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GUAYULE:

A RUBBER-PRODUCING SHRUB FOR ARID AND SEMIARID REGIONS

University of Arizona
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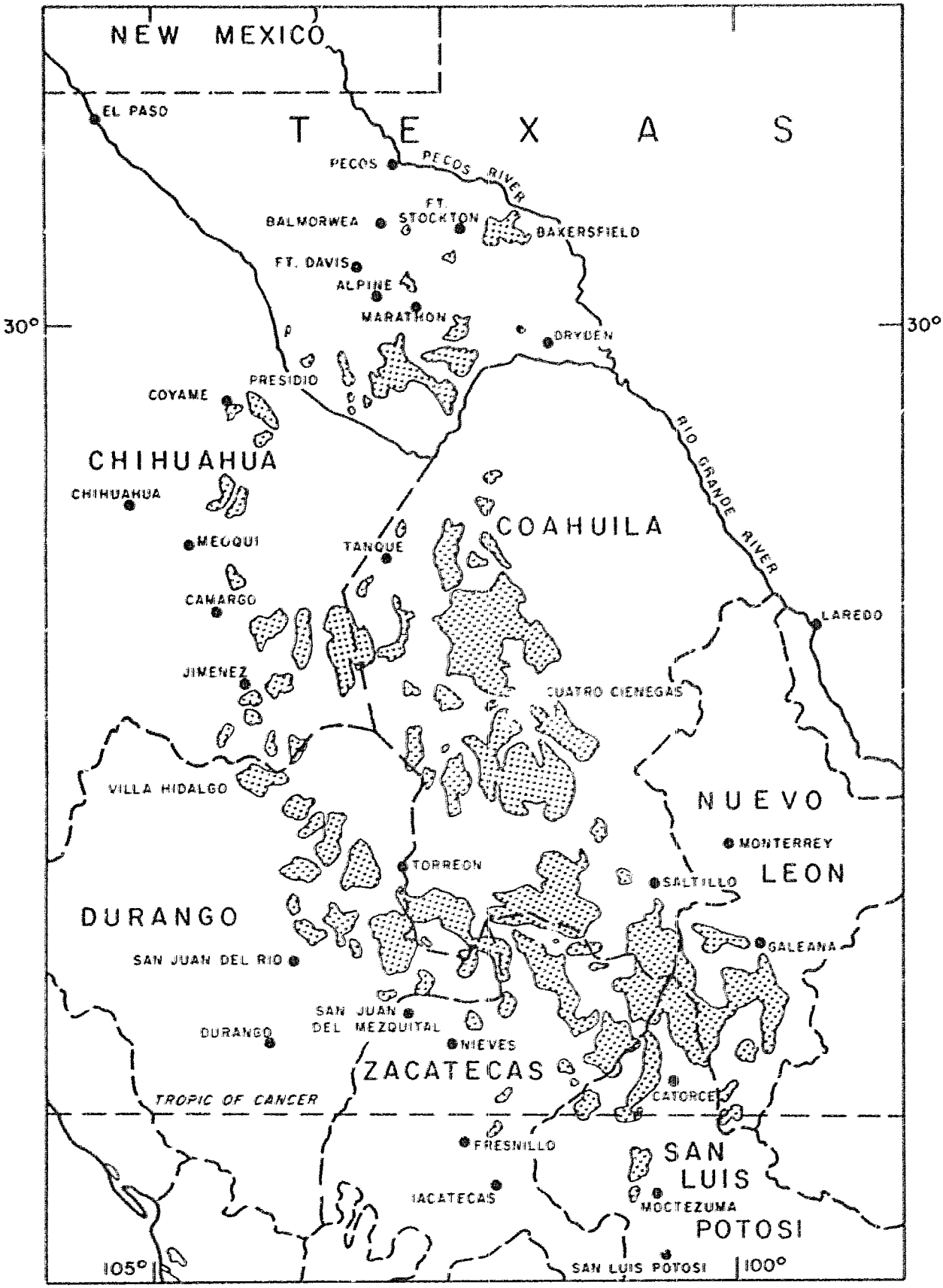

