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DISTRIBUTION OF ARIZONA WILD COTTON

(*THURBERIA THESPESIOIDES*)

By Herbert G Hanson
Assistant Professor of Biology
Tucson, Arizona, April 15, 1928

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Assistant Professor of Biology, University of Arizona

Introduction

Arizona wild cotton (*Thurberia thespesioides* A. Gray) is a very important plant in Arizona because it is the native host plant of the wild cotton boll weevil (*Anthonomous grandis thurberiae*). Coad showed, in 1914, that this weevil would feed on cultivated cotton. In 1920, when cotton was grown in a number of fields along Rillito River, near Tucson, five widely separated cotton fields were found infested. Hensley, in 1921, working under the State Entomologist, found the weevil in cultivated cotton near Continental, in the Santa Cruz Valley about thirty miles south of Tucson. He also found it in cultivated cotton near Old Fort Lowell on Rillito River, east of Tucson. So it has been fully proved that the wild cotton boll weevil will infest and damage cultivated cotton. Other insects occurring on *Thurberia* may prove destructive to cultivated cotton.

In order to protect Arizona cotton fields from infestation it is necessary to have accurate and complete information concerning the distribution and abundance of the wild cotton and the weevil. When this information is available, appropriate measures, such as the establishment of cotton-free zones, eradication of wild cotton, or other measures can be taken to safeguard the cotton industry of the State. The purpose of this paper is to bring together in a clear, usable form all the information that has been gathered on the distribution of the plant. At present, this information is scattered in botanical magazines, in bulletins and reports of the United States Department of Agriculture and of the Arizona Commission of Agriculture and Horticulture, and as unpublished observations by reliable men. This paper, by presenting the available data on *Thurberia*, will serve to avoid duplication of scouting and to show what additional work on distribution is necessary in order to protect the cotton fields.

DESCRIPTION OF ARIZONA WILD COTTON.

In 1855 Asa Gray published the botanical name and description of the Arizona wild cotton from specimens collected in Mexico. It belongs to the cotton family (*Malvaceae*), and is closely related to cotton (*Gossypium*). It is a perennial shrub or low tree, ranging from two or three feet to over ten feet high. Under favorable conditions it may grow from a seedling to a height of five to ten feet in a single season. The stems near the base in larger plants are often two to two and one-half

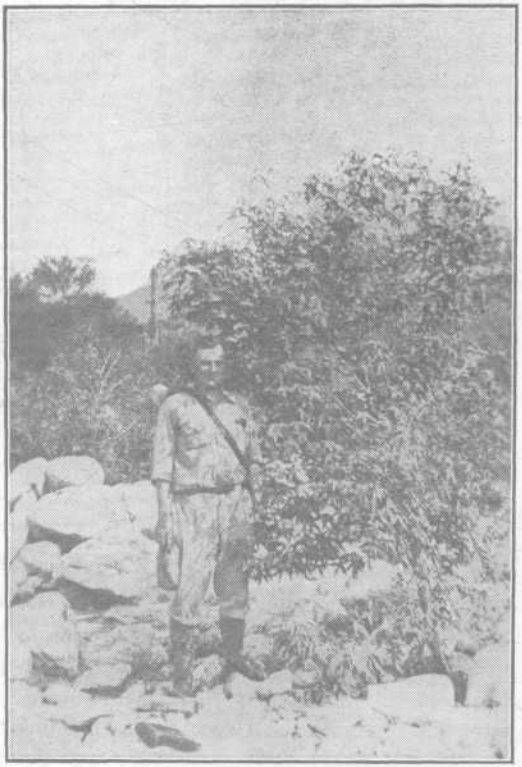

Fig. 1.—A Thurberia plant growing in a wash on the south slope of the Santa Catalina Mountains, near Tucson, Arizona. August 26, 1919.

inches in diameter. It resembles cotton in habit of growth in that there is usually one main stem with numerous lateral branches. Blooming begins usually in August and continues through September into October. The upper branches bear more flowers and fruits than the lower branches. The leaves are palmately cleft or parted into three to five parts. A large number of flower buds are produced. The flowers, usually white, but varying to pink, range from one and one-half to two and one-half inches in diameter. The plant is strikingly hand-

some with its open growth, bright green, glossy foliage, reddish stem and attractive flowers. (See Fig. 1.) In the field it is quickly recognized against a glaring gray background of rocks and sand. (See Fig. 2.) The fruit is a small pod or boll from one-half to three-fourths of an inch in length and about one-half of an inch in diameter. It is divided usually into three chambers but, occasionally, into four or five. Each chamber contains about five dark brown, angular seeds arranged in two rows. Each seed is about five millimeters long and three to four millimeters wide. At first glance the seeds appear naked, but closer examination shows a thin coat of hairs less than a millimeter thick and closely appressed to the seed. On the inner wall of the boll, arranged along the lines where the pod breaks open, are white hairs four to five millimeters long. These hairs make the ripe, open pods resemble somewhat the cotton boll. The outside surface of the pod, the petals, sepals, flower stalks, and smaller stems are rather densely dotted with small black glands.

