ESTABLISHING HIGHWAY SLOPES WITH WOODY PLANTS PROPAGATED AS ROOT CUTTINGS

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Technical Paper

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TO: J. F. McLaughlin, Director
Joint Highway Research Project

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Project: C-36-48C

FROM: H. L. Michael, Associate Director
Joint Highway Research Project

File: 9-5-3

The attached Technical Paper "Establishing Highway Slopes with Woody Plants Propogated as Root Cuttings" is from research conducted on the Part I HPR Research Study titled "Research in Roadside Development and Maintenance". The paper has been authored by Messrs. D. F. Hamilton, R. E. McNiel and P. L. Carpenter and was reported in the Interim Report titled "Root Cuttings for Roadside Slope Stabilization".

The paper is proposed for submission to the Plant Propogator for publication. Approval of such publication is requested.

Respectfully submitted,

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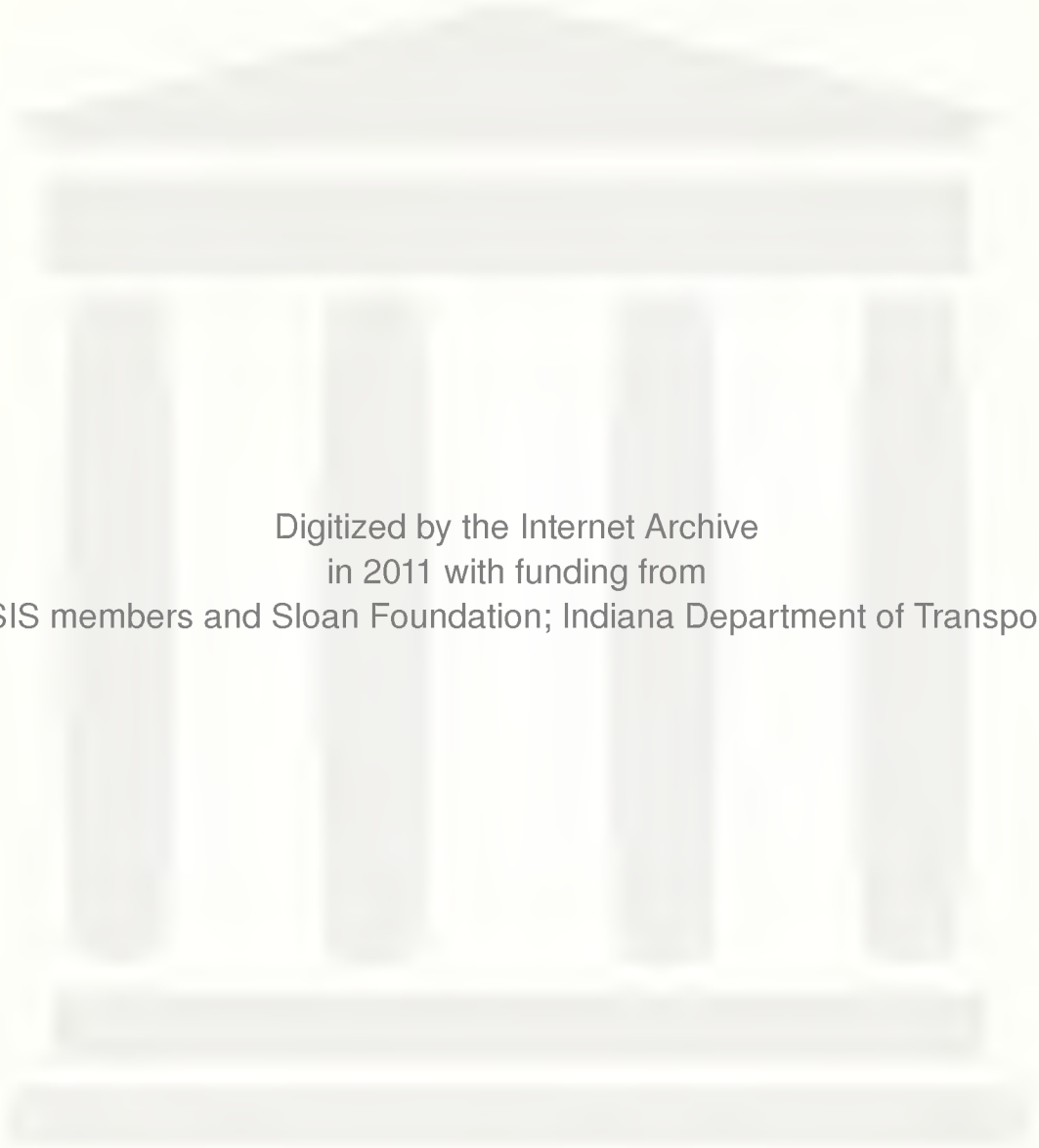

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ESTABLISHING HIGHWAY SLOPES WITH WOODY PLANTS PROPAGATED AS ROOT CUTTINGS

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Establishing Highway Slopes with Woody Plants Propagated as Root Cuttings

The root cutting method of propagation, although the least used method of vegetative propagation, is probably the least expensive and the most simple means of mass propagation (1). Propagation by root cuttings is a good method for increasing certain plants which do not bear reliable seed (2). Timing of propagation by root cuttings is very critical. Hartmann and Kester (2) state that the best results are likely to be obtained on cuttings from yourg two- to three-year old stock plants in late winter or early spring when roots are supplied with stored metabolites but before growth starts. They, also, stated that root cuttings should not be taken in the spring when the parent plant is rapidly making new shoot growth. Stoutemeyer states that root cuttings taken in the fall are not likely to overwinter successfully (1).

