

1929

Germination of Trees and Shrubs

L. H. Pammel

C. M. King

Copyright ©1929 Iowa Academy of Science, Inc.

Follow this and additional works at: <https://scholarworks.uni.edu/pias>

Recommended Citation

Pammel, L. H. and King, C. M. (1929) "Germination of Trees and Shrubs," *Proceedings of the Iowa Academy of Science*, 36(1), 201-211.

Available at: <https://scholarworks.uni.edu/pias/vol36/iss1/31>

This Research is brought to you for free and open access by the Iowa Academy of Science at UNI ScholarWorks. It has been accepted for inclusion in Proceedings of the Iowa Academy of Science by an authorized editor of UNI ScholarWorks. For more information, please contact scholarworks@uni.edu.

GERMINATION OF TREES AND SHRUBS

L. H. PAMMEL AND C. M. KING

This paper is the twelfth of a series of germination studies of trees and shrubs, which have appeared in proceedings of the Iowa Academy of Science.

The seeds for the present study were mostly collected in Texas and Mexico during January and February of 1929, by L. H. Pammel and were planted in the greenhouse at Iowa State College, during January and February of 1929.

List of species which had germinated May 1, 1929.

URTICALES

Urticaceae

1. *Celtis lacvigata* Willd. Southern Hackberry.

POLYGONALES

Polygonaceae

2. *Brunnichia cirrhosa* Banks. Brunnichia.

ROSALES

Saxifragaceae

3. *Ribes vulgare* Lam. Red Currant.

Leguminosae

4. *Leucaena glauca* (L.). Benth. White Popinac.
5. *Siderocarpus flexicaulis* (Benth). Small Texan Ebony.
6. *Havardia brevifolia* (Benth). Small. Huajillo.
7. *Sesbania macrocarpa* Muhl. Pea Tree.

GERANIALES

Rutaceae

8. *Citrus Medica* var *acris*. Martyn. Lime.
9. *Citrus aurantiacum* L. Sour Orange.
10. *Citrus mitis* Blanco. Calamondin Orange.
11. *Citrus nobilis* var *deliciosa* crossed with *Citrus maxima* Tangelo.

Meliaceae

12. *Melia Azederach* L. China tree.
13. *Melia Azederach* L. China tree. Dwarf form.

Euphorbiaceae

14. *Sapium sebiferum* Roxb. Tallow Tree.

SAPINDALES

Aceraceae

15. *Acer platinoides* L. Norway Maple.
16. *Acr platinoides* var *Schwedleri* K. Koch.

RHAMNALES

Rhamnaceae

17. *Colubrina americana* Nutt. Colubrina.

MALVALES

Malvaceae

18. *Hibiscus syriaca* L. Shrubby Althaea.

GENTIANALES

Oleaceae

19. *Fraxinus Berlandieriani* DC. Berlandier's Ash.

POLEMONIALES

Bignoniaceae

20. *Tecoma radicans* (L.) Juss. Trumpet Creeper.
21. *Tecoma stans* Juss. Yellow Elder.

Descriptions of seedlings follow:

URTICALES

Urticaceae

Celtis laevigata Willd. Southern Hackberry. (A form evidently distinct from *C. mississippiensis* Bosc.)

