TRESYSTM: TREE RECORDS SYSTEM FOR MUNICIPALITIES

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Abstract. TRESYSTM is a computerized inventory and data processing service designed for the practical management of urban trees. A municipal arborist may modify its various features to adapt TRESYSTM to the particular needs of his own city or town. All inventory data is displayed in a directory to trees called Tree List. The variables are tabulated in a City Summary, which is used principally for planning, budgeting, and evaluating accomplishments. A Species Summary, which compares individual species or cultivars, is a useful guide for selecting trees to plant on different types of sites. Other optional products are available to improve efficiency of various operations. As work is performed, records are updated in Tree List, and new summaries may be obtained annually or at other intervals. A growing number of communities in several states has been using TRESYSTM since 1978, when it was first offered commercially. TRESYSTM also has been modified for managing trees on institutional properties such as university campuses, cemeteries, or industrial parks. Costs of installation and operation are modest, compared to the benefits and savings which can be realized.

Many progressive communities, wanting to develop better organized tree care programs, are realizing that some type of tree inventory and record keeping system is essential. Without an organized way of handling information on thousands of trees and planting sites, effective planning and management are impossible. Consequently, daily operations may be inefficient and over the years the tree program deteriorates, along with the trees.

Various methods have been developed for tree inventories, certain of which also incorporate procedures for storage and retrieval of records and data processing. Some methods are relatively simple and rapid, producing summaries of data which are useful for justifying tree programs and initial planning, but not in managing those already well established. At the other extreme are comprehensive management information systems, most of which employ large computers owned or leased by cities. These have extensive capabilities of producing all sorts of information needed in planning and management. However, they do require a large amount of the city arborist’s time for development and operation of the system. Many towns and cities do not have the necessary computers and operators; others which do have them may not be able to accommodate the needs of the tree department.

An innovative solution is available through TRESYSTM, a Tree Records System for Municipalities. Now cities can subscribe to a computerized data processing service specifically designed for urban tree management, without having to invest in computers or divert data processing personnel from their usual tasks. This approach is novel in arboriculture and urban forestry, but is not at all uncommon in other fields. Many executives in the business community and in city management have found data processing service companies to be advantageous in proving specialized expertise and services.

The concept of TRESYSTM and how it works are explained in this article. The principal idea is to centralize technological capabilities of electronic data processing and management information systems in a service company. It provides these services to city tree programs so they can gain the benefits without being unduly distracted from their primary responsibilities in tree care. Through this centralization the service company can keep up with technological improvements in the rapidly developing field of data processing and incorporate them into its services to clients.

TRESYSTM has been designed to be versatile, practical, and quickly installed. A municipal arborist can tailor TRESYSTM to his own particular needs, using his experience and creative abilities to assemble pre-tested features in the most suitable combination; or a standard version of TRESYSTM can be chosen. The arborist need not spend time in learning about a computer, nor in

operating one. TRESYSTM frees him to concen-
trate on important arboricultural decisions, and
supplies information needed to make decisions, to
issue work orders, and to keep records of ac-
complishments. It is a managerial tool which can
extend his capabilities and improve his rapport
with other city officials.

**Inventory**

Usually a city will require some assistance in
selecting a system, conducting an inventory, and
making full use of the results. Objectives should
be clearly defined; procedures should be speci-
fied so objectives will be met; personnel need
to be trained and supervised carefully so that data
will be accurate; and processed data should be
evaluated so that realistic recommendations can
be formulated. Technical assistance in any of
these matters is provided through the service
company, and affiliated local representatives.

Once objectives and scope of the initial
TRESYSTM inventory have been defined, plans
can be completed within a day or two. Survey per-
sonnel can be trained in one to three days if they
are able to identify the common tree species.
Regular city employees may conduct the inven-
tory, or special arrangements may be made for hir-
ing seasonal help. These tasks are expedited
because planning consists of choosing predesign-
ed options; and data forms and printed instruc-
tions have been prepared so they are adaptable to
local conditions.

Two versions of the TRESYSTM inventory are
available, the speed survey and the intensive in-
ventory. Either can be modified to fit particular
needs. The *speed survey*, which is relatively fast
and inexpensive, is appropriate when only city-
wide summaries are needed for initial planning
purposes; or when finances are insufficient for a
more thorough inventory. Only the most critical in-
formation is collected, either from all municipal
trees or from a sample of them. The *intensive in-
ventory* produces complete information needed
for planning, management, and administering daily
operations. It may be conducted in one year or
over several years, and may include just street
trees or also other municipal trees, e.g., in parks,
malls, commons, or parking lots. Different forms
have been designed for speed surveys and inten-
sive inventories, to make data collection conve-
nient and rapid.

