

Miss. Series #149

Colorado State College Library  
Library Bulletin 12

MAR 6 1942

#149

# Rubber Producing Plants

(Other than Guayule and Rubber Trees)  
A List of References Useful to Investigators

Prepared by

Morris E. Paddock, Ph.D.  
Assistant Botanist  
Colorado Agricultural Experiment Station

Fort Collins, Colorado  
August, 1942

(5035-42)

## Introduction

This bibliography is concerned in the main with those plants which produce some rubber, other than guayule and rubber trees, and is intended mainly for the investigator of those plants.

Notices of articles in Biological Abstracts (Biol. Absts.), Botanical Abstracts (Bot. Absts.), Chemical Abstracts (Chem. Absts.), and the Experiment Station Record (ESR) have been indicated for the benefit of those who do not have easy access to some of the original materials.

Titles of certain articles, mainly Russian, have been given in English although the article itself is in a foreign language. For Russian periodicals and serials the citations are those given in the various abstract services mentioned above. To identify the actual periodical it will sometimes be necessary to make reference to the Abstract and then use the list of abbreviations for titles of serials as used by that service.

An excellent bibliography of guayule has been prepared by Alan J. Blanchard, Assistant Librarian of the Soil Conservation Service. 1/ Those who want a good summary of synthetic rubber, as a background, should consult the series of twelve articles by Dr. Harry Barron 2/ or the study by Lawrence A. Wood. 3/ A good book on rubber technology is Dunbrook and Morris's translation of Memmler. 4/ Another is the volume by Flint. 5/

This bibliography has been prepared as a result of the interest taken by the Colorado Agricultural Experiment Station\* in the critical rubber situation in the United States, and has been issued as a Library Bulletin by the College Library as a part of its contribution to the solving of difficulties brought on by the war.

Morris E. Paddick

- 
1. Blanchard, Allan J. Guayule; a list of references. Washington, 1942. 53 p. mimeographed. (U.S. Soil conservation service. Soil conservation bibliography no. 4. April 1942)
  2. Barron, Harry. Synthetic rubbers. Rubber age (London), 22:37-40, April 1941 and succeeding issues through March 1942.
  3. Wood, Lawrence A. Synthetic rubbers; review of their compositions, properties and uses. Washington, U.S. Govt. print. off., 1940. 29 p. (U.S. National bureau of standards. Circular C427.) 10¢.
  4. Memmler, Karl, ed. Science of rubber; translated by R.F. Dunbrook and V.N. Morris. New York, Reinhold, 1934. 770 p. \$15.
  5. Flint, C. Falconer. Chemistry and technology of rubber latex. New York Van Nostrand, 1938. 715 p. \$14.
- 

\*This publication should also be considered as being no. 149 of the Miscellaneous Series of the Colorado Agricultural Experiment Station.

RUBBER PRODUCING PLANTS  
-----

- I. General
  - II. Mexico and the United States
    - A. General
    - B. Colorado Rubber Plant
    - C. Golden Rod
    - D. Milkweed
    - E. Rabbit Brush
    - F. Others
  - III. Russia
    - A. General
    - B. Kok-Saghyz
    - C. Others
  - IV. Central and South America
  - V. Far East
  - VI. Madagascar
  - VII. Africa.
  - VIII. Europe (Except Russia)
- 

I. General

- Fawcett, W. Notes on rubber plants. Jamaica. Botanical department. Bulletin, n.s., 1, no. 7:99-111, 1894. (ESR, 6:425, 1894/95).
- Fox, C.P. An adapted Wiley extractor for rubber extractions. Journal of industrial and engineering chemistry, 5:417, May 1913.
- Further progress in rubber plant investigations. India rubber world, 104:55, July 1941.
- Grunfeld, Otto. Old and new facts concerning rubber-bearing plants. Kautschuk 12: 171-4, 1936. (Chem. Absts. 30:7905<sup>8</sup>, 1936) Review and discussion of past literature.
- International institute of agriculture, Rome. Bibliography of tropical agriculture, 1932-36. Rome, The Institute, 1933-1937. 5 v. (Biol Absts. 10:5037, 1936)  
See sections on Rubber yielding plants.
- Kogan, L.M. Technology and extraction of natural rubber. Caoutchouc and rubber (USSR), 1939, no. 8:31-4. (Chem. Absts. 34:6123<sup>7</sup>, 1940.)
- Machine for recovering rubber from low content plants; Stacom device. Rubber age, 46:299, February 1940.
- Patent for extracting rubber from goldenrod. Science, n.s., 71:Sup.14, Feb.21, 1930.
- Pearson, H.C. Rubber producing plants of minor importance. International review of the science and practice of agriculture, 10:418, April 1919.
- Pissarev, V. Rubber plants for temperate climates. Semenovodstov (Seedgrowing) 23/24:2408, 1932.