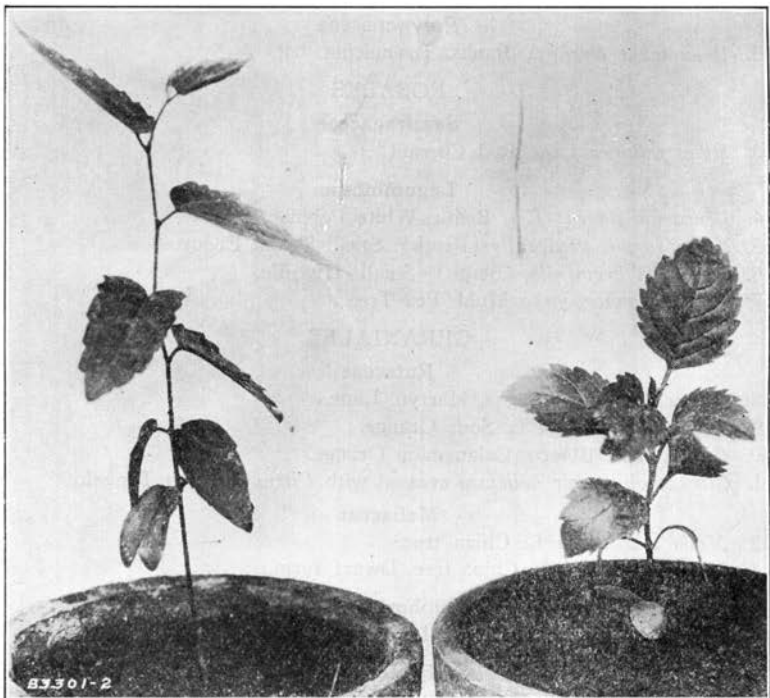


Fig. 12. Southern Hackberry, *Celtis laevigata* (left). Yellow Elder, *Tecoma stans* (right). Showing cotyledons (one only in each exhibited) and early leaves. Photographed by Photo Sect., Ia. Agr. Exp. Sta.

Seeds collected at Brownsville, Texas, Feb. 20, 1929, were planted in the greenhouse March 1 and germinated April 18.

Germination epigeaeous. Straight tap root.

Cotyledons petioled, elliptical, notched at apex, prominently veined, paler below.

First and second leaves nearly opposite. Stem pubescent. Succeeding leaves alternate. Leaves elliptical, coarsely dentate, prominently veined, rough on both sides. Petiole short. Stem pubescent slightly zig-zag.

POLYGONALES

Polygonaceae

Brunnichia cirrhosa Banks. Brunnichia.

These seeds are enclosed in a three-sided involucre.

Collected at San Benito, Texas, February 24, 1929, planted in greenhouse March 1, germinated freely March 28.

Germination epigeaeous. Hypocotyl whitish.

Cotyledons fleshy, elliptical, paler beneath.

Petiole grooved.

Leaves simple, alternate. First leaf cordate, rounded at base, tapering toward apex. Sinus narrow. Lower surface paler, veins prominent, mid-vein reddish.

Young leaves and petioles with some purplish-red coloring. Petioles swollen at attachment to the stem.

Second and third leaves like the first.

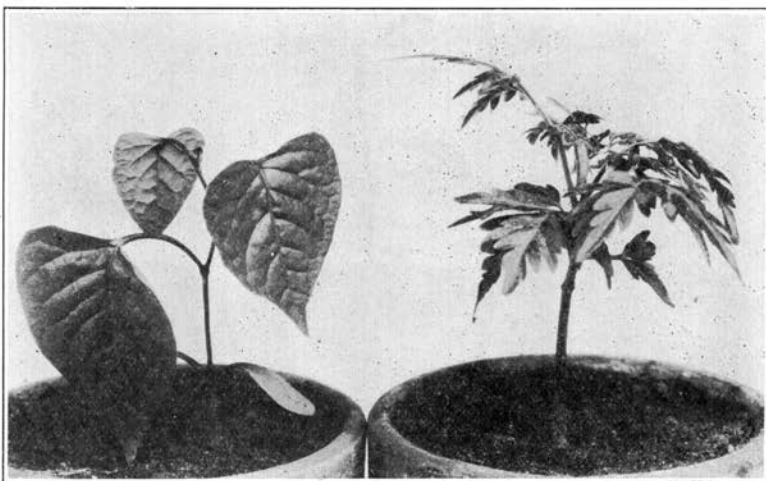


Fig. 13. Dwarf China tree, *Melia Azedarach*. Showing early leaves, Cotyledon dropped. *Brunnichia, Brunnichia cirrhosa*. Showing cotyledons and early leaves. Photographed by Photo Sect., Ia. Agr. Exp. Sta.

ROSALES

Saxifragaceae

Ribes vulgare Lam. Red Currant.

