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Richard W. Pohl
Iowa State College

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Traditionally the castor bean, *Ricinus communis* L., has been used as a representative endospermous dictotyledon in the study of seed types and germination in elementary botany courses. Such usage occasions great hazard to students, since the seeds are extremely toxic, causing death if taken internally or blindness if rubbed into the eye (Wheeler, 1954).

Because of the dangers of the castor bean, Wheeler recommended several legumes which possess endosperm as substitutes. Most of these are either not available in the eastern United States or are rather small for satisfactory use.

The seed of the Kentucky Coffee Tree, *Gymnocladus dioica* (L.) K. Koch, is very large and possesses abundant endosperm. At first thought, this would seem to be an ideal seed to substitute for castor bean. However, the seeds are extremely hard and refuse to germinate without special treatment.

Wheeler has recommended boiling various legume seeds for fifteen minutes to one hour to soften them for dissection. Such treatment was quite ineffective in softening *Gymnocladus* seeds, and it was found necessary to boil the seeds three to four hours before adequate softening occurred. Boiling for this length of time causes a slight exfoliation of the outer layer of the integument, but does not otherwise damage the seed.

Several methods of speeding germination were tried. Barton (1947) states that soaking *Gymnocladus* seeds in absolute alcohol for seventy-two hours caused swelling of 92 percent of the seeds when subsequently soaked in water. In one trial, twenty-five seeds were soaked in absolute alcohol for this period; germination of the seeds was then attempted in vermiculite. While all seeds absorbed water and softened rapidly, no germination occurred in nineteen days. All seeds were then found dead and decomposing. The alcohol treatment caused fragmentation of a thin, non-cellular horny layer on the seed coat. Such a layer is of common occurrence on the seeds of *Caesalpinoideae* and may account for the impermeability of these seeds to water.

Scarification of the seeds was also attempted by immersion in concentrated sulphuric acid, as suggested in the Woody-Plant Seed Manual (1948). The seeds were treated with acid for eighteen hours, then washed and planted. Considerable exfoliation of the seed coats occurred, but prompt germination ensued and consistently high percentages of normal seedlings developed.

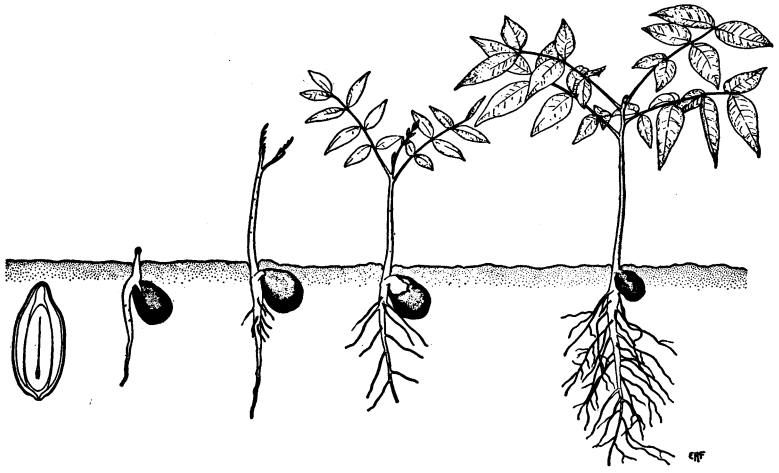

Fig. 1. Germination of *Gymnocladus dioica*. Used by permission of Wm. C. Brown Co.

The seeds of *Gymnocladus* are ovoid, dark brown, with a dull, smooth external surface. They range from 15 mm. to 22 mm. in length. In the dry condition the hard seed coat is tightly adherent to a thin, horny layer of endosperm. The large straight embryo fills most of the seed and has thick, fleshy cotyledons and a very short axis. When the seed is boiled or scarified and soaked in water, the embryo and seed coats soften and the horny endosperm expands greatly, becoming clear and gelatinous. There is a clear distinction in appearance and texture between endosperm and cotyledons. Germination is hypogeal, the first leaves being once-pinnately compound. Seedlings should be available for use about ten days after the seeds are planted.

The Kentucky coffee tree is primarily a plant of the lower Mississippi Basin. It ranges primarily from eastern Ohio to central Alabama, westward to central Michigan, southern Wisconsin and southern Minnesota, to eastern Kansas and the eastern panhandle of Texas (Fassett, 1939). The trees are found in rich woods, especially on river bottoms. The seeds may be harvested in quantities in the fall or spring. The pods are only partially dehiscent and the seeds usually have to be extracted by hand.

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Department of Botany and Plant Pathology
Iowa State College
Ames, Iowa