PREVIOUS INVESTIGATIONS.

Late in 1912, O. F. Cook, of the Bureau of Plant Industry, and Harold Bell Wright discovered the wild cotton boll weevil and its work in the capsules of wild cotton plants in the Santa Catalina Mountains, near Tucson. This discovery was described by Cook early in 1913. (4.) As early as July 4, 1903, Professor J. J. Thornber had collected the plant in Stone Cabin Canyon in the Santa Rita Mountains. In 1912 (13) he described briefly and recommended it for ornamental planting. On account of the close relationship of *Thurberia* to cotton, the United States Department of Agriculture had also paid some attention to it for three or four years previous to 1912, in connection with cotton breeding work. In August, 1913, Pierce and Morrill (10, 11) spent two weeks scouting for and examining wild cotton plants in Fish Creek Canyon, another canyon near Roosevelt, in the Santa Catalina Mountains, and in the Santa Rita Mountains. From October 19 to November 15, 1913, Vernon Bailey (1) studied the distribution, abundance, and habits of the plant in various parts of Arizona. The briefness of his survey probably accounts for some inaccurate statements, such as "naked seeds" and "sotol and blue oak are invariably with it." Schwartz and Barber (12) in a period of two months from November, 1913, to January, 1914, visited many places in Arizona studying the distribution of *Thurberia*. From April 16 to November 16, 1914, Coad (2,3) studied very carefully the biology of the weevil and the distribution and habits of the wild cotton plant throughout the Santa Catalina Mountains and on the slopes of the Tanque Verde, Rincon, and Santa Rita mountains. Townsend (14) from July 9 to October 6, 1917, travelled 1,287 miles from Las Cruces, New Mexico, southwestward into Arizona and then northwestward into the Mogollon Mountains, north of Roosevelt Lake, to determine the eastern range of the plant. In

August and September, 1919, Herbert C. Hanson (7) spent six weeks scouting 27½ miles of washes on the southern slope of the Santa Catalina Mountains and 24 miles of washes on the western slope of the Santa Rita Mountains to determine the distribution of *Thurberia* in relation to cultivated fields. A trip was also made to the Superstition Mountains and one to Fish Creek Canyon. In September, 1920, Perry A. Glick (5) scouted the Superstition Mountains and from there northeastward to Roosevelt Lake. He also scouted the southern portion of the western slope of the Santa Rita Mountains. Hensley, in 1921, spent a few weeks scouting washes on the northwestern slope of the Santa Rita Mountains. He visited other points in the southeastern part of the State and the region around Roosevelt.

DISTRIBUTION OF THURBERIA.

Thurberia has no well defined habitat. It occurs on dry slopes, peaks of low mountains, moist beds of canyons, and in dry washes that extend from the base of mountains out through the mesa. The plants in the washes become small as the distance from the mouth of the canyon increases. The greatest

Fig. 2—Thurberia plants in full bloom growing in a wash on the west slope of the Santa Rita Mountains. September 5, 1919.

abundance of plants, according to Coad, occurs in the beds of canyons and washes. Thornber reports the largest plants, up to 14 feet high and over three inches in diameter at the base, on slopes around 4,000 to 5,000 feet. The plant ranges from about 2,200 feet to about 7,000 feet in elevation.

