

Proceedings of the Iowa Academy of Science

Volume 29 | Annual Issue

Article 58

1922

Germination Studies of Some Shrubs and Trees

L. H. Pammel

Iowa State College

C. M. King

Iowa State College

Copyright © Copyright 1922 by the 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. (1922) "Germination Studies of Some Shrubs and Trees," *Proceedings of the Iowa Academy of Science*, 29(1), 257-266.

Available at: <https://scholarworks.uni.edu/pias/vol29/iss1/58>

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 STUDIES OF SOME SHRUBS AND TREES

L. H. PAMMEL AND C. M. KING

A study has been made by the Botanical Department of Iowa State College during the past season of the germination of the following: *Quercus Gambellii*, *Pasania densiflora*, *Maclura pomifera*, *Prunus caroliniana*, *Rhus Toxicodendron*, *Rhus canadensis*, *Gleditsia aquatica*, *Rhamnus californica*, *Rhamnus tinctoria*, *Lycium halimiflorum* and *Shepherdia argentea*.

Descriptions of the seedlings of these plants, with an account of the conditions under which the seeds germinated are herein given. Previous papers may be found in Proceedings of the Iowa Academy of Science.

Quercus Gambellii. Nutt. Gambell's Oak.

Locality of specimen, Salt Lake City;

Collected September 16, 1921, by L. H. Pammel.

These acorns were placed in soil on the greenhouse bench October 1, 1921; they began to show sprouts above ground the middle of December.

The acorn fruit of this species is almost sessile; the cup is $\frac{1}{2}$ to $\frac{2}{3}$ of an inch in diameter, hemispherical, covering about $\frac{1}{3}$



Fig. 1. Seedling of *Quercus Gambellii*. Acorns of the same oak
Drawn by C. M. King

of the acorn. Acorns barrelshaped, obtuse at apex, about $\frac{2}{3}$ of an inch to one inch in length, color medium yellowish brown.

Germination hypogaeous. Scales of the young stem small, wooly pubescent, soon falling. Stem hairy. First leaf entire, smooth; second and third slightly dentate, prominently veined, pubescent on petioles and midrib, hairy on margin; Stipules reddish, glandular, bearing slender hairs about $\frac{1}{60}$ to $\frac{1}{75}$ inch in length. Leaves become dark green above, paler beneath. The upper surface of the later leaves smooth, glaucous, pubescent on midrib; Lower surface smooth. Outline rounded becoming lobed.

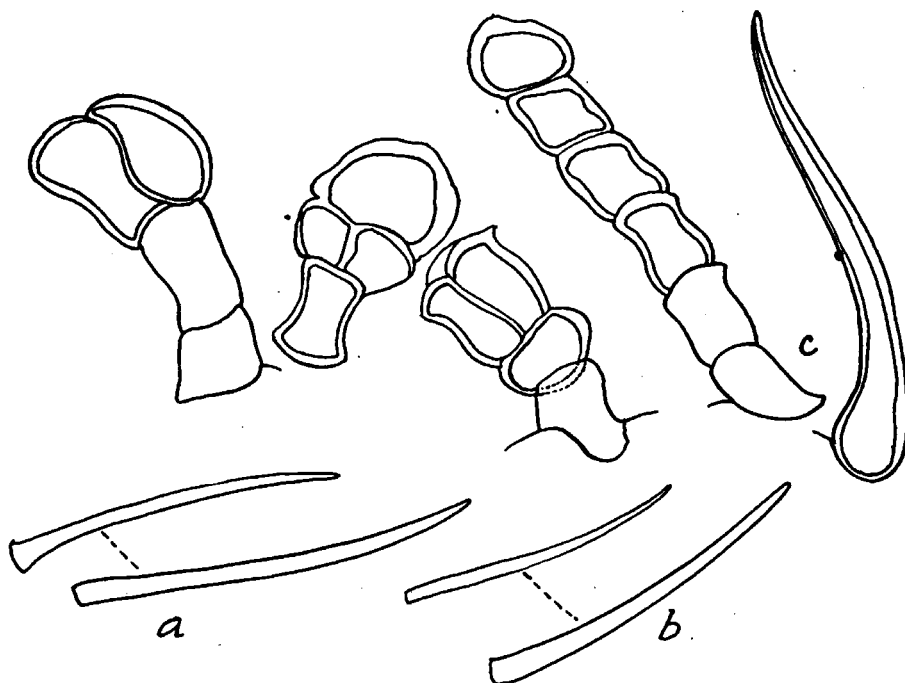


Fig. 2. Trichomes of *Quercus Gambellii*; (a) simple hairs from leaf margin, (b) from stem, (c) from stipules: glandular hairs and simple trichome