Size of root cuttings used in propagation also appears critical. According to Hartmann and Kester (2) root cuttings of trees and shrubs should be from two to six inches long.

Since seeding of woody plants has not proven entirely successful on highways experiments were designed with the following objectives:

(1) to study the feasibility of stabilizing roadside slopes with woody ornamentals propagated from root cuttings.

(2) to determine rates of planting of root cuttings necessary for sufficient slope cover.

(3) to determine the best planting dates for propagation by root cuttings.

MATERIALS AND METHODS

A field experiment to determine the feasibility of stabilizing roadside slopes with woody plant materials propagated from root cuttings was established on May 13, 1968. The planting site was a slope with a western exposure and a three-year cover of grasses. After tilling to a three-inch depth, two- to four-inch root cuttings of Comptonia peregrina (L.) (sweet fern), Rhus glabra (L.) (smooth sumac), and Robinia hispida (L.) (moss locust) were spread by hand and then covered with a three-inch bark mulch. Each species was planted in plots of 100 square feet, and randomly replicated three times on the slope. Root cuttings were planted at the following densities: C. peregrina at four per square foot, R. glabra at two per square foot, and R. hispida at one per square foot. No fertilization or watering program was maintained, although rainfall supplied adequate moisture for establishment of the root cuttings. The average weekly rainfall was: 1.98 inches in May, 0.82 inches in June, 0.88 inches in July, 1.38 inches in August, and 0.49 inches in September.

RESULTS AND DISSCUSSION

Initial observations made June 14, 1968, showed shoot development from root cuttings of R. glabra and R. hispida, while shoot development was not observed from root cuttings of C. peregrina until July 3, 1968. The number of root cuttings of all species giving shoot development increased throughout the first summer (Table 1). Plant counts made September 9, 1968, showed that the percentage of root cuttings established was considerably larger for R. glabra than for the other species (Table 2). Even though

Table 1. Total number of Shoots Developing from Root Cuttings of Rhus glabra, Robinia hispida and Comptonia peregrina planted on May 13, 1968.

Plant	Total Number of Shoots (per sq ft) Date July 12, 1968	September 9, 1969	April 22, 1969	May 14, 1971
Rhus glabra	3.2	4.6	2.8	20.5
Robinia hispida	0.4	0.4	0.4	0.3
Comptonia peregrina	0.4	0.4	0.1	0.1

Table 2. Percentage of Root Cuttings of *Rhus glabra*, *Robinia hispida* and *Comptonia peregrina* Showing Shoot Development.

Plant	Percent Showing Shoot Development — Date: July 12, 1968	September 9, 1968	April 22, 1969	May 14, 1971
Rhus glabra	53.0	77.3	46.2	34.2
Robinia hispida	13.7	14.7	12.0	11.3
Comptonia peregrina	3.0	3.3	0.8	0.7

R. glabra showed the highest percentage of shoot development from root cuttings the first summer, root cuttings of R. hispida showed better survival counts after the first winter (Table 3). Survival of root cuttings of C. peregrina was extremely poor during the first winter. After the first winter the percentage of root cuttings of all species surviving decreased only slightly.

In a similar experiment root cuttings of the same species were planted on October 1 and 15, 1968. Observations the following spring showed no survival. Failure of the root cuttings to overwinter on the roadside slope cannot be attributed to any specific factor.

Plant heights were also taken periodically throughout this study. Rhus glabra consistently gave the most rapid growth. For the final plant height May 14, 1971, R. glabra was found to have a maximum height of seven feet, R. hispida a maximum height of two feet, and C. peregrina only one foot.

The percentage of root cuttings of R. hispida and C. peregrina showing shoot development is small, but for R. hispida the total number of plants is adequate to give sufficient tree cover on slopes. Rhus glabra would provide excellent and rapid tree cover on highway slopes when planted as root cuttings. Root cuttings of C. peregrina would be unsatisfactory for roadside slope stabilization, with only marginal cover being obtained.

Table 3. Percentage of Root Cuttings Producing Shoot Development by September 9, 1968, Surviving in April 1969, and May 1971.

Plant	Percent Survival Date	
	April 22, 1969	May, 1969
Rhus glabra	59.6	44.0
Robinia hispida	81.8	76.9
Comptonia peregrina	23.1	20.0

LITERATURE CITED

1. Hartmann, H. T., and D. E. Kester, 1968. Principles and Procedures of Plant Propagation. Prentice-Hall, Inc. New Jersey.

2. Stoutemeyer, V. T., 1968. Root cuttings. The Plant Propagator 14(4): 4-6.