A complete set of data in an intensive inventory
consists of thirty to forty standard and optional
variables. These include data on 1) the property
address, its landscape quality, land use; 2) loca-
tion of each tree; 3) species or cultivar; 4) tree
diameter, height, and crown spread; 5) condition
of health of foliage, branches, and trunk, each
recorded separately; 6) causes of injury to
foliage, branches, or trunk; 7) growing space for
crown and roots; 8) traffic conditions; 9) pre-

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The *City Summary* consists of tables in which
are tabulated the variables recorded in the inven-
tory, with figures for the whole city and for areas
within it. These are used principally for planning
and budgeting. *Tree List* has a line for each tree,
showing all data gathered in the inventory. In
each area of the city, trees are listed numerically
by property address within street, which are ar-

 ranged alphabetically. Thus, Tree List serves as a
directory to all trees, for use either in the office or
Several types of optional products are available or under development. These can be produced upon request at any time of the year. They can assist the arborist in improving the effectiveness and efficiency of his program over the years.

Fig. 1. Quality control during data collection, processing, and retrieval is essential. High standards of quality are built into TRESYSTM methods.

Uses of TRESYSTM Products

Daily Operations. The Tree List is used principally in daily operations, and comes in two versions: abridged and complete. Abridged copies of Tree List are carried by all tree crews. The foreman records work done on each tree in the space below the printed line, by entering another date and appropriate code for planting, trimming, removal, etc. At the same time other tree records that have changed can be updated by entering new data beneath the old. If the foreman has time, other trees in the vicinity also can be checked and in this way, records are kept up to date wherever crews have worked. If most records have not been updated within a reasonable time, such as five years, a re-survey may be advisable. This method of updating is much faster than the original inventory, as only about one-third of the data will need to be revised, and this can be done quickly in the Tree List.

Work orders also can be issued in conjunction with the Tree List. A work order form with multiple copies is available on which the city arborist or district supervisor writes the Tree List page numbers, tree identities, and other entries indicating where, when, what, and by whom work is to be done. The work order form is also used for updating when copies are sent to the service company.

A complete Tree List contains all data recorded over the years, with a line for each date. It is kept in the office as a reference for several purposes. When a resident telephones to complain or inquire about a tree, its recorded history often enables the arborist to give an immediate answer. He thus saves the time otherwise required to inspect the tree and then respond to the request. When devising work schedules and assignments, Tree List may be consulted to estimate time, personnel, supplies, and equipment required, or to aid in choosing species for planting. For legal matters, Tree List contains information required to establish values for damage claims, e.g. losses caused by auto accidents; or in defense against law suits it may establish that the city was not negligent in tree care. Even after trees die and are removed, their records are maintained — in a place called Tree Heaven (trees which have spent their life enduring city conditions already have passed through purgatory).

Planning, Budgeting, Evaluating Progress. The principal uses of City Summary are for planning, budgeting, and evaluating accomplishments and progress. Every year as data are revised and updated, new copies of Tree List and City Summary are produced, so that fresh information is
available for organizing the work. In the first two
tables, average landscape quality in each area of
the city may be compared to the city average, or
to values in previous years; numbers and percent-
tages of trees and planting spaces are given, and
also trees per mile and per acre. The next three
tables give the status of updating by years, and
the work done and work needed as recorded in
the past year. Tables 6 to 8 summarize by areas
site variables which influence tree performance
and planting choices: amount of traffic, presence
of utility wires or pipes, land use category, plant-
ing space dimensions, and vertical and horizontal
space for crown growth. Tree characteristics are
summarized by areas in Tables 9 to 14: averages
and distributions of diameter, height, and crown
spread; average health ratings of foliage, bran-
ches, and trunks; causes of injuries to each of
these; and number and percentage of trees in
each species and cultivar. Additional tables appear
if data on other variables was collected in the city.

Such summaries of information have many uses.
We will mention just a few examples, as most uses
are readily recognized. Annual work done and im-
provements in landscape quality point to ac-
complishments worth noting in annual reports. If
landscape quality is deteriorating, or there are ac-
cumulations of planting spaces or in dead trees to
be removed, or if the rate of trimming is too slow
for normal cycles, budget and manpower in-
creases can be justified factually. Information
about growing space and other site variables can
be used to make advance plans for procuring
planting stock. Planting needs by areas can be
determined from numbers of open spaces or from
work needs. Other work loads in each area —
trimming, spraying, removal — can be projected
from numbers of trees, sizes, and health condi-
tions. Build-ups in diseases or insects can be
detected from yearly trends in tree health and in-
jury causes, and plans can then be made for more
precise diagnoses and remedial treatments.

Optional Products for Special Needs. The
routine use of Tree List and City Summary can in
itself improve a city’s tree care program, as
already indicated. Furthermore, there are optional
products available or under development for
special applications. Species Summary gives

many details about each species and cultivar that
is present in sufficient numbers. This useful guide
for selecting trees to plant on different types of
sites can help to assure better health and to avoid
maintenance problems in the future. A subset of
Tree List can be printed according to any set of
criteria. For example, all elm trees can be listed in
a sequence that provides an efficient route for a
spraying operation. Lists of open spaces or dead
trees can help to locate places where trees need
to be planted or removed. A master landscape
plan can be prepared, showing present condition
and future planting plans in each block. Graphical
street profiles of any variable, such as landscape
quality or tree condition, can be produced to
assist in planning. Maps of the city can be drawn
by computer, showing planting needs or pockets
of unhealthy trees. Cost analyses can be used to
compare productivity of crews or efficiencies of
various equipment types, and to project costs for
the next budget. Most of these options are based
on data already in Tree List, so the additional costs
of producing them by computer are relatively
modest.