Drawn by C. M. King

Trichomes. The stem bears numerous minute hairs; simple, colorless sharp-pointed, about $\frac{1}{60}$ inch in length. The hairs upon the stipules are larger ($\frac{1}{30}$ inch) clear, colorless, slender, pointed.

The trichomes of the upper side of the leaf vary from simple slender sharp-pointed hairs to stellate trichomes with several (2-5) rays. Upon the under side of the leaves the hairs are simple.

Along the margins of the leaves are numerous colorless hairs.

Pasania densiflora Oerst.

Specimens collected near Redlands, California, September, 1921, by L. H. Pammel.



Fig. 3. Seedling of *Pasania densiflora*. Acorns of same tree
 Drawn by C. M. King

Planted in the greenhouse October 1, 1921. Seedling appeared at the surface of the ground the middle of December. The fruit about $1\frac{1}{2}$ inches long, nearly an inch in diameter, ovoid, gently rounded to the apex; woolly about the apex, color uniform light brown. Cup shallow, bracts spreading. Germination hypogaeous.

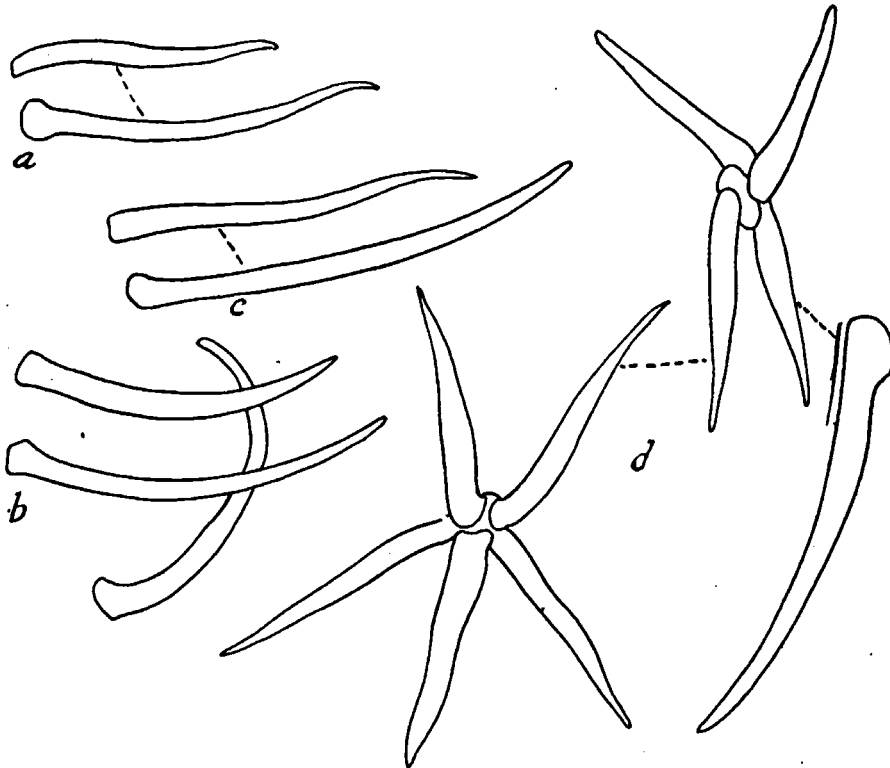


Fig. 4. Trichomes from seedling of *Pasania densiflora*; (a) stem, (b) leaf margin, (c) stipules, (d) stellate and simple hairs from upper surface of leaf

Drawn by C. M. King

Hypocotyl slightly pubescent. Early scales upon the stem, small.

