ELECTRICAL IMPEDANCE

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Electrical impedance is being developed to determine the readiness of coniferous seedlings for overwinter cold storage.

PREAMBLE

Some relationship exists between frost hardiness, dormancy and electrical impedance, however, the extent of these relationships is difficult to determine. In general, electrical impedance measures the ionic or electrolytic content of the tissues, which in turn reflects their metabolic activity. The higher the ionic content, the lower the electrical impedance and the higher the metabolic activity. Conversely high impedance means low ionic content and low metabolic activity. Metabolic activity in turn is related to dormancy and frost hardiness. This is an oversimplification of the relationships, but will serve the purpose here.

STAGE OF PROGRESS

An impedance bridge with accessories is illustrated in figures 1 and 2. Electrical impedance prediction equations have been developed from three years of impedance data. The aim of these equations is to see if we can predict some weeks ahead the date when the trees will reach an impedance level at which they will be ready to be lifted for overwinter cold storage. The testing of these impedance prediction equations was started in September 1975 at Orono nursery for white spruce, red and white pine. The results are presented in figure 3. One set of the three species was lifted on October 30 and another set on November 13 and placed in cold storage at -5°C. These cold stored trees and some freshly lifted stock were outplanted on April 14, 1976. Survival at present (September) is close to 100 per cent.

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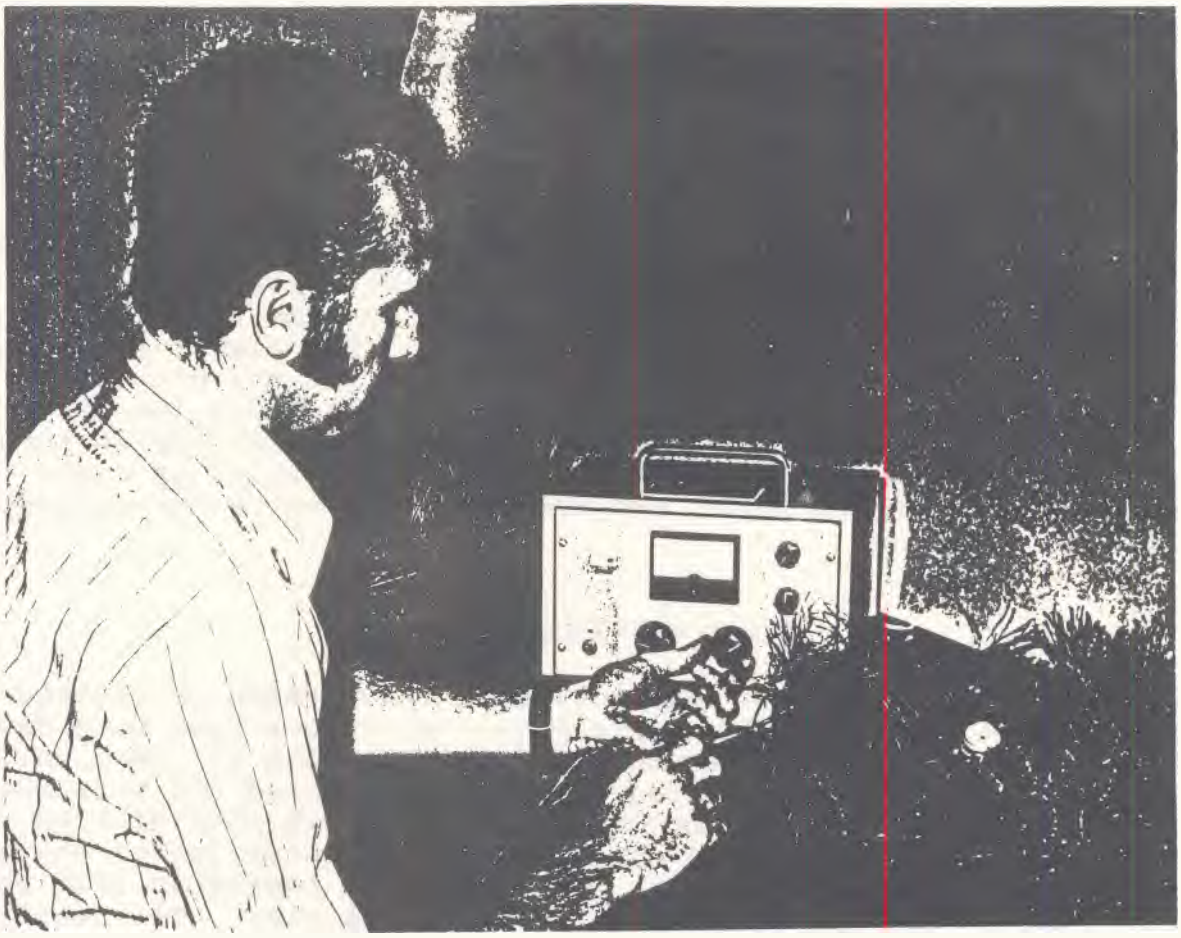