DISTRIBUTION OF NATIVE GUAYULE IN MEXICO AND TEXAS AFTER JENKINS (1946)

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W. G. McGinnies
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Tucson, Arizona
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HISTORICAL REVIEW

GUAYULE:
A Rubber-Producing Shrub for Arid and Semiarid Regions

HISTORICAL REVIEW

Guayule is a shrub native to the dry lands of north central Mexico, particularly the states of Coahuila, Chihuahua, Durango, Zacatecas, San Luis Potosi, Nuevo Leon, and the adjacent Big Bend area of Texas, usually at an altitude between 2,000 and 6,000 feet. Within its native habitat it grows in scattered patches of from less than one acre to several hundred acres in size. It is largely restricted to outwash slopes of calcareous soils in regions having an annual rainfall of 10 to 15 inches, occurring principally in late spring and early autumn. While guayule will grow better in regions with higher rainfall, it may not survive in competition with other plants.

From the purely scientific viewpoint, the first record of guayule was made by Dr. J. M. Bigelow, attached to the Mexican boundary survey, when he reported it from near Escondido Creek, Texas. Bigelow's specimen was identified and named Parthenium argentatum by Professor Asa Gray of Harvard University.

The genus Parthenium comprises 16 species native to the western hemisphere. The species of this genus range from annuals through perennials and woody shrubs to tree-like types. Guayule (Parthenium argentatum) is the only species of the genus known to produce any significant amounts of rubber.

Description and Ecology

In its native habitat the root system of guayule consists of a tap root which may lose its prominence and give way eventually to an intricate system of dense fibrous laterals and their branches. Under cultivation guayule's roots may reach a depth of 20 feet, if not terminated by impenetrable soil layers. The plant is usually a symmetrical and closely-branched shrub, less than three feet in height. Both upper and under surfaces of leaves are covered with the hairs that produce the light gray-green sheen so characteristic of the plant. Leaves are long and narrow, slightly tapered at both ends. Individual flowers are inconspicuous, formed in heads by common receptacles, and are both wind and insect pollinated. Seed production is generally large depending on moisture conditions.

During World War II the Emergency Rubber Project(*) made a survey of the guayule resources of Mexico and the adjacent Big Bend of Texas. The Project report contained considerable information on the ecology of the guayule plant, emphasizing the fact that the wild guayule is distinctly a desert plant, native only to the high desert areas. In spite of this fact, its growth in Mexico indicated that water requirements might be greater than expected. The water supply of the 10 - 15 inches of natural rainfall might easily be increased to a total of 12 - 20 inches or more through natural runoff. The availability of water appeared to be favored by rocky, highly permeable soils with a high infiltration capacity, which in turn favors the deep penetration of roots with resulting increase in drought resistance. While guayule in Mexico is usually associated with limestone, this was attributed to the physical makeup of the soil rather than to the chemical requirements of the plant.

The guayule plant grows over gross area of something like 130,000 square miles, but occurs sparsely in the area both as to stand and density. The accompanying vegetation is typical of desert regions with a growth of shrubs, cacti, yucca, and other plants. Temperature conditions vary widely, though the minimum temperature is well above zero. There is a wide variation of soil types within the region also, but mostly are stony, calcareous, and friable.

Guayule was reported as occurring in patches on the footslopes of widely scattered mountains, although areas suitable for its growth constitute only about 15% of the total area covered and of that 15% only 10% has guayule growth. Most of the guayule land was in private ownership. It was estimated that there were 154,000 metric tons of shrub available in the states of Chihuahua, Durango, Zacatecas, San Louis Potosi, and Nuevo Leon. In addition, there were 100,000 metric tons available in Coahuila. In 1942 four guayule mills were consuming 180 metric tons of shrub for a 24-hour day.

It was known that the Big Bend country of the Rio Grande had a supply of wild shrub. It was enough to support at one time the operations of a mill built at Marathon, Texas. The survey showed that there was in a neighborhood of 2,500 tons of shrub in this area. The accuracy of this survey was confirmed when the Emergency Rubber Project harvested 2,400 tons of shrub milled in Salinas.