Seeds collected at Ames, July 4, 1928, from ripe fruit, planted in pots, and left standing under garden shrubs.

Germinated 100 percent April 10, 1929.

Germination epigeaeous. Hypocotyl pale, from 1 to 2 inches long. Well developed root system while seedling has yet but one leaf.

Cotyledons 1/3 in. long, elliptical, 3-veined, the pair often bringing the seed coat above ground upon their tips.

Petioled with scattered hairs on margin, and on petiole.

First leaf roundish, cordate at base, 3-lobed pointed. Margin of leaf doubly serrate. Palmately conspicuously veined. Scattered hairs above, below, along margin and on petiole.

Second leaf like the first.

Leaves simple.



Fig. 16. Red Currant, *Ribes vulgare*. Showing cotyledons, first and second leaves. Drawn by C. M. King.

Leguminosae

Leucaena glauca (L.) Benth. White Popinac.

A plant both cultivated, and native.

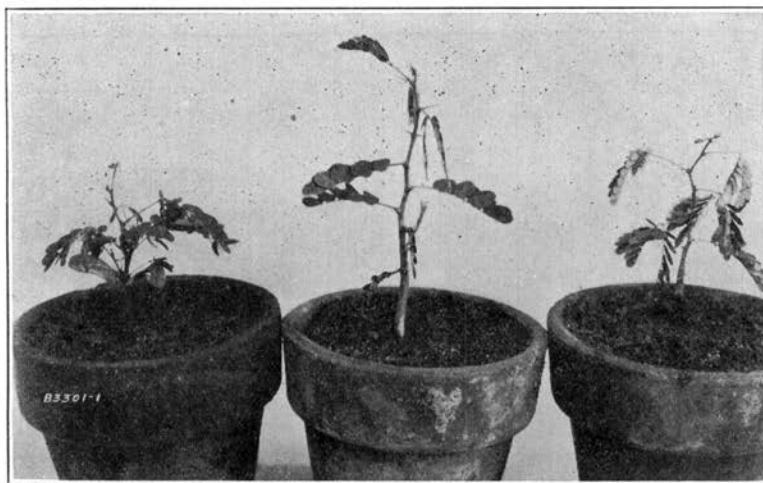


Fig. 15. White Popinac, *Leucaena glauca* (left). Showing cotyledons and early leaves. Texan Ebony, *Siderocarpus flexicaule texensis*. Showing early leaves, folded. Huajillo, *Havardia brevifolia*. Showing early leaves folded. Photographed by Photo Sect., Ia. Agr. Exp. Sta.

Seeds collected at Rio Grande City, March 2, 1929, planted in the greenhouse March 8, germinated March 24.

Germination epigaeous.

Cotyledons sagittate, very short petioled, fleshy, $\frac{3}{4}$ inch long.

First leaf pinnately compound, 7 pairs of elliptical leaflets.

Second leaf bipinnate, each pina with leaflets and short terminal spine.

Leaves 3 to 6 bipinnate, each pinna with 5 pairs of leaflets and short terminal spine.

Scattered hairs on stems, petioles and leaves.

(See Lubbock, Seedlings 1:471.)

Siderocarpus flexicaule (Benth). Small Texan Ebony.

Seeds of this tree were collected at Brownsville, Texas, February 14, 1929, planted in the greenhouse February 25, and germinated two seeds March 10, third seed May 6.

Germination hypogaeous. Cotyledons remain in the seed coat, below ground.

Leaves alternate. First pinnately compound with 7 pairs of leaflets, elliptical and paler beneath. Second with 8 pairs of leaflets. Succeeding leaves bipinnate, pinnae each with 6 pairs of leaflets,

