

NATURAL AND INDUCED FLOWERING IN YOUNG PINE TREES

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In forest trees we have numerous examples of distinct growth phases, and one of the more obvious one is the formation of the first sex organs. This stage, although easily recognizable in vivo, presents considerable difficulties when one attempts to explain it on biochemical grounds, or induce it at will. The literature abounds with reports of the failures to induce flowering at an early age in woody plants, and almost every person interested in general field of forest genetics has at one time or another attempted to induce flowering in forest tree seedlings.

Despite the many attempts, no reliable technique has evolved that induces flowering in very young seedlings, with the exception of the grafting work by Dr. Mirov (1951) . There have been, however, several successful attempts to considerably advance this "ripeness-to-flower stage". These treatments relied on either mutilation of the trees, fertilization of the trees, or on a combination of these two approaches. By this method, six-year-old slash pine seedlings, *Pinus eliotii* Engelm., were brought into flowering by Hoekstra and Mergen (1957), and Wareing (1953) was able to induce male flowers on 12-year-old Scotch pine trees. It should be realized, however, that in both instances the trees had passed the juvenile stage in many other phases of their development, e.g. foliage, bark, and wood cells.

In this maturing process, the various tree characteristics appear to progress fairly independently of each other. Although a certain trend is present, the various steps do not seem to be dependent upon each other, e.g. mature conditions in one organ do not depend on the presence of mature traits in certain other ones. As an illustration might mention the observation where reproductive structures are produced before secondary needles are initiated. It seems to me that, although these various phases are interrelated and influenced by the environment, the physiological stages or phases of readiness for flowering proceed at their own pace and are only indirectly influenced by the maturation process in the other characteristics.

My observations on natural early flowering, as well as on induced early flowering, are based on experiments conducted over a period of six years. The observations are grouped together, as a matter of convenience, into six categories, namely: Report of early flowering; Relationship between first flowering and successive flowering; Effect