- Prokof'ev, A.A. Rubber formation in plants. Bull. Acad. Sci. (USSR) Ser. Biol. 1939:908-23 (in English 923). (Chem. Absts. 34:4937, 1940)
- Rubber plant experiments. Science, n.s., 80:261-2, September 21, 1934.
- Rubber; plant experiments by federal scientists. Scientific American, 152:79, February 1935.
- Rubber producing plants. Science, n.s., 69: Sup. 10-12, March 1, 1929.
- Russell, J.A. Alternative sources of rubber. Economic geography, 17:399-408, October 1941.
- Simpich, F. Can we grow our own rubber? Country gentleman, 89:5, August 16, 1924.
- Spence, D. and Caldwell, M.C. Determination of rubber in rubber bearing plants. Industrial and engineering chemistry, Anal. Ed., 5:371-5, November 15, 1933  
Very good discussion of methods.
- U.S. Bureau of plant industry. Report of the chief, 1922/23- 1940/41. Washington, U.S. Govt. Print. Office, 1923-41, 19 pts.  
Reports of the Division of plant exploration and introduction on rubber experiments are found on the following pages: 1922/23:28-30; 1923/24:34; 1924/25:21-23; 1926/27:28-29; 1927/28:24-25; 1928/29:26-27; 1929/30:32; 1930/31:24-25; 1931/32:15; 1933/34:18; 1934/35:18; 1935/36:14; 1936/37:18; 1937/38:18; 1938/39:24; 1939/40:26; 1940/41:27.
- U.S. Department of Agriculture. Report of the Secretary. Washington, Govt. Print. Office.  
1923/23:51. Possibilities of rubber production (Also printed in U.S. Department of Agriculture. Yearbook, 1923:49)  
1925/26:68-70. Demand for rubber information. (Also printed in U.S. Department of Agriculture Yearbook, 1926:68-70.)
- Wasserman, I. Practical work with rubber producing plants. Sozialistcheskai Rekonstruktzia Selskogo Khoziastiva. 12:137-51, 1931.

## II. Mexico and the United States

### A. General

- California botanical gardens. India rubber world, 76:132, June 1927.
- Dacy, G.H. Edison's rubber. Scientific American, 142:384-5, May 1930.
- DeKalb, C. Possibilities of rubber production in America. Manufacturers record, 85:103-4, June 5, 1924.
- Edison hunting for rubber weeds. Literary digest, 95:18-19, November 26, 1927.
- Hall, H.M. and Goodspeed, T.H. A rubber plant survey of Western North America. California University. Publications in Botany, 7:159-278. 1919. Excerpts: Agricultural news, 20:307, October 1, 1921. (ESR, 42:143, 1920)  
Mainly on rabbit brush.

Hall, H.M., and Long, F.L. Rubber content of North American plants. Washington, 1921. 65 p. (Carnegie institution of Washington. Publication no. 313) Review: International review of the science and practice of agriculture, 13:832-4, July 1922. Perhaps the most thorough report yet made.

Hall, H.M., and Long, F.L. Rubber plants. Carnegie institution of Washington. Yearbook, 19:365-366, 1920. (ESR, 46:42, 1922).

Hevea's rivals. Business week, p. 17-18, February 28, 1942.

Jardine, W.M. Rubber, a crop with possibilities. Nation's Business, 19:27, January 1931.

Marchionna, F. Domestic rubber plant investigation launched by U.S. Rubber Co. Rubber age, 51:213-214, June 1942.

Mitchell, J.H., Rite, M.A., and Roderick, D.B. Rubber analysis of plants in S. Carolina. Science, n.s. 95:624-5, June 19, 1942.

Rubber facts that don't stretch, survey of minor emergency sources of natural rubber in U.S. Scientific American, 166:276-7, June 1942.

#### B. Colorado Rubber Plant

Cockerell, T.D.A. The Colorado Rubber plant. Colorado Springs, Colo. 1903. 2 p. (Colorado College Museum. Bulletin 1.)