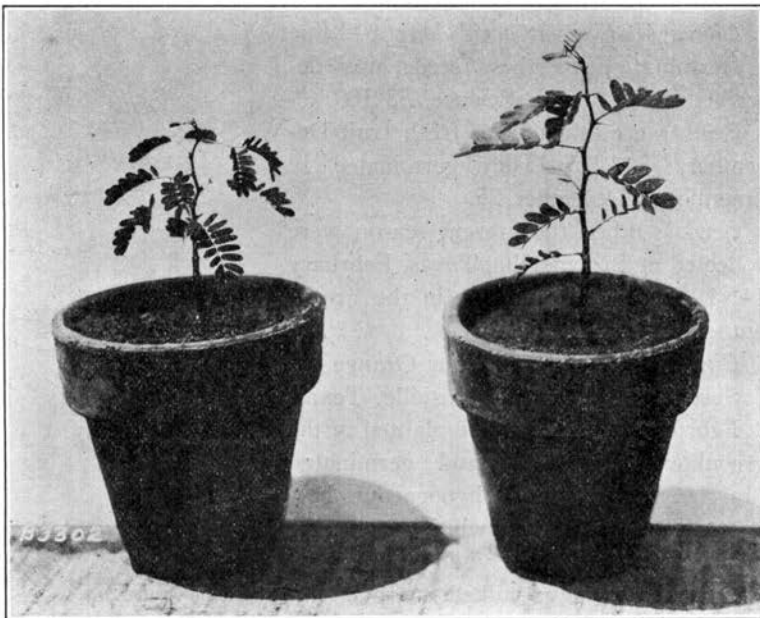


Fig. 14. Huajillo, *Havardia brevifolia*. Texan Ebony, *Siderocarpus flexicaule texensis*. Showing leaves expanded. Photographed by Photo Section, Ia. Agr. Exp. Sta.

one leaflet at the base, being absent and represented by a spine. The absent leaflets are the ones opposite each other at the bases of the pinnae.

Stipules spiny. Petioles slender. Leaves sensitive.

Stems pubescent.

Havardia brevifolia (Benth). Small. Huajillo.

Seeds were collected at Olmito, Texas, February 14, 1929. Planted in the greenhouse February 25 they germinated March 8. Cotyledons not observed.

First and second leaves alternate, pinnate, leaflets of each in 5 pairs.

A stout spine at the base of each petiole. Leaves 3-7 like first two. The eighth leaf bipinnate. Stem slightly pubescent.

Sesbania macrocarpa Muhl. Pea Tree.

Seeds collected at College Station, Texas, January 19, 1929, planted in greenhouse January 25, germinated freely, beginning February 24. Earlier description of this species occurs in Proc. Ia. Acad. Sci. 27:78-79, in which seeds from South Carolina, planted November 12, 1918, germinated April 1 and April 20.

GERANIALES

Rutaceae

Citrus Medica var *acris*. Martin. Lime.

Germination of these seeds was described in Ia. Acad. Science, 33:109.

Seeds were taken from fresh fruit December 1, 1925. They germinated in greenhouse December 25.

Seeds studied the present season were collected at Brownsville, Texas, February 14, 1929, and germinated in the greenhouse March 27, 1929.

Citrus Aurantium L. Sour Orange.

Seeds collected at Brownsville, Texas.

February 22, 1929, were planted in the greenhouse March 1 and germinated March 28. Germination hypogaeous. Hypocotyl arched at first, whitish becoming green. First leaf oval, vivid deep green, alike on both sides; stalked, margin with fine serrations. Base of petiole swollen.

Seeds sometimes polyembryonic.

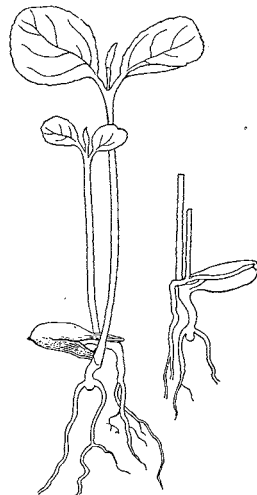


Fig. 1. Sour Orange *Citrus Aurantium*. Showing two seedlings from one seed. At right seed divested of seed coat. Seedlings showing first pair of leaves. Drawn by C. M. King.

