

# THE EFFECT OF LATE SUMMER IRRIGATION ON RED PINE BUDS AND SHOOT LENGTHS

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Red pine (*Pinus resinosa* Ait.) completes its height growth by early summer and begins to set buds in midsummer. This paper shows that irrigation, as opposed to drought, during the period of bud growth results in larger shoots that emerge from the buds the following year.

## The Experiment

The experimental procedure was described in detail earlier.<sup>1</sup> In brief, there were 60, 5-year-old red pines averaging 33 cm. in height growing in clay pots. In 1963, the following three treatments were employed: frequent watering-about 35 mm. equivalent rainfall once a week; infrequent watering-about 35 mm. equivalent rainfall every 2.5 to 3 weeks; and drought-no water added after start of the experiment. These treatments began July 23, and for convenience were termed: wet, intermediate, and dry.

In 1964, half of the trees from each 1963 treatment received frequent watering, while the other half were not watered. Before the treatments in 1964, all plants were well watered. These treatments began May 8

<sup>1</sup> Clements, J. R. Shoot responses of young red pine to watering applied over two seasons. *Can. J. Bot.* 48 (1): 75-80. 1970.

and ended June 30 when leader extension stopped.

Lengths of terminal buds on leading shoots were measured in November 1963. Final shoot lengths were measured in 1964. Hereafter, in this paper, shoot refers to the 1964 leading shoot.

Differences in mean bud sizes and mean shoot lengths between treatments were tested by t-test. The level of significance of statistical tests was 5 percent.

## Results

Mean bud sizes and shoot sizes are shown in table 1. Buds on the wet trees were 14 percent longer than those on intermediate trees and 38 percent longer than those on dry trees. All differences in mean bud length were significant.

In the 1964 dry treatment, mean shoot length of wet trees was greater than that of intermediate trees, which, in turn, was greater than that of dry trees. The difference between wet trees and dry trees was significant.

In the 1964 wet treatment, wet and intermediate trees grew about the same amounts, which, in turn, exceeded significantly the shoot growth of dry trees.

Differences between mean shoot lengths under the two 1964 treatments were not significant for any of the 1963 treatments.

### Discussion

The results clearly show that frequency of irrigation during bud development markedly affected bud lengths and hence shoot lengths.

Comparisons between 1964 treatments also indicate a predominant effect of 1963 watering treatments on shoot lengths. Compared to the dry treatment in 1963, the irrigation treatments, i.e., intermediate and wet, in 1963 resulted in a 14 to 38 percent increase in mean shoot length in 1964. Further, for each 1963 group of plants, the mean 1964 shoot length was not significantly longer in the 1964 wet treatment than in the 1964 dry treatment. Lack of significant difference between 1964 mean shoot lengths indicates that the influence of the 1963 treatments could not be counteracted by irrigation treatment during the

subsequent year. In other words, the differences in mean 1964 shoot growth resulting from the various 1963 irrigation treatments could not be overcome by adequate moisture in 1964.

In growing young thrifty red pine and possibly other species with the same height growth, quickly in a nursery, irrigation during bud development is important. However, in growing young red pine for Christmas tree stock, drought during bud development may be advantageous as such trees will have short bushy shoots.

TABLE 1.—*Mean lengths of apical buds, November 1963, and mean lengths of shoots, 1964*

Treatment 1963	Bud Length 1963	Shoot length in 1964	
		Wet	Dry
	<i>Inches</i>	<i>Inches</i>	<i>Inches</i>
Wet .....	0.44	4.2	3.8
Intermediate .....	0.38	4.3	3.1
Dry .....	0.32	2.4	2.4