In Arizona the plant appears, from present data, to be most abundant in the Santa Catalina, Santa Rita, Rincon, Tanque

Verde, and Baboquivari mountains. The most northern point of distribution is Boulder Canyon in the Bradshaw Mountains, north of Phoenix. Barber found a few plants there in 1913. Other records of the northern limits are the Superstition Mountains by Barber in 1913, the Fish Creek Canyon region and the Globe Hills north of Globe. Hensley reported finding in 1921 a few plants in a wash on the west side of Roosevelt Lake about three miles northwest of Roosevelt. In 1919 Hanson found a seedling in the bed of Tortilla Creek several miles west of Fish Creek Canyon. It appears that this seedling had grown from seed carried downstream from the group of plants on the hillside immediately west of Fish Creek Canyon, or from some other unreported group of plants further west. In the southeastern part of the State *Thurberia* has been reported from the Chiricahua Mountains and the Dos Cabezas Range in the vicinity of Bowie; from the Dragoon Mountains south of Dragoon; from the Mule Mountains near Bisbee, and from the Huachuca Mountains between Bisbee and Nogales. In the southern part of the State the western limit of distribution, from the data now collected, is the Baboquivari Mountains about 50 miles southwest of Tucson. 1921 Thompson reported *Thurberia* from the eastern slope of these mountains. In the spring of 1922, the writer found a few plants in a canyon on the west slope of Baboquivari Peak and in a wash at the extreme northwestern end of the Baboquivari Mountains. The writer also found scattered clumps of *Thurberia* on the north slope of the Coyote Mountains, which are located at the northeastern end of the Baboquivari Mountains. Table I shows in detail the regions and localities in Arizona that have been scouted and the results.

In Mexico, the plant has been reported from various localities in the mountain ranges in the eastern part of Sonora, in southwestern Chihuahua and southward to Guadalajara, Jalisco. According to Morrill (9) weevils have been collected from wild cotton at various places in western Sonora and Sinaloa.

TABLE I SHOWING THE REGIONS AND LOCALITIES SCOUTED, NAMES OF INVESTIGATORS, AND RESULTS CONCERNING OCCURRENCE AND ABUNDANCE

Region or locality	Investigator	Results
Apache Mts.	Townsend	No plants found.
Baboquivari Mts.	G. E. Thompson, C. T. Vorhies	Abundant on sides of canyons on eastern slope north of Baboquivari Peak. Weevils found.
	H. C. Hanson	A few plants found in a canyon west of Baboquivari Peak and in a wash at the extreme northwestern end of the range.
Bradshaw Mts.	Barber	A few plants found. No weevils.
Cherry Creek Buttes	Townsend	No plants found.
Chiricahua Mts.	Townsend	No plants found.
	Thornber	Collected herbarium specimen.
Coyote Mts	Hanson	Plants and weevils found on north slope.
Date Creek Mts.	Bailey	No plants found.
Davidson Spring	. . . .	Specimen in U. S. National Herbarium.
Dos Cabezas Mts.	Thornber	Collected herbarium specimen.
	Townsend	Two plants found in Nine-mile region. Weevils found.
Dragoon Mts..	Thornber, Bailey	Collected herbarium specimen. No plants found.
Fish Creek Canyon	Pierce, Morrill, Bailey, Barber, Hanson, Glick	Scattered plants found, especially on west-facing slope west of the canyon. No weevils found.
Globe Hills, one mile north of Globe	Townsend, Bailey	50 or more plants on south and southwest exposure of hilltop. Abundant at 3,500 to 3,800 feet.
Graham Mts.	Bailey	No plants found.
Huachuca Mts.	Goodding	Collected herbarium specimen.
Mazatzal Mts.	Townsend	No plants found during a seven-hour automobile trip along eastern side.
Mogollon Mts.	Townsend	No plants found.
Mule Mts. near Bisbee	Goodding	Collected herbarium specimen.
Pinal Mts.	Bailey	No plants found.
	Townsend	
Pinaleno Mts., western side	Townsend	No plants found.
Rincon Mts.	Thornber	Very abundant. Weevils reported from here. Collected herbarium specimen.
	Blumer	
Roosevelt Lake Region	Pierce, Morrill, Glick	No plants found in canyon near Roosevelt.
		No plants found on eastern side of lake opposite the dam, nor in six miles along Pine Creek between Roosevelt Lake and Fish Creek Canyon.
	Hensley	Reported a few plants in a wash three miles northwest of Roosevelt.
Salt River Mts.	Bailey, Pierce, Morrill	No plants found.