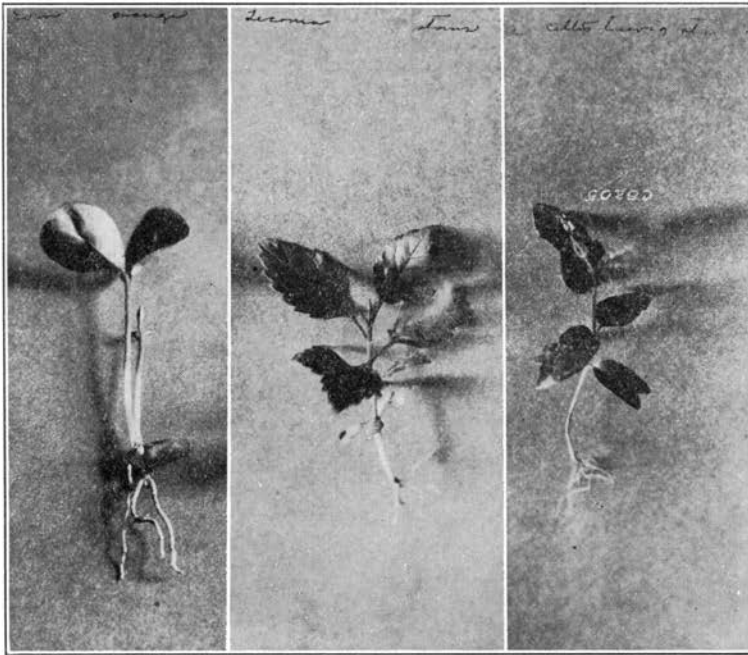


Fig. 8. Sour Orange, *Citrus Aurantium*. Showing polyembryonic seed and first leaves. Y-le low Elder, *Tecoma stans*. Showing cotyledons and early leaves. Southern Hackberry, *Celtis laevigata*. Showing cotyledons and early leaves. Photographed by Photo Sect. Ia. Agr. Exp. Sta.



Fig. 9. Calamondin Orange, *Citrus mitis*. Showing cotyledons remaining within seed coat, and Tangelo. *Citrus nobilis* var. *deliciosa*, crossed with *C. maxima*. Showing polycarpal seed, two seedlings. Photographed by Photo Section, Ia. Agr. Exp. Sta.

Citrus mitis Blanco. Calamondin Orange.

Seeds collected from fruit at Brownsville, Texas, January 5, 1929.

Planted in greenhouse March 13, seeds germinated April 15. Germination hypogaeous. The growing hypocotyl arched, white becoming green.

First pair of leaves opposite. Petiole compressed, jointed.

Citrus nobilis var. *deliciosa*, crossed, with *Citrus maxima* Merr. Tangelo. A cross between tangerine and grapefruit.

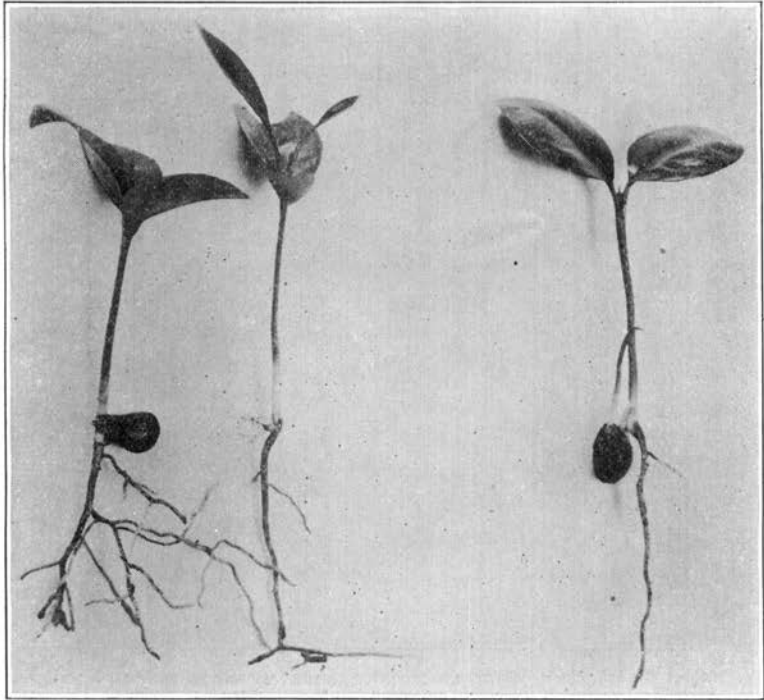


Fig. 11. Calamondin Orange, *Citrus mitis* (2 at left). Tangelo, *Citrus nobilis* var. *deliciosa*, crossed with *C. maritima*. Showing cotyledons remaining within seed coat, and early leaves. Photographed by Photo Sect., Ia. Agr. Exp. Sta.