During the early years of World War II all possible resources of natural rubber were being explored. In the general vicinity of Marathon in the Big Bend country of Texas there were remnants of native guayule stands in the area that had

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(*) Most of the material in this Introduction was derived from the final report of this Project, entitled The Emergency Rubber Project, A Report on Our Wartime Guayule Rubber Program, compiled by the Emergency Rubber Project, Paul H. Roberts, Director, 1946. This history of the war effort provided a review of most of the research and production activities related to guayule, and at the same time may serve as a starting point for future programs. Even though the knowledge was gained under the stress of war needs, its lessons are applicable to present or future large-scale programs or limited developments. It is largely for this reason that the activities are described in some detail.

been harvested in the previous years. This shrub was located in small widely scattered patches over a large area. Most of it was a considerable distance from railroads and highways. The shrub was pulled by hand and thrown into large carts, then towed by small crawler tractors to collecting locations and there baled by the contractor.

Early History of Rubber Production

The guayule shrub as a rubber plant has had a long and interesting history. The natives of north central Mexico were probably acquainted with its rubber-producing characteristics long before the white man appeared on the North American continent. It was reported that in the 18th century Indians were seen playing with rubber balls for which the rubber was said to have been procured by communal chewing of the bark of the native guayule.

As far as is known the first commercial extraction of rubber from guayule was made by the New York Belting and Packing Company which imported 100,000 pounds of shrubs in 1880, and extracted the rubber by immersing it in hot water.

In 1904 William A. Lawrence devised the pebble mill method that was used up to the end of World War II. As a result of his development of this method, a large mill was built at Torreon, Mexico, by the Continental Mexican Rubber Company, in 1905 - 1906. In September 1909 a mill at Marathon, Texas, built by the Texas Rubber Company, began operations that ran for about 9 months and then shut down, resumed operation in April 1925, shut down in September 1926, and was subsequently dismantled.

Many mills were built at one time or another in the guayule country, including the one at Marathon, Texas. It is said that there were as many as 13 in existence at one time in Mexico, some of which were not well located, and so faded out of the picture. Other were acquired by the Continental - Mexican Company.

The Continental Rubber Company was organized in 1903 in New York. A subsidiary Mexican corporation known as Cia. Ganadaro y Textil de Cedros was organized in 1904 and acquired a vast property known as Hacienda San Juan Bautista de los Cedros, an old Spanish land grant containing 1,882,000 acres in the heart of guayule country. At the same time the Continental - Mexican Rubber Company, another subsidiary incorporated in 1904, built a small mill at Torreon, Mexico (as noted earlier), more or less for experimental purposes. Using this unit as a model in 1905 - 1906 a very large mill was built having a monthly capacity of one million pounds of wet rubber, as it was then marketed.

The Continental - Mexican Company later built four mills, plus a small batch mill, and the three constituted the entire wild guayule production industry at the outbreak of World War II. Later a number of other mills were erected in Mexico, one by General Tire and Rubber Company. The amount of rubber produced varied widely over the years. Starting with 150,000 pounds in 1905, it reached a maximum of 21,475,000 pounds in 1910, dropped to a low of 65,000 in 1921, and again increased to a peak of about 12,000,000 pounds in 1927. From 1931 - 1933, there were no shipments because of low rubber prices, but in 1934, 900,000 pounds were produced with shipments increasing to a peak of nearly 20,000,000 pounds in 1944. Practically all of this rubber was shipped to the United States.

