

EFFECT OF TREE WRAP ON THE INCIDENCE OF FROST CRACK IN NORWAY MAPLE¹

by John H. Hart and Gurdon K. Dennis

Abstract. During the winters of 1970-1971 and 1971-1972, frost cracks developed on Norway maple cv. 'Emerald Queen' planted in a Michigan nursery. Trees in low areas or on poorly drained soils were more frequently injured than those planted on better drained soils. Wrapping trees in November, 1971, with bands of Kraft paper did not reduce the incidence of frost cracks during the 1971-1972 winter.

Longitudinal splitting of the bark and wood is known as frost crack (3). The exact mechanism of frost cracking is still a matter of some doubt, though it is probably due to unequal expansion and contraction of the wood during rapid freezing and thawing (2). The cracks usually originate at the base of the trunk and extend upwards from a meter to several meters.

This study was done to determine the incidence of frost cracking on maple in a commercial tree nursery and to study the effect of wrapping the trunks of the trees in the autumn on the subsequent development of new cracks.

The maple trees, 4-7 cm dbh, were located in a private nursery near Rochester, Michigan. Several visits were made to the nursery during the fall of 1971 to assess the 1970-1971 damage. These surveys revealed that the cracking was almost entirely restricted to 'Emerald Queen' maples although other cultivars of Norway maple (*Acer platanoides*) were present as well as other tree species. The 'Emerald Queens' in one area were planted in long rows which transversed rolling ground. Cracking was restricted to the trees located in the lower, more moist (or poorly drained) areas. Generally there was only a single crack which started at the ground line and extended vertically 0.5-2.0 meters.

In another area of the nursery 'Emerald Queen' trees were growing in two parallel rows on a gentle slope in a heavy clay soil. In November, 1971, the trunk of every other tree was wrapped from the ground line to a height of approximately 1.5 meters. Three of the 133 trees had evidence of

prior cracking. The wrapping material was the common commercial tree wrap (two sheets of Kraft paper, 10 cm wide, banded together with an asphalt compound). The wrap was applied to the trees in a spiral arrangement with about a 50% overlap between layers. It was removed in May, 1972, and the presence or absence of cracking was recorded for each tree.

The 1972 results revealed that ten of 64 wrapped trees and seven of 69 unwrapped trees had cracks (Figs. 1 and 2). Three of the ten wrapped trees with cracks had slight cracks prior to wrapping. The scars on all three trees either reopened or increased in size during the time they were covered. Trees with cracks appeared to be randomly distributed in the rows and there were no obvious differences in size between cracks on wrapped and unwrapped trunks. However, cracks under the wrap were oozing a dark slimy material, possibly due to infection by microorganisms (Fig. 2). Cracks on unwrapped trees (Fig. 1) were not oozing.

French and Fuhs (1) have previously reported frost crack occurring on Norway maple during November 1970 on similar sized trees in a Minnesota nursery. As far as could be determined, the cracks occurred during a period when the temperature reached lows of -15°C following relatively mild weather. This same weather pattern was observed in Michigan (4) except that the lowest temperature recorded in the area of the nursery of -8°C , not unusual for that time of year. However, in the Michigan nursery we do not know when the cracking occurred during either the winter of 1970-1971 or 1971-1972. The most unusual weather for either winter in Michigan was recorded (4) for November 1971 when two very warm periods were followed by rapidly dropping temperatures. On 17 November 1971 the temperature was 20°C ; six days later it was -11°C .

¹ Michigan Agricultural Experiment Station Journal Article No. 8448.



Figure 1. Frost crack on *Acer platanoides* cv. 'Emerald Queen', May, 1972.



Figure 2. Frost crack on *Acer platanoides* cv. 'Emerald Queen', May, 1972. Trunk was wrapped with tree wrap in November, 1971. Note dark stain at the base of the crack.

In general our observations agree with those of French and Fuhs (1) with respect to size and location of the cracks. However, they reported that 'Emerald Queen' was the most resistant of eight varieties of Norway maple while we found it to be the most susceptible. Our results also agreed with earlier reports (2,3) that trees growing in poorly drained sites are more subject to cracking than are those growing in drier, better drained soils. But, our results do not support the recommendation (3) that young trees can be protected by covering their trunks with tree wrap in late fall. Additional research is needed in other areas under a variety of conditions to determine the effectiveness of tree wrap.

Literature Cited

1. French, D.W. and J.S. Fuhs. 1973. *Frost crack in Norway maple, Acer platanoides*. Minn. Acad. Sci. J. 39:3-4.
2. Peace, T.R. 1962. *Pathology of trees and shrubs with special reference to Britain*. Oxford University Press, London. 753pp.
3. Pirone, P.P. 1972. *Tree maintenance*. Fourth Edition. Oxford University Press, New York. 574pp.
4. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, *Environmental Data Service. Climatological Data*. Michigan. Volumes 21-22, 1970-71.

*Departments of Botany and Plant Pathology and Forestry and the Cooperative Extension Service, respectively,
Michigan State University
East Lansing, Michigan*