

Indolebutyric Acid Failed to Aid Black Walnut Seedling Development

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Various growth regulators have proved helpful for rooting cuttings and some have improved root growth of transplanted seedlings (3) (4).

Survival and growth of black walnut (*Juglans nigra* L.) seedlings in old-field plantings have been poor. A recent black walnut planting survey in Indiana (2) showed that average survival for planted black walnut seedlings was 44 percent. Many nursery-grown black walnut seedlings develop tap roots with few secondary roots so it seemed that stimulated secondary root growth would aid survival and top growth of transplanted seedlings.

In a recent study neither secondary root growth nor survival and height growth of transplanted black walnut seedlings were greatly improved when the roots were soaked in low concentrations of indolebutyric acid.

Methods

Nursery-grown black walnut seedlings were placed in 10-quart pails with enough liquid to cover the pruned, 8-inch root systems. Treat-

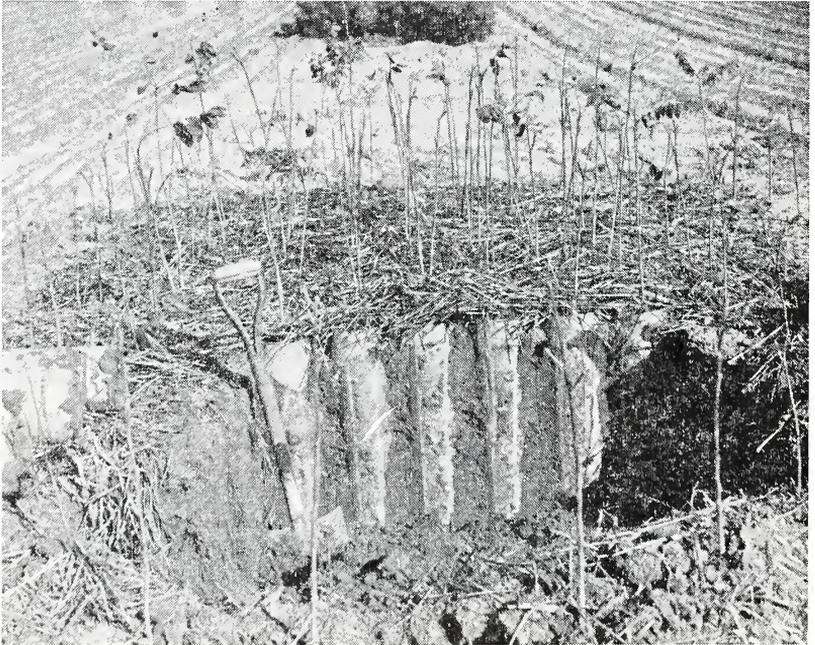


Figure 1.—Seedlings were grown in stove-pipe pots to facilitate root recovery.

ments included five water solutions containing 10, 20, 40, 80, and 640 parts indolebutyric acid per million parts water and one tap water control. Seedlings in the 640 parts indolebutyric acid per million treatment were "dipped" for 45 minutes but in the other treatments seedlings were soaked for 24 hours. Five replications of each treatment were prepared 2 weeks before planting and five more were prepared 1 day before planting. The two treatments were scheduled to simulate treatment at the nursery before shipment and treatment by the planter just before planting. The planting was done in a completely randomized design.

The study was divided into two parts: one a pot study to determine the effects of indolebutyric acid on root growth, the other an old-field planting to find out the effects of IBA on survival and height growth of planted seedlings.

The pot study was conducted at the Vallonia Nursery where the soil is Princeton fine sandy loam. Seedlings were planted in 24-inch