Figure 1. Wide range impedance bridge with coaxial cable to probes in white pine. Dial gauge calipers also shown.

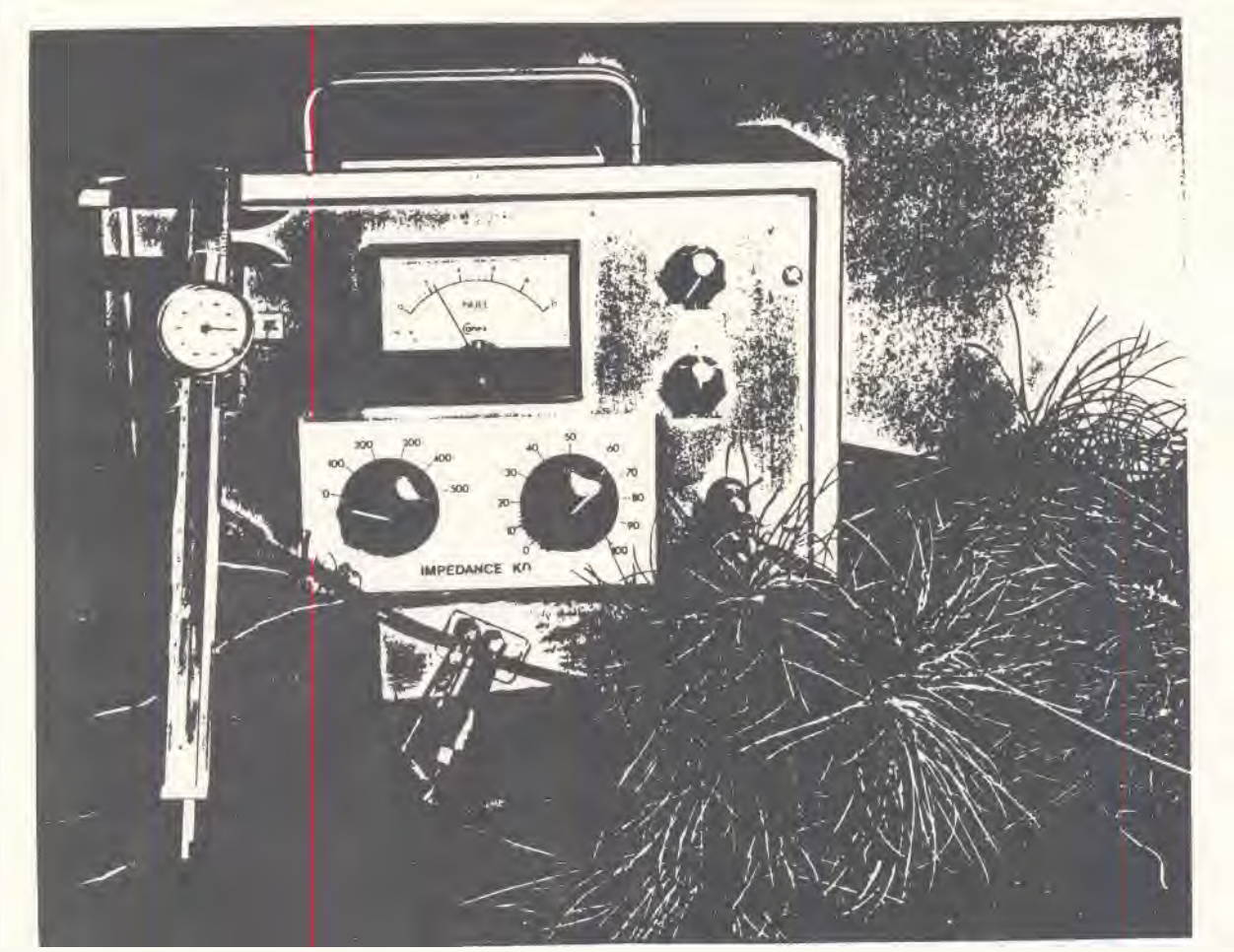

Figure 2. White Pine impedance (in kilo ohms) stem measurement.