First leaf $\frac{3}{8}$ of an inch in length; lower surface puberulent, stipules green, fugacious; upper surface puberulent. Second leaf bright green below, prominently veined, coarsely dentate; upper surface puberulent, margin slightly hairy. Third leaf much like the second; coarsely dentate. Young shoots of rusty color.

Trichomes. The hairs upon the stem are numerous, simple, slender, sharp-pointed, $\frac{1}{100}$ to $\frac{1}{50}$ of an inch in length.

Upon the stipules are simple hairs (from $\frac{1}{75}$ to $\frac{1}{60}$ inch) and numerous glandular hairs composed of three to seven cells; the terminal cells are in groups of two or three; these with some of the preceding simple cells, have a yellowish content; the basal cells are colorless.

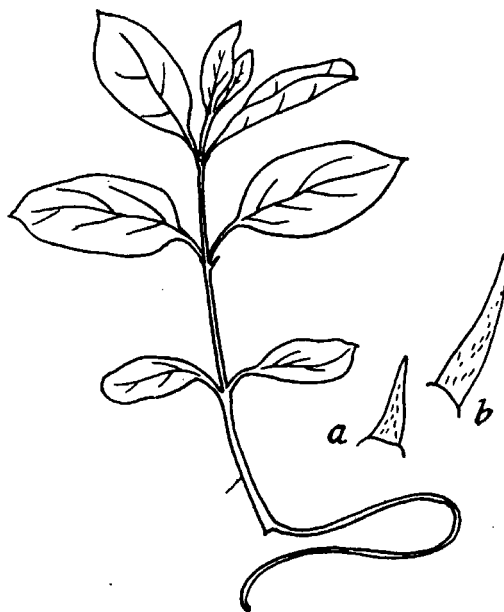


Fig. 5. *Maclura pomifera*, seedling with hairs (a) from leaf edge, (b) from stem
 Drawn by C. M. King

Maclura pomifera. (Raf.) Schneider. Osage Orange.

The seedling of osage orange studies was brought in July 10 from locality of Ames.

The two cotyledons, thick, oval, obtuse, entire; petiole short; shining dark green above, paler beneath, pinnately nerved.

Stem erect, terete, herbaceous, becoming woody; covered with short hairs; first internode one inch in length. First pair of leaves lanceolate, entire acuminate, bearing minute hairs; pinnately nerved. Petioles hairy, short, channelled. Stipules acute, hairy.

Fig. 6. Seedling of *Prunus caroliniana*

Drawn by C. M. King

Prunus caroliniana. Ait. Mock Orange.

Seeds received from Dr. Morton, Greenville, South Carolina. Stratified out of doors in garden soil through the months of January and February, 1922; winter mild. Planted about March 1 in greenhouse. Germinated April 1.

Germination hypogaeous, seed remaining below the surface.

Leaves alternate, first two small, $\frac{1}{4}$ inch long, the following leaves increasing in size, light bright green. Leaves laurel-like, firm, entire. Petioles short. Stem reddish, slightly clothed with fine hairs. Hairs on petiole and scattered along margin of leaves.

Rhus Toxicodendron. L. Poison Ivy.

Seeds stratified out of doors. Planted in greenhouse February, 1922. Cotyledons appeared March 28.

The stem below, slightly reddish, broadly elliptical, about $\frac{1}{2}$ inch in length, stalked; slightly reddish above, lower surface paler and greener in color. Surface smooth, midrib prominent, lateral veins distinct. Leaves alternate, petioled, compound with three leaflets.

The lateral leaflets with prominent dentate teeth, midrib conspicuous, lateral veins prominent, smooth, lower surface pale, upper surface reddish. Second leaf like the first; terminal leaflet larger than the others, prominently dentate; margins hairy; stem slightly pubescent.

Trichomes. On edges of leaves, small, colorless; on stem small, weak, colorless.

Rhus canadensis. Marsh.

Seeds collected at Salt Lake City, September, 1921, by L. H.