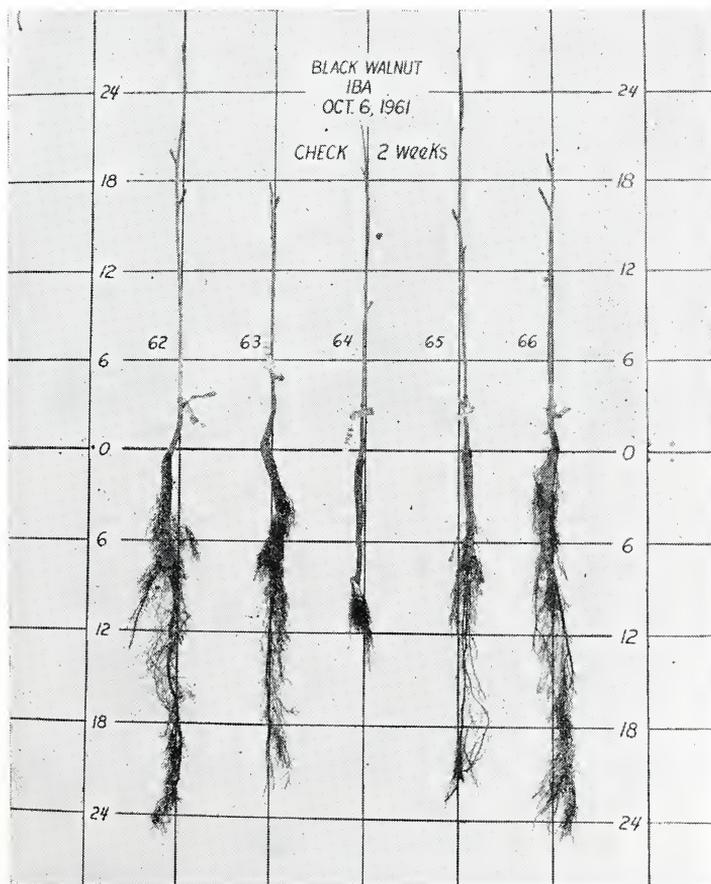
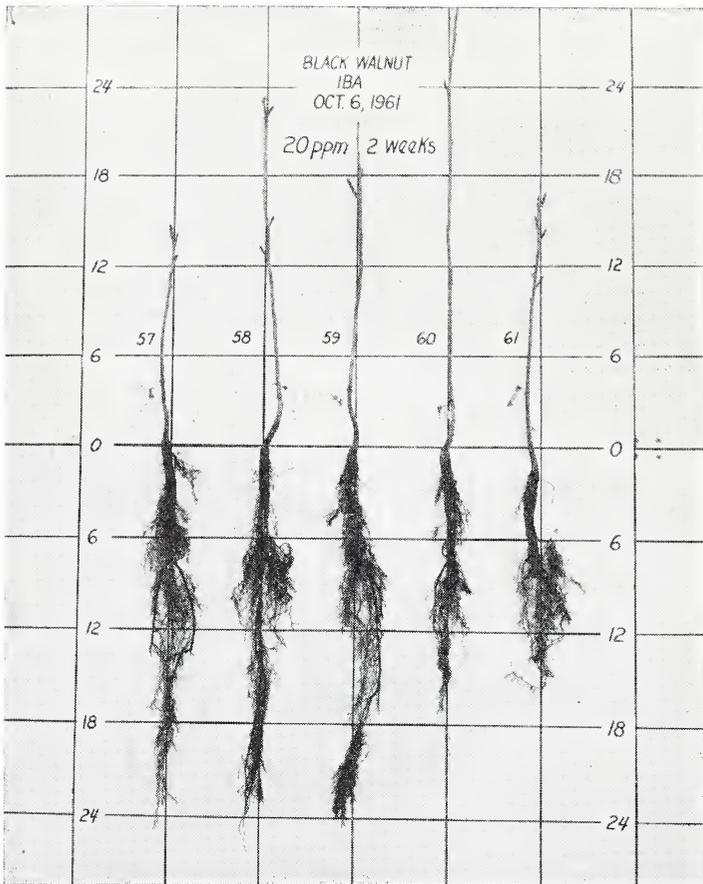


Figure 2.—Root growth of IBA-treated seedlings was slightly better than for the controls. (A) Untreated seedlings; (B) IBA-treated seedlings.



galvanized stove-pipe pots to facilitate recovery of the root system at the end of the growing season (1) (fig. 1). To approach natural soil temperature, the pots were buried with about 1 inch protruding above ground level. Top soil, kept separate during the excavation, was used to fill in around the roots of planted seedlings. All seedlings were mulched to conserve soil moisture. Sixty seedlings, one in each pot, were carefully measured and photographed before planting in the field and after the growing season.

The old-field plots border an intermittent stream on silty clay loam soil in Orange County, Indiana. An old field was selected for the planting site in order to study the treatments under severe conditions. Sixty 10-tree plots were planted.

Results and Discussion

One-year root growth of transplanted black walnut seedlings, as determined by root volume and weight of potted seedlings was not greatly improved by any of the indolebutyric acid solutions. Secondary

root growth of acid-treated seedlings was slightly better than for the controls but differences were not statistically significant (fig. 2). Root growth was not affected by treating the seedlings either 2 weeks or 1 day before planting.

Second-year results of the old-field planting showed that indolebutyric acid did not increase survival or growth of black walnut seedlings on old-field sites. Survival of all stock, regardless of treatment, was excellent and ranged from 94 to 99 percent. Survival of seedlings treated 2 weeks before planting was 96 percent compared with 97 percent for seedlings treated 1 day before planting.

Two-year height growth was very poor. Dieback, characteristic of planted black walnut seedlings, occurred both years. Growth would have been better on a more favorable forest site. But on the old field indolebutyric acid neither helped nor hindered height growth and it is a matter of conjecture whether IBA would have been more effective on a better site.

These results indicate that indolebutyric acid was relatively ineffective in stimulating secondary root growth of black walnut seedlings and it did not aid survival and height growth of field-planted stock.

Literature Cited

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