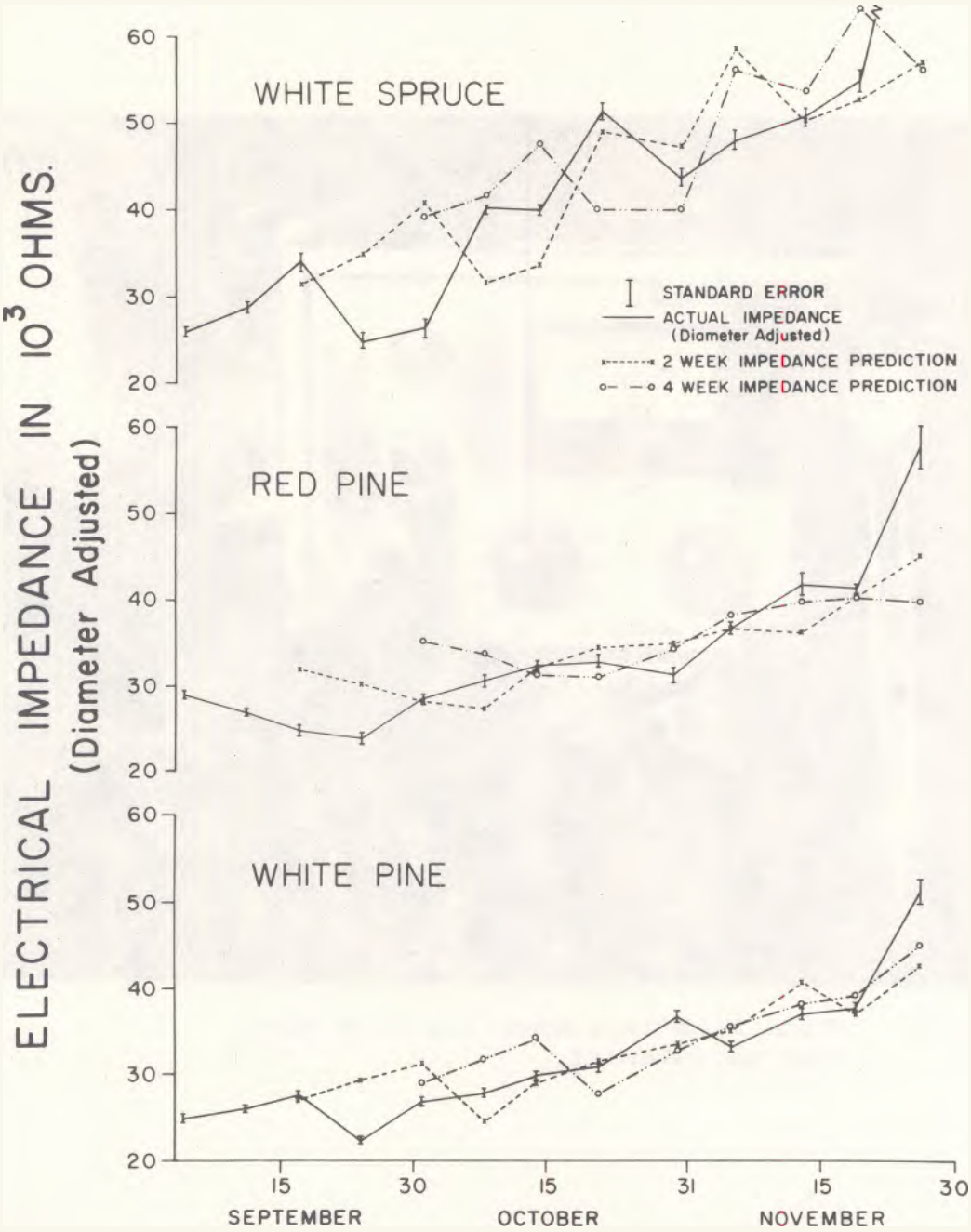

Figure 3. Electrical impedance trends over the period of September to November for white spruce, red and white pine at Orono nursery. The actual impedance is adjusted for diameter and each point is an average of 25 observations. Two and four week predicted impedance values are also shown to demonstrate the discrepancies between predicted and actual impedance.

REFERENCES

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