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BOTANY

THE CONTROL POLLINATION OF SLASH PINE

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A large amount of controlled pollination work has been done with pine, but little descriptive or illustrative material has been published on the development of female ovulate or carpellate strobili. Recognition of the different developmental stages of the female strobilus is essential in controlled pollination. This report describes several stages in the development of slash pine (*Pinus elliottii* Englem.) female strobili.

In controlled pollination, the female strobili must be bagged as soon as they can be distinguished in order to protect them from chance or open pollination.

The successive stages in the development of the female strobili must be known so that they will not be bagged too early, pollinations will be done at the correct time, and the pollination bags will be removed as soon as possible so as not to injure the young cone.

In stage 1, the ovulate strobilus is still covered by a fibrous sheath at the time it emerges from the dormant bud. The strobili appear either singly or in clusters up to four in slash pine. This is the proper stage for covering with pollination bags.

In stage 2, the strobili are partially developed. The scales are still closed with no chance of pollination.

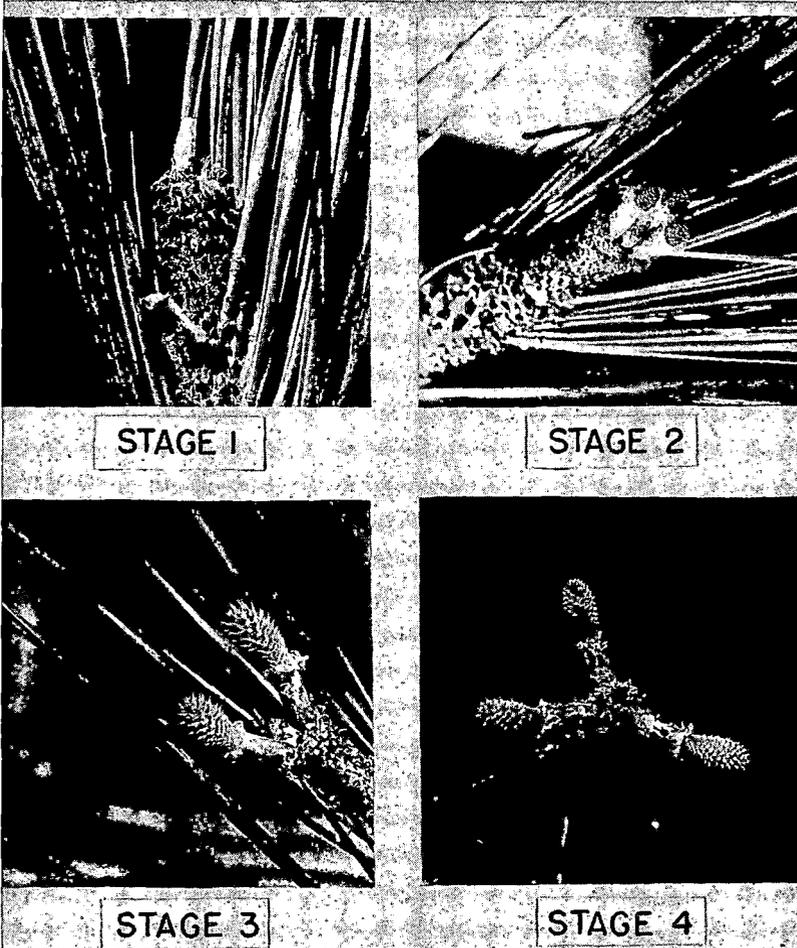
In stage 3, the strobili are ideal for pollination. The strobili are receptive when the ovulate scales have separated and are almost at right angles to the axis of the conelet. At this stage wide spaces between the scales offer easy access to pollen.

The pollen grains drift downward between the scales, lodging upon the rim of the micropyle and upon the micropylar arms. A fluid secretion extends downward from the megasporangium. The fluid, after coming in contact with pollen grains, is shortly withdrawn, and the pollen grains are carried upward with it into a saucer-shaped depression at the top of the megasporangium. The micropyle now closes, the arms wither and the two ovulate scales grow until they become closely pressed together.

The female strobili in stage 4 are closed and no longer receptive to pollen. The ends of the scales have thickened so that they press closely together, with no spaces for pollen to enter. Bags can be removed safely from female strobili at this time.

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In slash pine in Clark County, Georgia, the total elapsed time between stage 1 and stage 3 over a 3 year period averaged 29 days. There is about 15 days of elapsed time between stage 1 and stage 2. There is also about 15 days of elapsed time between stage 3 and stage 4. The female strobili under the bags are similar to the uncovered conelets. The color is lighter and the stem is more elongated, thus separating the scales a little farther apart. If not pollinated, the female strobili will remain in the receptive stage for a longer period of time.



Stages of development of female strobili on *Pinus elliotii* var. *elliotii* used as criteria in controlled pollination. Stage 1, time to bag for controlled pollination; Stage 2, strobili partially developed; Stage 3, about the optimum for pollination; Stage 4, bags may safely be removed from branches covering the female strobili. Photographs by U.S. Forest Service.