

WOUND CLOSURE IN EUCALYPTUS

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Abstract. A two-year study was conducted to evaluate seasonal differences in the rate of wound closure in *Eucalyptus camaldulensis*. Wound closure was measured 3, 6, 9 and 12 months after wounding. Wounds made in spring closed most rapidly. Slowest closure was recorded for wounds made during late fall and early winter.

Résumé. Une étude d'une durée de deux ans fut réalisée afin d'évaluer les différences saisonnières dans la taux de fermeture des blessures de l'*Eucalyptus camaldulensis*. Le degré de fermeture des blessures fut mesuré trois, six, neuf et douze mois après que les blessures furent effectuées. Les blessures faites au printemps se sont fermées plus rapidement. Le taux de fermeture le plus lent fut observé pour les blessures faites à la fin de l'automne et au début de l'hiver.

The effects of season on wound closure rates in deciduous trees has been extensively studied by several researchers. Although most pruning wounds are made during the winter months, reports in the literature show that wounds made then close slowly.

Following a 3-year study, Neely (5) concluded that wounds made in spring prior to leaf emergence closed in a shorter period of time than wounds made during other seasons. The same study showed summer wounds close more rapidly than winter wounds, and that fall wounds are slowest to close. Neely used white ash, *Fraxinus americana*; honeylocust, *Gleditsia triacanthos* var. *inermis*; and pin oak, *Quercus palustris* in his studies.

Mercer (4) reported that wounds generally callus best when made between late winter and spring. Working with beech (no species given), he found no difference in the amount of callus tissue produced between wounds inflicted in the autumn and the following spring and stated, regarding a fall wound, "the wound will be open for six months longer than the spring one and therefore will have six months longer to decay"(4).

Others have also found fall wounds to be detrimental to tree health. Felix and Shigo (2) report that wounds made late in the growing season, when many species of wood-inhabiting fungi are sporulating, tend to be infected more rapidly than wounds made at other times.

It has been suggested that tree wound size and rate of closure is important, primarily in preventing

wood decay. Harris (3) stated that wound width is directly proportional to the danger of decay; however, unless a wound calluses over within 3 years, the rate of callusing has little or no effect on decay. Because of this, time of wounding may be more important in a small wound than in a large wound that takes several years to close (4).

In an earlier study, the authors found that wounds on *Eucalyptus camaldulensis* closed faster when made in late spring than in fall or winter (6). Finding that spring wounds closed more rapidly than fall or winter wounds followed the results reported for deciduous trees.

This paper reports an experiment to determine the effects of season, by month, on wound closure in an evergreen tree species, *Eucalyptus camaldulensis*.

Materials and Methods

A uniform stand of 7-year-old *Eucalyptus camaldulensis* (red gum) was used for this study. The trees were 10 to 14 meters in height, and 15 to 20 centimeters in diameter. The trees were flood irrigated from April through October.

Treatments consisted of diamond shaped wounds 65 square centimeters in size (after Shigo, 7). The wounds were placed approximately 1.5 meters above ground level and in randomized locations around the trees. In wounding, the bark was removed using a hatchet and mallet, and the cambium scraped from exposed wood. Wounds were made to different trees once each month beginning July 1984 and ending June 1985.

Wound closure resulting from inward growing callus tissue was recorded each month using a clear plastic lined grid to measure wound size. Wound closure data were collected from August 1984 to August 1986.

Results and Discussion

Table 1 summarizes wound closure after 3, 6, 9 and 12 months. After a 3-month period, wounds made during June closed significantly faster than

Table 1. Percent wound closure (mean of 5 replications)*

Wound month	Months after wounding			
	3	6	9	12
January	0 a	6 a	33 bcd	45 bc
February	0 a	12 a	28 abcd	34 abc
March	1 a	33 b	49 d	56 c
April	2 ab	35 b	46 d	55 c
May	9 bc	32 b	44 d	56 c
June	13 c	32 b	38 cd	55 c
July	6 ab	14 a	28 abcd	46 bc
August	4 ab	15 a	25 abcd	43 bc
September	0 a	2 a	5 ab	22 abc
October	2 a	4 a	16 abc	43 bc
November	0 a	0 a	4 a	15 ab
December	0 a	0 a	2 a	7 a

Means in a column followed by same letter not significantly different, $p = 0.01$ Duncans multiple range test.

wounds made most other times of the year, including March-April. This indicates that wound closure in eucalyptus may be delayed during the period of active growth, March-April, when stored energy is being utilized for shoot elongation.

After 6 months, wounds made March through June closed more rapidly than those made during any other month. However, there were no statistical differences in closure between wounds made July through February.

After 9 months, wounds made in spring (March-May) closed more rapidly than those made September-December. Even after 12 months, wounds made in spring and early summer had still closed more than those made during November and December.

Over a 12-month period, wounds on *Eucalyptus camaldulensis* made in late winter, spring, summer or early fall closed at similar rates. However, wounds made in early winter (December) had closed only 7 percent of the initial wound area after a full year, as compared to over 55 percent

closure in wounds made from March to June. The early winter wounds also suffered considerable tissue dieback beyond the original wound margins. Conversely, the June wounds suffered no such dieback.

Conclusions

In an evergreen broadleaved tree species, *Eucalyptus camaldulensis*, the most rapid closure rates occurred following spring (March-May) wounding. Slowest closure rates occurred in wounds made during late fall and early winter (November-December).

The increased closure rates of spring wounds may help prevent the entry of wood decay forming agents. This study suggests that the optimum time to prune eucalyptus is in spring, which supports prior research conducted on deciduous tree species.

Further studies are needed to determine the effects of time of wounding on tree growth and vigor, as well as responses of other evergreen tree species.

Literature Cited

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