Cockerell, W.P. Note on rubber producing plant. Science, N.S., 19:314-5, February 19, 1904.

#### C. Golden Rod

Edison's rubber process. India rubber world, 81:55, February 1930.

Polhamus, L.G. Progress in rubber from Goldenrod. Rubber age, 47:25, April, 1940.

Polhamus, L.G. Rubber content of various species of goldenrod. Journal of Agriculture Research, 47:149-52, August 1, 1933.

Presley, J.T. Rubber content of goldenrod leaves affected by light. Science, n.s., 83:436, May 8, 1936.

Progress of goldenrod experiments of Thomas. A. Edison. Dun's International Review, 55:40, August, 1930.

Rubber from goldenrods. India rubber world, 100:35, July 1939.

#### D. Milkweed

Beckett, R.E. and others. Rubber content and habits of a second desert milkweed (Asclepias erosa) of southern California and Arizona. Washington, U.S. Govt. Print. Off., 1938. 11 p. (U.S. Department of agriculture. Technical bulletin no. 604.)

Beckett, R.E., and Stitt, R.S. Desert milkweed (*Asclepias subulata*) a possible source of rubber. Washington, U.S. Govt. Print. Off., 1935. 20 p. (U.S. Department of agriculture. Technical bulletin 472.)

Claims milkweed rubber suitable for bullet proof gas tanks. *Rubber Age*, 49:337, August 1941.

Fox, C.P. Another Ohio grown rubber. *Ohio naturalist*, 12:469-71, 1912.

Fox, C.P. Ohio grown rubber, crop of 1910. *Ohio naturalist*, 11:271-2, 1911.

Horticultural investigations at Iowa Station. Iowa Agricultural Experiment Station Annual report, 1927/28:32 (ESR, 61:338, 1929)

Saunders, A.T. Rubber found in milkweed. *India rubber world*, 43:4, 1910.

Saunders, W. On the manufacture of rubber from a milkweed. *American Pharmaceutical association proceedings*, 23:655-658, 1875.

#### E. Rabbit Brush

Doten, S.B. Rubber from rabbit brush. Reno, Nev., 1942. 22 p. (Nevada Agricultural experiment station. Bulletin no. 157.)

Goodspeed, T.H. Wild rubber on wastelands of the west: rabbit brush. Abstract. *Science n.s.*, 95: Sup. 6, January 30, 1942.  
Same: *Science news letter*, 41:69, January 31, 1942.

#### F. Others

Chrysil rubber. *Agricultural news*, 19:77, March 6, 1920.

Fox, C.P. Apocynum or Indian hemp rubber. *Journal of Industrial and Engineering Chemistry*, 4:387, May 1912.

Fox, C.P. Wild lettuce rubber, *J. of I. and E. Chem.* 5:477, June 1913.

Long, E.S. Experiments with a new cactus rubber. *India rubber world*, 62:709-10 August 1920.

Ocotillo as rubber substitute. *Pan American Magazine*, 32:219-220, March 1921.  
(*Bot. Abs.*, 11:3249, 1922)

Rubber from poinsettia serum. *Rubber age*, 44:81, November 1938.

Three hundred million pounds of chrysil rubber. *India rubber world*, 61:203-4; January 1920.

Weeks, G.F. Euphorbia rubber in Mexico. *Rubber age*, 22:479-81, 537-8, 603-4. February 10, March 10, 1928.

III. Russia

A. General

- Altukhov, M. Problems in the utilization of Soviet rubber-producing plants and the results obtained. Sotsialist Sel'skoe Khoz, 1939, no. 1:120-7; Khim. Referat. Thur., 1939, no. 7:114. (Chem.absts. 344937<sup>7</sup>, 1940)
- Elkin, S.I. The cultivation of rubber bearing plants. Caoutchouc and rubber (USSR), 1939, no. 4-5:7-10. (Chem. Absts., 34:5697<sup>2</sup>, 1940)
- Legros, J. Secondary rubber yielding plants of the Caucasus region and of central Asia. International review of agriculture 28:468T-81T, December 1937. (Chem. absts.32:8185<sup>8</sup>, 1938)
- Nichiporovich, A.A. Industrial sources of rubber in USSR. (Khinor, Referat. Thur. 2:102-3, 1939 Chem. absts., 34:1511<sup>1</sup>, 1940.)
- Nikolaev, V. Cultivation of the rubber bearing plants on the Black Sea shore (Ann. State Inst. Expt. Agron. Leningrad) 5:469-471, 1927. Izo. gosud. Inst. opyt. Agron. (ESR, 60:444, 1929.)
- Russian rubber. Rubber age, 28:610, March 25, 1931.
- Spicer, R.E. Rubber in Soviet Russia. India rubber world, 87:39, January 1933.
- Tau-saghyz, or mountain gum plant discovered in Russia. Kok-saghyz and other Russian plants. Iron age, 149:74, April 2, 1942.
- Vasil'ev, V.F., Rubber producing plants in Crimea. Soviet Subtrop. 4, no. 2; 9-17 1932. (Chem Absts., 28:5711<sup>1</sup>, 1934.) (ESR, 70:25) 1934.

