TRUNK DECAY ON GREENSPIRE LINDEN

by Spencer H. Davis, Jr. and J.L. Peterson

During April of 1977 the authors were called to a town in northern New Jersey to investigate a problem with a clone of small-leaved linden (*Tilia cordata,* Mill.) affecting a large percentage of the 600 plus trees planted along the streets. In the same town no similar problem was observed on silver linden (*T. tomentosa* Moench).

A report and description of this problem was given in the Rutgers University Insect-Disease Newsletter soon after our survey (4). During the following weeks a survey was made of six other communities in central and northern New Jersey where linden were planted and in a subsequent newsletter (5) we noted that the particularly susceptible clone of the linden was *Tilia cordata* Greenspire (plant patent #2086). Since that time, through personal communications (6) we have learned that a similar condition of the Greenspire linden has been noted in Pennsylvania, Ohio and Massachusetts.

From a distance the crown of even a severely affected tree appears excellent (Fig. 1). Twig growth is good, leaf color and size and density of the foliage is excellent. During the early stages of the problem only a swelling of the trunk is observed and is most pronounced immediately above the soil line to a height of several feet. In more advanced stages the bark splits vertically and eventually rolls back along the margins of the splitting (Fig. 2). In the most advanced stages various fungi may be found growing from the area of split bark (Fig. 3) as described for various genera and species by Baxter (1) and Boyce (2). The fungi which we found fruiting on various affected trees were: *Schizophyllum commune, Polyporus versicolor, P. paragamenus,* and *Pleurotus ostreatus.* The presence of one or more of these saprophytic or slightly pathogenic woodrotters would indicate that the problem is environmentally or mechanically induced and the various fungi then enter the injured wood and decay follows (1, 2).

Cross sections of tree trunks with only a slight bulge and small area of bark eruption have only a small area of discolored and dead wood just beneath the area of the ruptured bark. New wood laid down during the current growing season may begin to callus over the injured area.

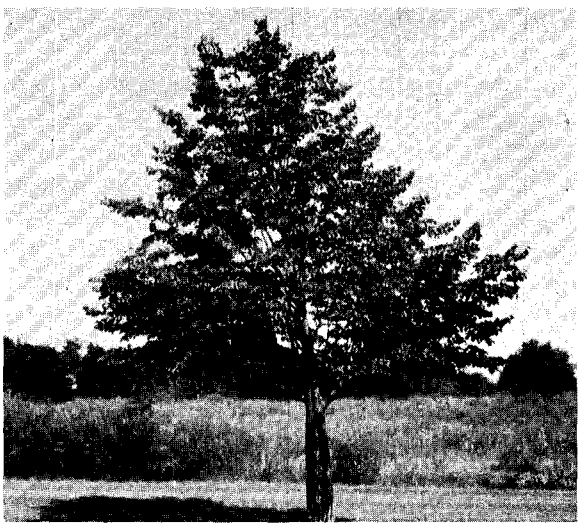

Fig. 1. Tree with excellent crown despite advanced stage of trunk injury.

Fig. 2. Swollen trunk with ruptured bark of tree in Figure 1.

When severe bulging of the trunk base is observed, along with extensive areas of ruptured bark with fruiting conks of wood rotting fungi, the injured area may extend into the fifth or sixth ring (Fig. 4). Even in these advanced stages the five or six outer annual rings may have normal, live and active wood except in the area immediately below the injured bark. The wood in the rotted ring or rings may extend around 360 degrees of the tree with definite demarcation of rings with rot adjoining non-rotted rings. This phenomenon has been described by Shigo in various species (8, 9), and is defined as "compartmentalization."

In our survey of trees in six communities in New Jersey the problem originated primarily as winter injury on the southerly side of the trunk and usually extended from near the soil line upward for several feet as described for various species by Baxter (1), Davis (3), Pirone (7) and others. On other trees the problem originated on various sides and in most cases lawn-mower or other mechanical damage initiated the problem.

In some trees where bark eruptions were present in several quadrants of the trunk there was an inner core of solid living wood surrounded by one or two rings of decayed wood. These were then overlaid by rings of living wood except under the areas where the bark was split open (Fig. 5).

In the cases where winter injury initiated the problem, at least two different periods were observed as times when most of the injury first occurred. In trees where severe bulging and cracking was present the injured growth ring was five years prior to our 1977 observations or the winter of 1971-72. As recorded by Boyce (2), Pirone (7) and others this type of winter injury occurs during periods of extreme fluctuation from high to low temperatures. While the exact time of the in-

Fig. 3. Swollen trunk with fruiting bodies of wood-rotting fungi.