Seeds of the above were collected at Brownsville, Texas, February 14, 1929.

Planted in the greenhouse February 25, they germinated freely March 28. Germination hypogaeous. Cotyledons stalked, fleshy. First leaf broad, smooth, upper surface dark.

Meliaceae

Melia Azedarach L. China-tree.

Seeds collected at College Station, Texas, January 29, 1929, were planted February 1, germinated freely, beginning February 24.

This species was described in Proc. of Ia. Acad. of Sci. 1924. Seeds collected at Hansboro, Miss., January 25, were planted January 29 in the greenhouse and germinated freely, beginning March 1.

Melia Azedarach L. China tree. Dwarf form.

Seeds collected at San Benito, Texas, from February 24, 1929, were planted in the greenhouse



Fig. 10. Dwarf China tree, *Melia Azedarach*. Showing cotyledons and first two leaves. Drawn by C. M. King.

March 1, and germinated freely March 31. Germination epigeaeous. Hypocotyl at first notched.

Cotyledons narrow elliptical, stalks smooth on both sides. First pair of leaves opposite, yellowish green, smooth, three-lobed, basal lobes narrow, lobes deeply dentate.

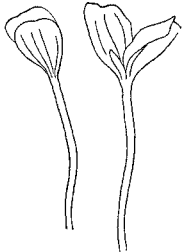


Fig. 5. Tallow tree, *Sapium sebiferum*. Showing cotyledons. Drawn by C. M. King.

Euphorbiaceae

Sapium sebiferum Roxb. Tallow tree.

Seeds collected at Brownsville, Texas, March 5, 1929.

Planted in the greenhouse March 13, one seed germinated April 20. Germination epigeaeous. Hypocotyl green, stout. Cotyledons fleshy, ovoid, elliptical.

SAPINDALES

Aceraceae

Acer platinoides L. Norway Maple.

Seedling taken from under parent tree April 28, 1929, apparently of about two weeks growth above the surface of the ground. Germination epigeaeous.

Cotyledons strap-shaped, 1½ inches in length, distinctly 3-nerved. Hypocotyl, deep reddish in color.

First pair of leaves cordate, serrate at angles of leaf, widest halfway between base and apex.

Leaf strongly 5-veined, from the base.

Leaf thin, bright green, smooth.

Succeeding leaves opposite, shape as in first pair, widening to the characteristic shape of this maple leaf.

Acer platinoides var. *Schwedleri* K. Koch. Red Maple.

Numerous seedlings appeared under the parent tree on the campus of Iowa State College in April, 1929.

Seedling studied, of four weeks' growth.

Hypocotyl red; a reddish coloring appearing throughout the young plant.

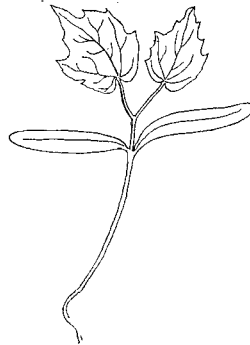


Fig. 3. Norway maple, *Acer platinoides*. Showing cotyledons and first pair of leaves. Drawn by C. M. King.

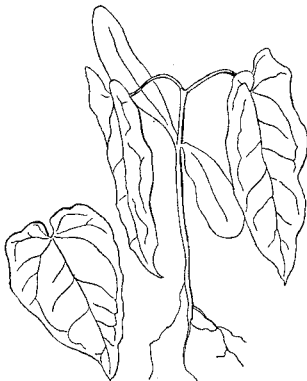


Fig. 2. Red Maple, *Acer platinoides* var. *Schwedleri*. Showing cotyledons and first pair of leaves (leaf at left shows form). Drawn by C. M. King.