B. Kok-Saghyz.

- Bobkov, P.K. Losses of rubber in the processing of the roots of kok-saghyz. Caoutchouc and Rubber (USSR), 1939, no. 12:22-5. (Chem.Absts. 34:4299<sup>4</sup>, 1940.)
- Bobkov, P.K. Obtaining rubber from roots of kok-saghyz. Caoutchouc and Rubber (USSR) 1939, (Chem.Absts. 34:6123<sup>6</sup>, 1940)
- Bobkov, P.K. Saccharification and fermentation of the wort obtained in the complex processing of the rubber-bearing kok-saghyz to give alcohol with the extraction of latex and rubber. Spirto-Vodochnaya Prom. 15, no. 3:11-14, 1938. (Chem. Absts., 34:6007<sup>8</sup>, 1940.)
- Brandes, E.W. Rubber from russian dandelion. Agriculture in the Americas, 2:127-131, July 1942.
- Cultivation of kok-saghyz in USSR during 1940. India rubber world, 104:63, September 1941.
- Fabritsiev, B.V., and Vishnevskaya, M.T. Rubber from kok-saghyz. Caoutchouc and Rubber (USSR), 1938, no. 8-9:45-9; no. 11:13-7. (Chem.Absts. 33:4819<sup>2</sup>, 1939).
- Ignat'ev, A.M., Uzina, R.V., and Erofeev, L.L. Storing of roots of kok-saghyz and preparing the latex. Caoutchouc and Rubber (USSR), 1940, no. 1:30-3 (Chem. Absts., 34:4299<sup>4</sup>, 1940).

Investigations on chemical, physical, and mechanical properties of kok-saghyz. India rubber world, 105:504, February 1942.

Kolachov, Paul J. American rubber from American farms. Columbus, Ohio, National Farm Chemurgic Council, 1941, 76. Mimeographed. (National Farm Chemurgic Council. Paper no. 124) Abstract in: India rubber world, 105:368, Jan. 1942.

Kolachov, Paul J. Kok-saghyz, family 'Compositae', as a practical source of natural rubber for the United States. Columbus, O. National farm chemurgic council, 1942. 19 p.

Kolachov, Paul J. Rubber for peace and war. Columbus, O. National farm chemurgic council, 1943. 8 p. mimeographed (National farm chemurgic council, paper no. 142)

Mashtakov, S.M. Qualitative changes of rubber and resins in kok-saghyz roots in the course of the plant development. Compt. Rend. (Doklady) Acad. Sci. (USSR) 19:307-309, 1938. (Biol. Abs., 14:9405, 1940; Chem. Absts. 33:6645<sup>5</sup>, 1939.)

Mashtakov, S.M. Qualitative variations of rubber in the roots of kok-saghyz at the second year of investigation. Compt. Rend. Acad. Sci. (USSR), 24:509-12, 1939. (in English) (Chem. Absts. 34:2029<sup>3</sup>, 1940.)

Nichiporovich, A.A. and Bourovaya, V.N. Rubber accumulation in kok-saghyz as a function of its biological maturing processes. Compt. Rend. (Doklady) Acad. Sci. (USSR), 19:311-314, 1938. (Biol. Absts., 14:9406, 1940; Chem. Absts., 33:5697<sup>6</sup>, 1939.)

Pincus, J.W. Russia grows its own rubber. Rubber age, 49:179-81, June 1941.

Tikhov, L. Storage of roots and biological treatment of kok-saghyz. Caoutchouc and rubber (USSR), 1940, no. 6:85-6. (Chem. Absts., 34:7657<sup>3</sup>, 1940.)

#### C. Others.

Chondrilla rubber plant. India rubber world, 81:56, 58. January, March, 1930.