Availability and Costs
Development of TRESYSTM began in 1975, and
continued with thorough testing in the borough of
State College, Pennsylvania. According to com-
ments from borough officials, the city arborist,
and members of the tree commission, TRESYSTM
has been functioning effectively since its incep-
tion. Communities in several states began install-
ing TRESYSTM in 1978, when it was first offered
commercially. It is now available nationwide and
in Canada.

Technical services for installing TRESYSTM and
keeping it in operation are available on a contrac-
tual basis, renewable annually. The computer pro-
grams used for data processing cannot be
adapted easily to computers which some cities
have, because of their complexity and specificity
for arboricultural applications; so the programs
themselves are not available.

The costs of TRESYSTM services depend mainly
on the number of trees inventories, the data
variables recorded, and the type of inventory, i.e.
a speed survey or an intensive inventory. The lat-
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The expense of starting TRESYSTM may be reduced or spread out in several ways. 1) Conduct the inventory over several years, thus lowering the cost per year. 2) Decrease the number of trees through a sample inventory, or the amount of data through an abridged inventory (in either case, it would be possible to convert to a complete inventory through updating or supplemental surveys in subsequent years). 3) Use city employees or volunteers for conducting the inventory, but be sure to provide adequate training and careful supervision so the quality of the data will not suffer. 4) Include several small cities or towns in a coordinated inventory, e.g. a county-wide survey which could be arranged through a regional planning commission.

Benefits

Benefits which can be realized from TRESYSTM, or from other comprehensive management information systems, will depend partly on the ingenuity of the municipal arborist and the supportiveness of his city. The potential is great for improving the quality of trees and the efficiency of the tree care program.

The quality of trees can be improved through selection of better trees for planting and more effective allocation of cultural treatments. Many years may pass before such improvements can be fully appreciated, but they will start to accumulate soon after TRESYSTM techniques are applied. Results will be detected and documented in annual TRESYSTM reports.

The efficiency of tree care operations can be increased through TRESYSTM procedures of cost accounting, crew and equipment efficiency analyses, and cost projections. Unit costs of planting, trimming, spraying, and removal can be lowered, and thus the number of trees treated per year can be increased.

The initial impact of using TRESYSTM, however, may be to identify and justify needs of the tree department for budget increases and reallocation of resource. The inventory may turn up many dead and dying trees that should be removed, and replaced by cultivars that will require less maintenance. The work load may be higher for several years, and perhaps new or addi-

Fig. 2. Records of tree care are added to inventory data whenever work is performed. This continual updating process overcomes obsolescence of data, and provides annual summaries of accomplishments that are useful for planning and budgeting.
tional equipment will be required. Nevertheless, if TRESYSTM techniques are used to improve the efficiency of operations, the lower unit costs will offset the initial impact on the tree budget. The alert municipal arborist can exploit this opportunity to improve the overall capabilities of his department.

The ultimate results that may be anticipated include a more productive tree department, more valuable trees that are healthier and maintained at lower cost, and a more beautifully landscaped city. What an opportunity for those with the vision and ability to make it work!

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ABSTRACTS


Because there are so many different plants classified as ornamentals and so many are genetically unrelated, and they are grown under a wide range of conditions, they are susceptible to a large number of different diseases. The majority of these are caused by pathogenic fungi, but others are incited by bacteria, nematodes, viruses, mycoplasmas, and flowering parasitic plants ( dodder). The beginning diagnostician should start by attempting to decide whether the disease is caused by a plant pathogen or is abiotic (physiological disorder). He should determine if the plant is hardy to the area in which it is being grown. All parts of the plant should be examined, including leaves, stems, trunk, and roots. Finally, the diagnostician should be familiar with available cooperative extension and U.S. Department of Agriculture publications.


A city environment demands hardy trees. They must be kept free of diseases, insects, mites, nematodes, and other pests. The ideal choices cope well with soil compaction as well as with the extremes of very dry or overly wet soil. The selected varieties must withstand wind, snow and ice storms, city smoke and other air pollutants, extremes in temperature, use of salt on sidewalks or streets, and mechanical injuries from cars and lawn mowers, and other external forces. Other things to consider include soil drainage and water table level, soil reaction or pH, exposure to wind and sun, local legal constraints, attitudes of neighbors, view(s) when the tree is half grown or fully grown, and the size of the mature tree.


In a narrow belt extending from southeastern Virginia down the Atlantic seaboard, around the Gulf of Mexico, and into western Texas, grows a tree that symbolizes the Old South. The tree is Quercus virginiana, the live oak. The live oak grows best on rich hummocks and ridges a few feet above sea level. It grows well and fast in rich soil. The live oak is so named because it keeps its leaves throughout the year. The live oak became the first North American tree to be set aside for future use in a forest preserve. In 1799 Congress bought 150 acres of live-oak timberland. The live oak is an embodiment of virtues envied by mere mortals; boundless strength, tenacious steadfastness, endurance to weather all storms, indestructibility through time, and a secure indifference toward the future.