Epigealous. Cotyledons strap-shaped, length $1\frac{3}{4}$ inches, width $\frac{1}{3}$ inch, smooth, firm in texture.

First pair of leaves, ovate-lanceolate, cordate at base, narrowed toward apex; reticulately veined, 5 strong veins springing from the base. Leaf reticulately veined. Margin entire.

RHAMNALES

Rhamnaceae

Colubrina americana Nutt. Colubrina.

Seeds were collected at Loma Alta, Texas, February 23, 1929, and planted in the greenhouse, March 1. Germinated March 20.

Germination epigealous. Hypocotyl yellowish.

Cotyledons elliptical, fleshy, sessile. First pair of leaves broad ovate, yellowish green, $\frac{1}{2}$ inch in length.

Leaves and petiole with fine dark markings.

Second pair like the first.



Fig. 7. *Colubrina americana*. Showing cotyledons and early leaves. Drawn by C. M. King.

MALVALES

Malvaceae

Hibiscus syriaca L. Shrubby Althaea.

Seeds were collected at Columbia, Mo., January 19, and germinated very freely February 20.

Earlier description of this species is given in Proc. Ia. Acad. Sci., 1928.

Seeds collected at Lexington, Ky., January 5, 1928, germinated freely in the greenhouse, January 31.

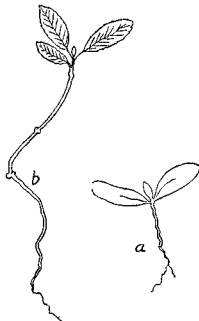


Fig. 6. Seedlings of Berlandier's Ash, *Fraxinus Berlandieriani*. Showing cotyledons (a), and early leaves (b). Drawn by C. M. King.

GENTIANALES

Oleaceae

Fraxinus Berlandieriani DC. Berlandier's Ash.

Seedlings were collected from under parent trees, at San Benito, Texas, March 8, 1929, by L. H. Pammel and Paul Cottrell.

Germinated epigealous.

Radicle whitish, epicotyl green, smooth, cotyledons somewhat fleshy, entire, pinnately veined.

Leaves opposite. First and second leaves early deciduous. Stem roundish. Third leaf, margin slightly crenate, leaf small, lanceolate. Fourth leaf larger, crenate, pinnately veined, midvein conspicuous. Stem soon becoming woody.

Eighth pair of leaves lanceolate, prominently veined, long petioled.

Under surface of leaves paler.
First 8 pairs of leaves simple.

POLEMONIALES

Bignoniaceae

Tecoma radicans (L) Juss. Trumpet Creeper.

Seeds collected at Columbia, Mo., January, 1929, were planted in the greenhouse January 10. First germination February 24.

Earlier description of this species is given in Proc. Ia. Acad. Sci., 1927, in which seeds from Pittsburg, Iowa, were planted in greenhouse December 7, 1926, and germinated December 24, January 1 and January 10.



Fig. 4. Yellow Elder, *Tecoma stans*. Showing one of the lobed cotyledons and first two leaves. Drawn by C. M. King.

Tecoma stans Juss. Yellow Elder.

Seeds collected at San Benito, Texas, February 24, 1929.

Planted in greenhouse March 1, and germinated March 20.

Germination epigealous. Cotyledons wide at base, 2-lobed, smooth.

First pair of leaves opposite ovate, acuminate, simply dentate, pale beneath. Second and third pairs of leaves simple, coarsely dentate. No stipules.

GERMINATION OF TREES AND SHRUBS

L. H. PAMMEL AND C. M. KING

This paper is the twelfth of a series which has appeared in the Proceedings of the Iowa Academy of Science.

Seeds for this study were collected in the south during January and February, 1929, by L. H. Pammel. They were germinated in the greenhouse at Iowa State College.

Description of about twenty-two species are included in this paper, in which they are described and drawn.