Region or locality	Investigator	Results
Santa Catalina Mts	Thornber, Coad, and others	Throughout the mountains, 2600-7000 feet, especially in beds of canyons and washes. Weevils widely distributed.
	Hanson	In washes from mouths of canyons down to about 2,250 feet; seedlings found in bed of Rillito River.
Santa Rita Mts.	Thornber, Coad, Hanson, Glick, and others	Very abundant near mouths of canyons; occurs from 2,850 feet to over 5,000 feet; only seedlings at lower elevations. Weevils common and abundant.
Sierra Ancha Mts., northern end	Townsend	No plants found
Sierrita Mts., eastern slope	Hanson	No plants found.
Superstition Mts.	Barber, Hanson, Glick	Plants found, but very rare. No weevils. No plants found.
Tanque Verde Mts.	Thornber, Coad	Plant found very abundantly. Weevils found.
Tortilla Creek on Apache Trail	Hanson	Seedling in bed of creek, several miles west of Fish Creek Canyon. No weevils.
Tortilla Mts	Bailey	No plants found.
Tucson Mts.	Pierce, Morrill, Coad	No plants found.

DESCRIPTION AND DISTRIBUTION OF THE WILD COTTON BOLL WEEVIL.

On account of the importance of the weevil a brief description of it is here given to aid in its identification. For more complete information concerning its life-cycle and destructiveness to cotton, the bulletins by Coad and the reports by the Arizona Commission of Agriculture and Horticulture should be consulted.

The adult is a stout beetle about one-tenth to one-fourth of an inch long. The young weevils are light golden brown in color. As the weevils grow older they turn dark brown to almost black on account of the scales rubbing off. The larvae are about one-third of an inch long and white in color. They are found in the inner tissue of bud or boll.

The weevil has been reported from seven mountain ranges in Arizona; the Santa Catalina, Tanque Verde, Rincon, Santa Rita, Coyote, and Baboquivari mountains near Tucson, and the Dos Cabezas Mountains near Bowie. Further field work will undoubtedly show a greater distribution, especially in the mountains in the southwestern part of the State. All localities where *Thurberia* has been found or may be found should be thoroughly scouted for the weevil.

