

Studies on the Propagation of Carob *Ceratonia siliqua* by Stem Cuttings

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ABSTRACT

Three experiments were conducted to study the effects of time of collection and Indolebutyric acid (IBA) concentration on the rooting of terminal and basal stem cuttings of carob *Ceratonia siliqua*. The collection dates were October and May 1990, and February 1991. IBA was used at 0, 2000, 4000, 6000, and 8000 ppm. The cuttings were rooted in perlite under intermittent mist in a glasshouse with controlled temperature and humidity. The split plot design with four replicates was used, with cutting type as the main plot, and the IBA concentrations as subplots. Responses were evaluated on the basis of rooting percentages, root numbers, and root lengths.

The results showed that carob cuttings taken during October did not root, nor did roots form without the use of IBA. Terminal cuttings gave better rooting than basal cuttings. The highest rooting percentage (55%) was obtained using terminal cuttings collected during February and treated with 8000 ppm IBA; however, this percentage was not significantly different from the May collection date or other IBA concentrations. The interaction between cutting type and IBA concentration in the May collection date was significant for the average number of roots, and the terminal cuttings treated with 8000 ppm IBA produced the highest value (16.63). No significant interactions were found between the factors in the experiment.

INTRODUCTION

Forests are important for ecological, economical, and social reasons. In the 1930s, the government of Jordan started a project to plant large areas with forest trees. The project started

with a small area and rapidly expanded. Yearly planted areas in the 1980s reached approximately 10–12,000 dunum. The project's main objective was to prevent soil erosion, with wood production as a secondary goal. A small area was planted for grazing (Forest Department, 1980–90).

Carob *Ceratonia siliqua* is suitable for forest areas as it is adapted to a wide range of soils and arid climates (Psarar and Hotzopolou, 1984). Carob is also considered a source of nutrition for livestock (Guessous et al., 1988). The seeds contain 40–50% sugar, and are used to produce food, gums, and syrup (Whistler, 1982; Winer, 1986).

Most naturally occurring carob trees in Jordan are in the secondary degradative forest zone. Planted trees, however, are found as road-side trees. Most of the latter are non-fruiting (male) and have long juvenile phases as they were propagated from seeds.

Carob is usually propagated sexually by seeds and asexually by cuttings. Seeds are not recommended for propagation because seedlings are slow to become reproductive and may be either male or female. Asexual propagation is rapid, maintains identical genetic make up, and allows gender selection.

Seasonal variation effects on the rooting of cuttings have been studied in many plant species. Fadl and Hartmann (1967) found that higher rooting percentages in "Old Home" pear hardwood cuttings were obtained in late summer and fall than during other seasons. Hartmann et al. (1990) mentioned that the best time to collect broad-leaved evergreen cuttings for rooting is after the completion of a flush of growth when the wood is partially matured. Pontikis and Xirochakis (1985) propagated mature cuttings of carob in spring, summer and autumn, and found that mature cuttings rooted only when collected during spring. Alorda et al. (1987) found that the

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