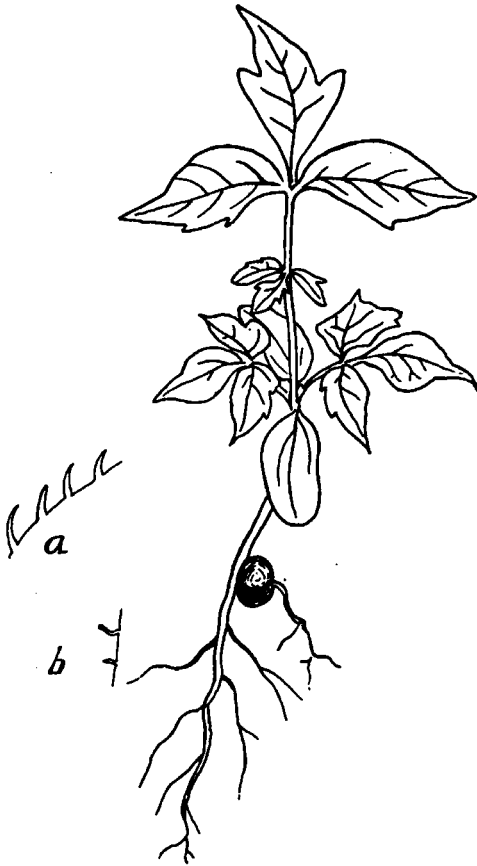


Fig. 7. Seedling of *Rhus Toxicodendron*.
Trichomes, edge of leaf (a); stem (b)
Drawn by C. M. King



Fig. 8. Seedling of
Rhus canadensis
Drawn by C. M. King

Pammel. Planted in greenhouse October 1. Showed germination the middle of December.

Germination epigaeous. Hypocotyl reddish, surface granular. Cotyledons somewhat fleshy, long stalked, petiole grooved, reddish. Cotyledons green upon both surfaces. Stem above the cotyledons, granular or scurfy, whitish. First leaf 3-parted, long petioled; the leaflets prominently veined, smooth upon both surfaces; first pair of leaflets entire, terminal leaflet serrate. Second leaf like the first, except that each leaflet is coarsely 3-lobed; leaflets smooth.

Gleditsia aquatica. Marsh. Water Locust.

This seed was supplied by Dr. Morton of Greenville, South Carolina. The seeds were placed out of doors in garden soil during the months of January and February, 1922; the winter was mild.

The last of February they were planted in pots in the green-

Fig. 9. Seedlings of *Gleditsia aquatica*

Photo by E. H. Richardson

house. May 1 the large cotyledons appeared above the soil, followed by strong rapid growth of the young plant.

Germination epigaeous. Cotyledons fleshy, elliptical, sessile; at first yellowish becoming bright green above, paler beneath; stem below the cotyledons smooth, whitish.

Cotyledons lifted out of the soil in position parallel to the stem, base first. Leaves alternate, leaflets at first appressed. Leaves pinnately compound, leaflets oval, about seventeen in number.

Rhamnus californica. Eschscholtz. California Buckthorn.

Seeds obtained by L. H. Pammel, at Yosemite Park, California.

Seeds scratched and planted in greenhouse January 16, 1922. Germinated February 25, 1922.

Germination hypogaeous. Young stem reddish below, slightly

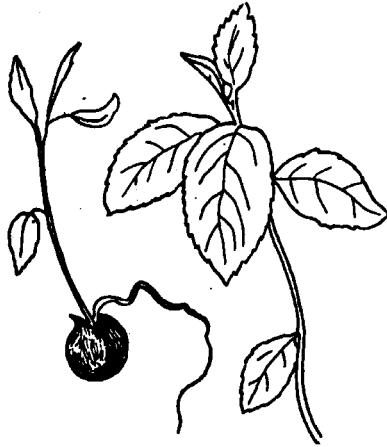


Fig. 10. *Rhamnus californica*. Seedlings at two stages, early stage showing outer seed-coat raised on tip of cotyledons

Drawn by C. M. King

puberulent. First leaves alternate, stipules small. First leaf finely serrate, 3d and 4th more coarsely serrate. The broad base of these leaves broadly ovate, prominently veined, bright green above, shiny; paler beneath. Stem between the 2d, 3d, 4th and 5th leaves more pubescent than below.

Rhamnus tinctoria. Waldst and Kit.

The seeds of this species were received from the Brooklyn Botanic Garden and planted in the greenhouse the last week of March. The first seedling germinated June 15.

