THE SHOOT GROWTH HABIT PECULIAR TO SECOND-YEAR PINE SEEDLINGS

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Shoot elongation in rising two-year-old pine seedlings is accomplished mainly by the extension of stem internodes below the terminal bud, rather than by bud flushing. This unique mode of shoot elongation, described by Thompson (1976), was studied using one-year-old overwintered jack pine *(Pinus banksiana* Lamb.) Japanese paperpot seedlings, placed in a greenhouse (16 hr day, 17 to 26 C) where shoot elongation was observed daily.

The overwintering shoot of one-year-old jack pine seedlings consisted of a closely spaced cluster of primary needles below the terminal bud, each subtended by an easily seen axillary bud. This cluster of needles is known as the rosette. Axillary buds were also present in the axils of the budscales of the terminal bud. In the fall the appearance of large axillary buds in the rosette was the first visible sign that height growth was slowing down in preparation for overwintering. This was usually followed by the formation of terminal buds with visible brown budscales. However, when buds were not visible, dissection of the shoot tip revealed the presence of succulent green budscales in all instances.

The entire first-year overwintering shoot is analogous in structure to the terminal buds of older trees, with primary needles in the seedlings being equivalent structures to budscales in older trees (compare Fig. 1 in Cannell and Willett, 1975 to Fig. 4 in Thompson, 1976). Axillary buds are initiated in the axils of primary needles of the rosette of first-year seedlings and of budscales in older trees. Terminal budscales are present at the tip of both structures (Fig. 1).

Shoot growth in the rising 2-0 year began with the extension of internodes between primary needles at the base of the rosette. As internode elongation spread from the base

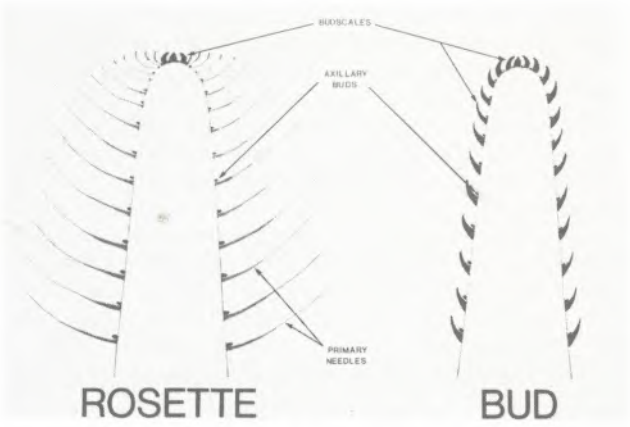

Figure 1. Structure of the rosette in one-year-old seedlings and terminal buds of older trees.

to the top of the rosette, buds in the axils of primary needles in the rosette swelled during the first week and flushed in the second week, resulting in the development of fascicle shoots. Activity from the third week on consisted mostly of the elongation of fascicle shoots, to form secondary needles, with negligible increases in height.

During the second and third weeks, terminal buds began to elongate and axillary buds present at the base of budscales flushed and developed into fascicle shoots. The contribution to total height growth by the rosette was approximately nine times greater than the height growth resulting from the extension of the terminal bud.

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1975. Rates and times at which needles are initiated in buds on differing provenances of *Pinus contorta* and *Picea sitchensis* in Scotland.Can. J. For. Res. 5:367-380.

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