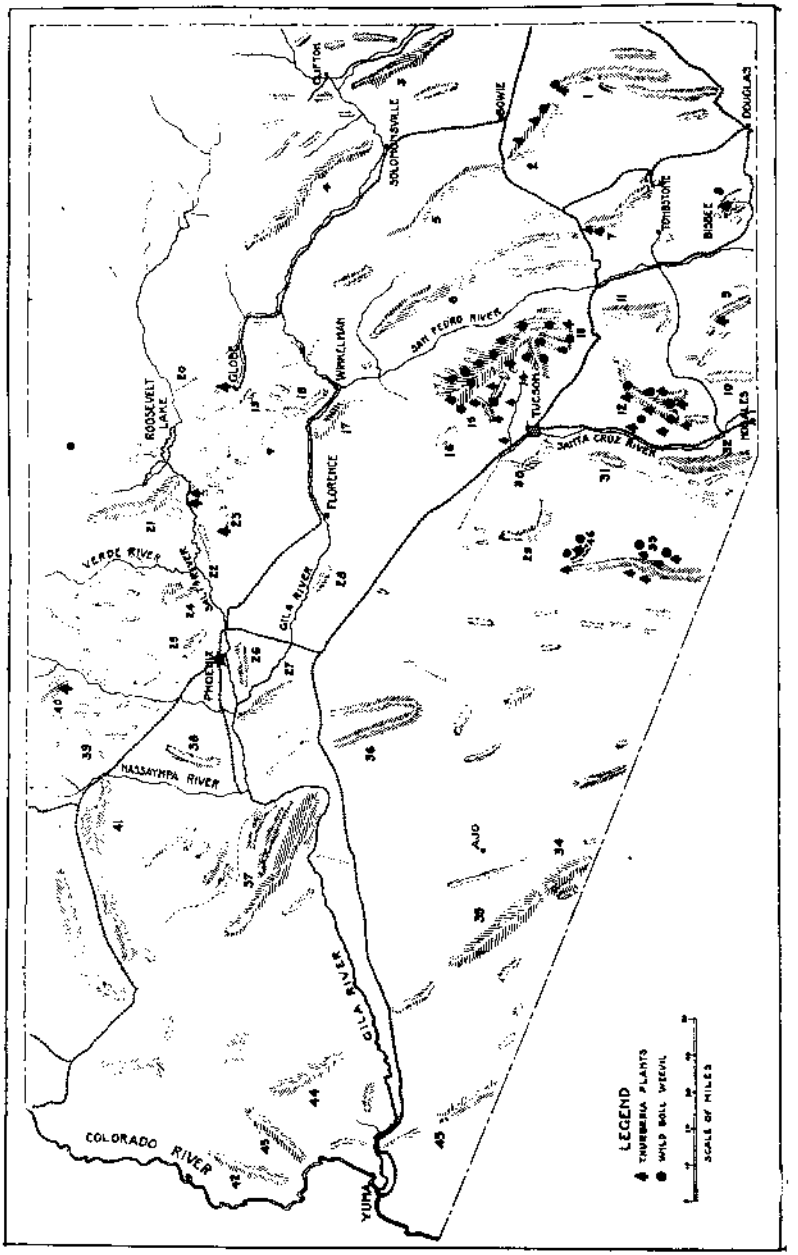

Fig. 3.—Map of the southern part of Arizona showing the known distribution of Arizona wild cotton and the wild cotton boll weevil.

Key to the names of mountains indicated by number on the map:

1. Chiricahua Mts.
2. Dos Cabezas Mts.
3. Peloncillo Mts.
4. Gila Range.
5. Pinaleno Mts.
6. Galiuro Range
7. Dragoon Mts.
8. Mule Mts.
9. Huachuca Mts.
10. Patagonia Mts.
11. Whetstone Mts.
12. Santa Rita Mts.
13. Rincon Mts.
14. Tanque Verde Mts.
15. Santa Catalina Mts.
16. Tortillita Mts.
17. Tortilla Mts.
18. Mescal Mts.
19. Pinal Mts.
20. Apache Mts.
21. Mazatzal Mts.
22. Goldfield Mts.
23. Superstition Mts.
24. McDowell Mts.
25. Phoenix Mts.
26. Salt River Mts.
27. Estrella Mts.
28. Sacaton Mts.
29. Roskruge Mts.
30. Tucson Mts.
31. Sierrita Mts.
32. Tumacacori Mts.
33. Baboquivari Mts.
34. Quitobaquita Mts.
35. Mohawk Range
36. Maricopa Mts.
37. Gila Bend Mts.
38. White Tank Mts.
39. Wickenburg Mts.
40. Bradshaw Mts.
41. Vulture Mts.
42. Trigo Mts.
43. Chocolate Mts.
44. Castle Dome Range
45. Gila Mts.
46. Coyote Mts.

CONCLUSION.

The information concerning the distribution of *Thurberia* in Arizona is very incomplete. The only regions that have been thoroughly scouted are the Santa Catalina and the western slope of the Santa Rita mountains, and probably the Tucson, Salt Creek, and Superstition mountains. Most of the scouting has been too rapid, and too large territories were covered to secure conclusive results. Bailey, in less than a month, visited about ten different mountain ranges; Schwartz and Barber visited many places in two months, and Pierce and Morrill, in two weeks, visited four different regions. The fact that these investigators did not find the plant in some of the regions visited does not prove that it does not occur there, because the time was inadequate for thorough scouting. Coad, however, spent six months, chiefly in the Santa Catalina Mountains, securing very reliable data. Hanson and Glick concentrated their scouting on certain small areas, especially the washes on the southern slope of the Santa Catalinas and on the western slope of the Santa Ritas, and secured conclusive data.

Intensive scouting in the future will undoubtedly show a wider distribution of *Thurberia*. From a study of the map it seems likely that the plants will be found in the Pinaleno Mountains and the Galiuro Range, east of the San Pedro River It appears that further scouting will connect the northern points of distribution with the southeastern points. The occurrence of *Thurberia* in the Superstition Mountains as reported by Barber, a very careful observer, should be checked, especially since Glick, after a fairly thorough search, failed to find it there. The occurrence of the plants in the Bradshaw Mountains, north of Phoenix, also reported by Barber, should be carefully checked also. The Goldfield, McDowell, and Estrella mountains ought to be carefully scouted on account of their nearness to the Salt River Valley. Not until 1921 was *Thurberia* reported from the Baboquivari Mountains, about fifty miles southwest of Tucson. This report brings to the fore the question of how far west it may be found. It appears that the Mohawk Range, the Gila, and Gila Bend mountains ought to be thoroughly scouted in order to determine the western limits of distribution.

In concluding, I wish to acknowledge the kindness of Professor J. J. Thornber, Director of the Arizona Agricultural Experiment Station, in furnishing numerous suggestions and data; Don C. Mote, State Entomologist of Arizona, in furnishing data and giving access to records and manuscripts of his office; Dr. C. T. Vorhies, B. R. Coad, P. A. Glick, Professor G. E. Thompson, and others, in giving data or loaning manuscripts.

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