Ignat'ev, A.M. Rubber from Crimea saghyz. Caoutchouc and Rubber (USSR), 1939, no. 6:41-4. (Chem. Absts., 33:8053<sup>5</sup>, 1939.)

Igolkin, G.I. and Zapriagaev, F.L. Chondrilla on Muiun-Kum sands near the Chu river, Soviet Botany, 6:78-94, 1935. (Biol. Absts. 11, 1191<sup>8</sup>, 1937).

Litvinchuk, K.A. Rubber, oil and fiber from the evening primrose. Tekh. Kul'turi 19, no. 5-6:75-7, 1939. (Chem. Absts., 36:1521<sup>4</sup>, 1942).

Mazanko, F.P. On a new method of tau-saghyz exploitation. Compt. Rend. (Doklady) Acad. Sci. (USSR), 19:95-98, 1938. (Biol. Abs., 13:17635, 1939).

Tau-saghyz rubber. India rubber world, 86:54, September 1932.

Yorob'eva, I.N.F. Sunflower plants as source of rubber. Caoutchouc and rubber (USSR) 1940, no. 11:23-5. (Chem. Absts., 35:2357<sup>7</sup>, 1941.)



#### IV. Central and South America

Central American rubber. Trinidad Royal botanical garden. Miscellaneous bulletin 23:282-287. (ESR 6:251, 1894-95).

Rubber of *Fosteronia floribunda* from Jamaica. Great Britian Imperial institute. Bulletin, 6:259, 260, 1908.

#### V. Far East

Boerlage, J.C. Enumeration of the plants producing caoutchouc and gutta-percha collected in the islands of Sumatra, Borneo, and Java. Buitenzorg, 1900. 29 p. (Buitenzorg. 'S Lands plantentuin, Bulletin de l'Institut botanique. no. 5) (ESR, 12:615, 1900/01)

Latex and rubber of *Parameria glandulifera* from India. Great Britain Imperial Institute Bulletin 5:14-16, 1907. (ESR 19:44, 1907/08).

VanRombaugh, P. Caoutchouc producing plants. *Teysmannia* 11:16-24, 1900 (ESR, 12:346 1901/02).

#### VI. Madagascar

Dolley, C.S. *Cryptostegia grandiflora*, a possible source of commercial rubber. India rubber world, 71:339-40, March 1925.

Dolley, C.S. Growing *cryptostegia* in U.S. as a commercial source of rubber. India rubber world, 76:3-4, April 1927.

Madagascar rubber plant. *Science*, n.s., 71: sup. 12, May 30, 1930.

New rubber plants in the U.S., *Euphorbia intisy*. *Scientific American*, 142:466, June 1930.

Polhamus, L.G. Rubber plants- hybrids of Madagascar species, visor in U.S. U.S. Department of agriculture, year book, 1932:329-331.

Polhamus, L.G., and others. Rubber content of two species of *Cryptostegia* and an interspecific hybrid in Florida. Washington, U.S. Govt. Print. Office. 1934. 22 p. (U.S. Dept. of Agriculture Technical Bulletin, 457)

Rebuffot, O. On the rubber extracted from the latex of *Euphorbia candelabro*. R. Istituto d'incoraggiamento di Napoli, 6 ser., 59:89. 1907. (ESR, 20:845, 1908/09)

#### VII. Africa

Investigations of *kickxia* caoutchouc from Cameroons. *Tropenpflanzer*, 9:590, 1905. (ESR, 17:775, 1905/06)

Ratnaparkhe, A.D. African rubber from Apocynaceae *Landophia indica*. *Science and Culture* 7, no. 1:55, 1941. (Chem. Absts., 36:927<sup>4</sup>, 1942)

Scasselati, G., Sforzolini. The rubber plants of southern Italian Somaliland. *L'Agricoltura coloniale* (ESR 34:152, 1916)

Seeds and plants imported during the period from April 1 to June 30, 1909. Washington Govt. Print. Off. 1909. 45 p. (U.S. Bureau of plant industry, Bulletin no. 168) Milkweed plant from West Africa, p. 31-32, (with notes by O.F. Cook and Woodside.)

Swingle and Humbert find rubber species. U.S. Department of agriculture. Official record, 8:1,8, February 28, 1929.

#### VIII. Europe (except Russia)

Rubber producing weeds in Germany. U.S. Bureau of foreign and domestic commerce, Commerce reports. 22:1:382, January 24, 1919. (From India rubber world, January 1, 1919.)