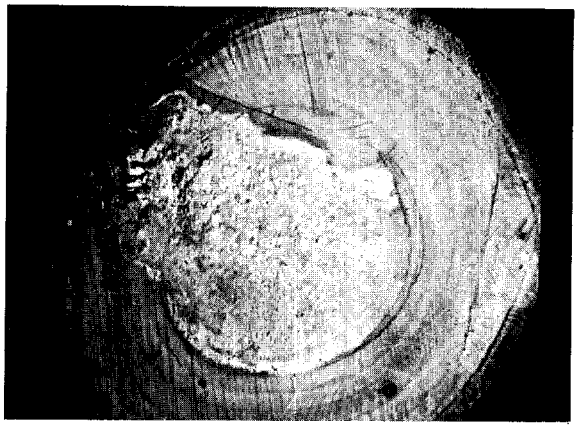

Fig. 4. Wood decay extending from central core to outer surface on southerly side of tree.

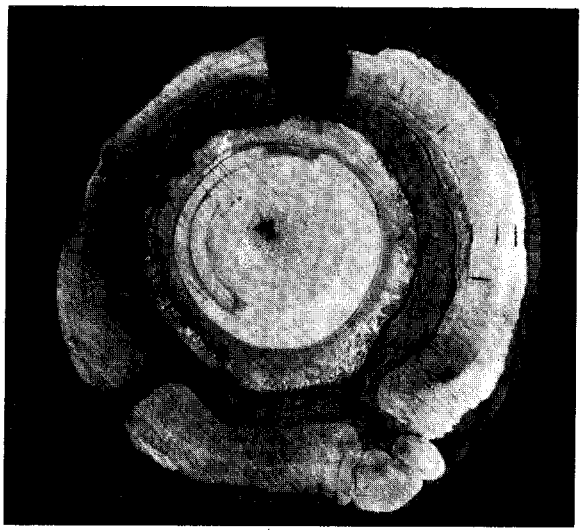

Fig. 5. Excellent example of compartmentalization in severely damaged tree.

itial injury cannot be determined the records show a period of 36 hours from January 14 to 16 in 1972 when the temperature dropped from 18°C to −15°C in the northerly areas of New Jersey where the problem was first called to our attention.

In the second type of winter injury in our 1977 observations only slight bulging and bark rupture was present. The dead area in the wood was limited to a small section on the southerly side of the tree and was in the annual ring of the previous year (Fig. 6). Records showed that an extreme temperature change occurred in the winter of 1975-76 when temperatures dropped from 12°C on January 14 to −16°C two days later.

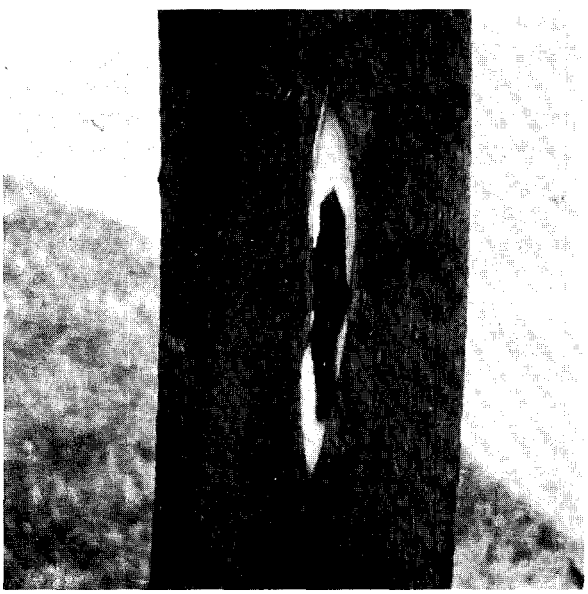

Fig. 6. Injury during 1975-76 winter as it appeared in summer of 1977. Bark removed to expose injured area.

Similar damage initiated by winter injury or mechanical damage has been noted on specimen trees of the Greenspire linden used in landscaping around homes and businesses, in parks and on golf courses. Since this was not a problem specifically of street side plantings the authors visited a large nursery where a number of *Tilia* species and varieties were grown.

In different blocks of trees, species, age of planting and number per block varied but in general we were able to observe up to 100 trees per variety. Among the blocks of Greenspire the percentage of damaged trees ranged from approximately 5% in the younger (6 years from budding) to nearly 90% in the older blocks (13 years from budding). The damage invariably had its origin on the southerly side of these trees starting at or near the soil line and extending upward for several feet.

Observations of other species and varieties which had no similar problems were: Littleleaf linden, *Tilia cordata* June Bride and Stewart; American linden *T. americana* L.; silver linden, *T. tomentosa* Moench.; large-leaved or crimean linden *T. euchlora* K. Koch.

It is true, many specimens of this clone appear to be healthy and thriving, but it appears to us that this tree is highly susceptible to winter and mechanical damage after which various fungi enter the wounds and cause extensive rotting of the tree.

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