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Root Tissue Development Around Wire-Basket Transplant Containers

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Wire baskets are an integral part of transplanting landscape trees and are designed for many types and sizes of mechanical tree spades. The wire basket functions as support for the root ball and as a means of lifting the tree (3). Most baskets are made from galvanized wire and are left intact at planting (P. Braun, personal communication), although some specifications require their removal (1). The potential longevity of the wire in the soil has led to concern and speculation about adverse effects of the basket on tree growth (4). Root girdling, tree instability, reduced shoot growth, and premature decline have been suggested as possible effects on trees planted in intact wire baskets (2, 5).

The purpose of this study was to determine whether wood union occurs after the root encloses the wire of the basket, a matter that has not been documented in the literature.

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In June 1986, four weeping golden willow (*Salix alba* L. 'Tristis') trees were excavated carefully by digging a trench 30 cm beyond and to the depth of the wire basket to reveal root–wire intersections. The trees had been transplanted in intact 71-cm wire baskets in 1979 and were now ≈11 years old with trunk diameters (at 30 m) averaging 27 cm. On each tree, three to five root–wire intersections were photographed, removed by cutting the root and intersecting wire, placed in the laboratory, dried at 22°C for 7 days, and then cut longitudinally on a table saw fitted with a carbide blade. Sections were sanded and photographed.

The trees were healthy and growing well, as evidenced by dark green adaxial leaf surfaces, current and previous season branches in excess of 80 cm long, and no dead branches or signs of decline. During the three previous growing seasons (1983–1985), the average annual ring width, measured from extracted trunk cores, for the four trees was 25 ± 5 mm. Excavation revealed that many roots had completely enclosed sections of the wire basket. Large structural support (brace) roots had reached 12 ± 3 cm in diameter with wire embedded 6 ± 1 cm deep. Initial tissue bridging was evident (Fig. 1). As the wire became more deeply embedded, periderm tissue was intact and somewhat swollen at the point of earlier contact with the wire.

Longitudinal sections revealed some initial infolding of the periderm; but, within 1 to 2 years of enclosing the wire, a complete union of vascular tissue had formed beyond the wire with intact and continuous periderm (Fig. 1). This observation is substantiated by samples excavated from four other tree species at different locations (data not shown) and is in contrast to a report by Feucht (2).

The regrowth of vascular and peridermal tissue seen in this study indicates the capacity of roots to enclose sections of wire baskets completely. Based on these preliminary results, we cannot determine the anatomical nature of the tissue or the extent to which the embedded wire may affect vascular tissue function for water, nutrient, and photosynthate transport. If vascular and cambial function is partially or fully restored, the concern about the detrimental effects of wire baskets may be over-stated. Further studies are necessary to determine the anatomical and functional integrity of the vascular tissues.

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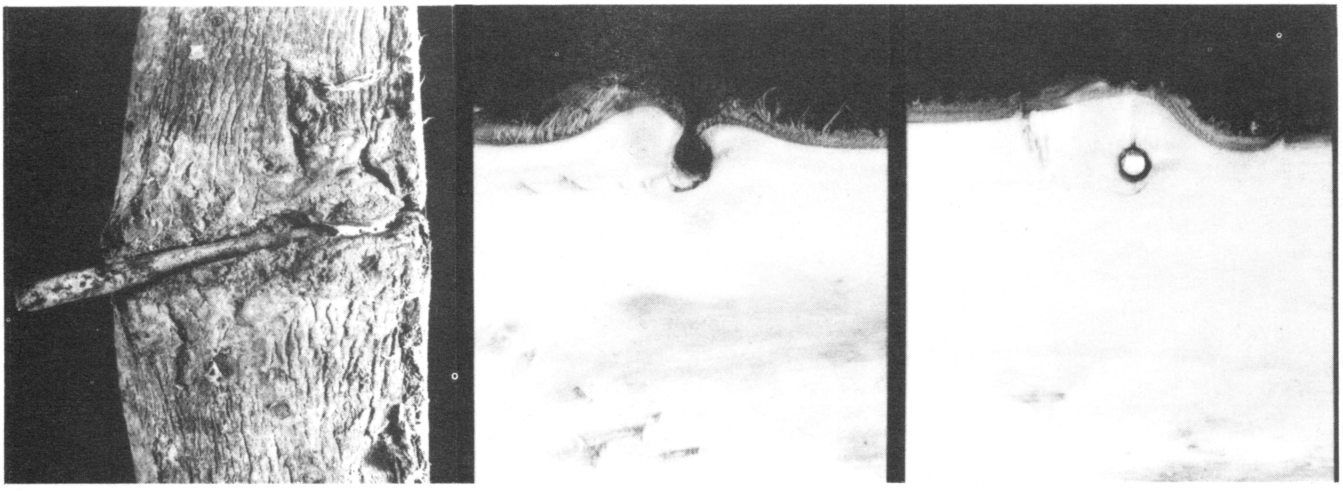

Fig. 1. Willow root piece with tissue bridge over a section of wire visible as a result of drying and shrinkage (**left**); longitudinal sections partially (**center**) and totally (**right**) enclosing the wire.