Germination epigeaus. Cotyledons obcordate, prominently reticulately veined, pale green below, dark green above. Stem, and stalk of cotyledon slightly granular.

First and second leaves small, alternate; stipules erect, glandu-



Fig. 11. Seedling of *Rhamnus tinctoria*, two stages

Drawn by C. M. King

lar pubescent. First leaf lanceolate, serrate, pale below, dark green above. The midrib of the first leaf with minute hairs. Third and succeeding leaves similar to first, except somewhat larger.



Fig. 12. *Shepherdia argentea*, seedling two stages, early stage, showing outer seed-coat raised on tip of cotyledons

Drawn by C. M. King

Shepherdia argentea. Nutt. Buffalo Berry.

The seeds were planted in the greenhouse March 6, 1922.

Germination took place about July 1.

The seed covering is lifted above the ground on the tip of the emerging cotyledon.

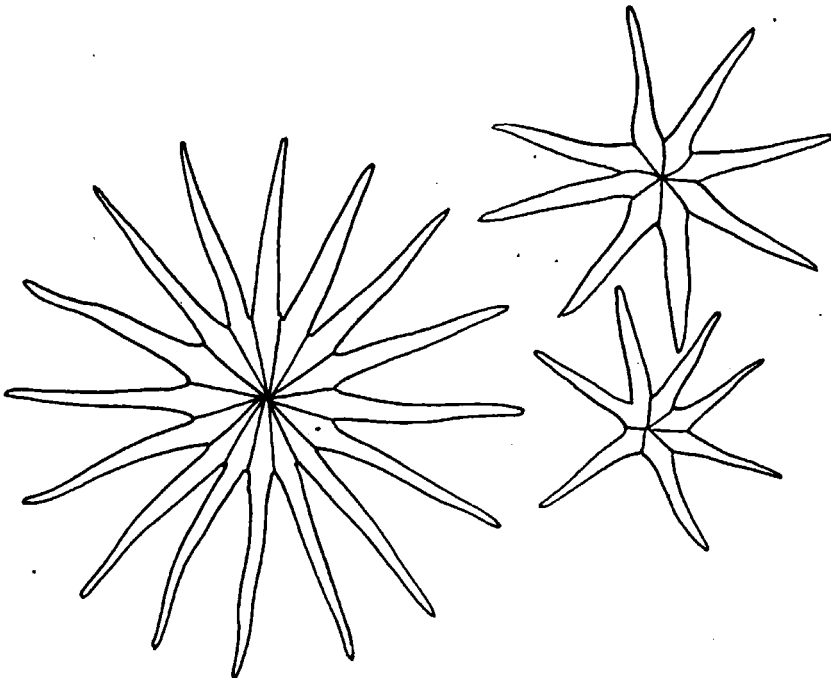


Fig. 13. Stellate trichomes from leaf of *Shepherdia argentea*

Drawn by C. M. King

Hypocotyl smooth, green, about one-half inch in length. Cotyledons oblong, obtuse, about $\frac{1}{3}$ of an inch long, round auricled to cordate at the base, somewhat thick, bright green, surface granular above.

Stem slightly hairy, green. First internode $\frac{1}{3}$ to $\frac{1}{2}$ of an inch long; first pair of leaves opposite, lanceolate, acute, entire, midrib prominent, both sides bearing numerous stellate hairs. Second pair of leaves slightly larger, less acute, venation more distinct. Leaves with numerous characteristic stellate hairs above and below; petioles short.

Trichomes. On both sides of the leaves are borne stellate hairs, of three to sixteen rays. These hairs are colorless. They give the leaves a scurfy appearance.



Fig. 14. Seedling of *Lycium halimiflorum*

Drawn by C. M. King

Lycium halimiflorum. Mill. Common Matrimony Vine.

The seeds of this plant were gathered from the vines in March, 1922. They were planted in the greenhouse on March 17, 1922.

April 20, cotyledons appeared; slender lanceolate, pale below, green above; smooth stem slightly reddish.

Leaves alternate, entire, crowded, oblong to spatulate — lanceolate. Petiole grooved. Branchlets appearing in axil of leaves.