der Bom Nursery	Good form
<i>Platanus acerifolia</i> 'Tremonia'	IlSink Nursery	Upright shape
" " assorted clones	De Dorschkamp	Jansen's selections
<i>Prunus avium</i> assorted clones	De Dorschkamp	Jansen's selections
<i>Prunus nigra</i> 'Mahogany Lustre'	Belmonte Arboretum	Beautiful red bark
<i>Prunus virginiana</i> 'Shubert'	Boskoop	Interesting leaf color
<i>Pterocarya fraxinifolia</i> (seedlings)	Hilversum	Wide spreading, pest free
" " 'Dumosa'	Eindhoven	Good small tree
<i>Quercus palustris</i> × <i>Q. phellos</i> (seedling)	Hilversum	Large tree
<i>Quercus robur</i> 'Alpha'	NAKB	Mildew resistant, upright habit
" " 'Beta'	NAKB	Mildew resistant, upright habit
" " 'Cupressoides'	Ede	Remains narrow, upright habit
" " 'Gamma'	NAKB	Mildew resistant, upright habit
* <i>Robinia pseudoacacia</i> 'Bessoniana'	Eindhoven	Compact, round headed
" " 'Frisia'	Belmonte Arboretum	Yellow foliage
" " 'Pyramidalis'	Wageningen	Columnar, spineless
" " 'Sandraudiga'	Royal van der Bom Nursery	Large, well-shaped tree; pink blossoms
" " 'Tortuosa'	Belmonte Arboretum	Contorted branches, clustered foliage
" " 'Unifolia'	Hilversum	Single leaf form
<i>Sorbus aria</i> 'Magnifica'	Bennekom, Eindhoven	Leaves dark above, white underside
<i>Sorbus</i> × <i>arnoldiana</i> 'Schouten'	Bennekom, Eindhoven	Small, upright, not good in pavement
<i>Sorbus intermedia</i> 'Brouwers'	Belmonte Arboretum	Pyramidal, good in pavement, resistant to fire-blight
<i>Sorbus</i> × <i>thuringiaca</i> 'Fastigiata'	Bennekom	Dense crown, resistant to fire-blight and canker
<i>Tilia cordata</i> 'Erecta'	Eindhoven	— —
* <i>Tilia europaea</i> 'Pallida'	Eindhoven	Reddish twigs, good branching
<i>Tilia platyphyllos</i> 'Delft'	Royal van der Bom Nursery	Insect free, columnar habit
<i>Ulmus hybrid</i> 'Clusius'	NAKB	Foliage lighter color than sister clone 'Lobel'

\* Already in United States, but not well known.

\*\* Described to the authors but not actually seen.

interests in prompt and wise use of improved cultivars.

Early commercial production should be balanced against the risk of serious mistakes. Both trial plantings and more formal testing have their roles. A nurseryman who propagates and sells a cultivar prematurely incurs some risk to self and customers, but their experiences may amplify the testing program.

Reliable information should be sent out at appropriate times through extension services and other channels. Releases should be timed with the nursery production and marketing timetables, so that demand for a cultivar is not excessively stimulated before it becomes available. Trial plantings can be used as part of the extension effort, for results are most convincing when seen directly.

### Conclusions and Recommendations

The authors have observed many Dutch selections of trees that may be desirable for urban plantings in the United States. Furthermore, potential cooperators who are interested in exchanging and testing plant materials have been identified. The next logical steps in the exchange program are to import selected trees from The Netherlands for propagation, distribution, and testing in the U.S., and to respond to reciprocal Dutch requests. Thus, we recommend:

1. Representatives of the U.S. Forest Service, American Association of Nurserymen, Agricultural Research Service, the USDA Plant Quarantine Office, and the Metropolitan Tree Improvement Alliance should discuss the future of the exchange program, the introduction of European selections, quaran-

tine, propagation, distribution, and testing. Agreement should be reached on responsibilities of each participating agency or organization.

2. Coordinators of the plant exchange program should be appointed in both the United States and The Netherlands, their responsibilities defined, and budgets provided.
3. The plant list (Table 2) should be evaluated and revised by U.S. nurserymen.
4. Arrangements for exchanging information should be formalized.
5. The plans for continuing the urban tree cultivar exchange program should include provisions for assisting Dutch participants to study cultivars in the United States and to procure propagating materials.

### Literature Cited

1. Boom, B.K. 1975. Nederlandse dendrologie. H. Veenman & Zonen B.V. Wageningen, Netherlands.
2. Gerhold, H.D., C.J. Sacksteder. 1982. *Better ways of selecting trees for urban plantings*. J. Arboric. 8(6):145-153.
3. IJssink, L.K.J., G.P. IJssink, G.L. IJssink. 1978. Darthuizer vademecum. Darthuizer Boomkwekerijen en Zaadhandel B.V., Leersum, Holland. 352 pp.
4. International Agricultural Centre. 1982-1984. *Agricultural Science in The Netherlands*. Wageningen, Netherlands. 351 pp.
5. Karnosky, D.F., H.D. Gerhold, W.H. Collins. 1982. *METRIA projects on species trials and cultivar testing*. J. Arboric. 8(7): 178-181.
6. Mayer, F.G. 1963. Plant explorations: ornamentals in The Netherlands, West Germany, and Belgium. USDA Agricultural Res. Serv., ARS 34-32. 185 pp.
7. Nederlandse Dendrologische Vereniging. 1964-1981. *Dendroflora*, Nr. 1-18, Cumulative Index. Boskoop, Netherlands.
8. Sacksteder, C.J., H.D. Gerhold. 1979. *Street tree testing systems: manual for cooperators*. Sch. Forest Resources, Penna. State Univ., University Park, PA, Research Paper No. 45, 37 pp.