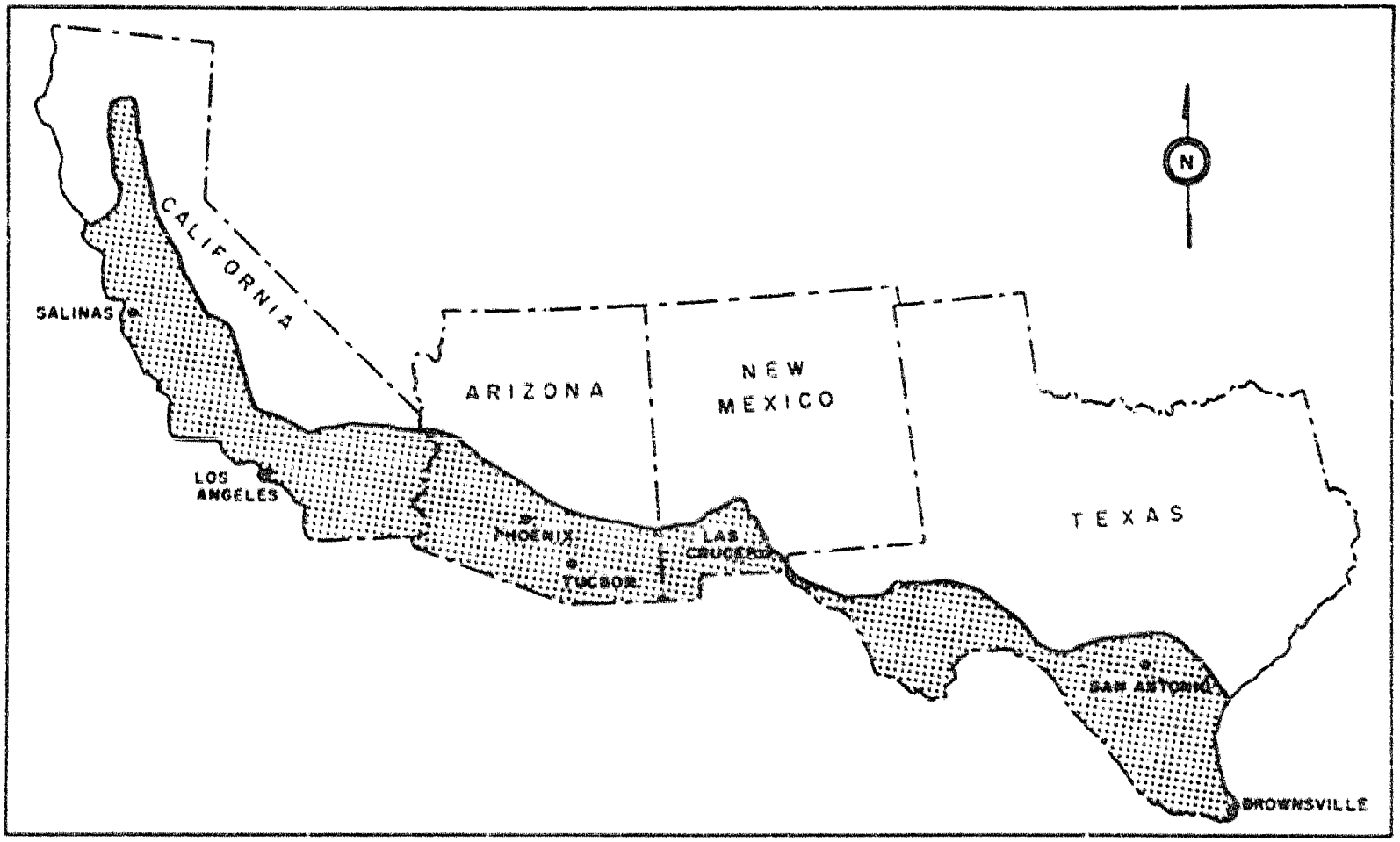

FIGURE I. AREAS IN THE UNITED STATES WITH CLIMATE CONSIDERED SUITABLE FOR THE CULTIVATION OF GUAYULE. (AFTER SWENSEN AND BULLARD)

With a view to its domestic culture, the first really scientific study of guayule was made in 1907 by Professor Francis E. Lloyd of the Alabama Polytechnic Institute, under the auspices of the Continental - Mexican and Intercontinental Rubber Companies. The results of his study were published in 1911 in a Carnegie Institution monograph entitled Guayule, A Rubber Plant of the Chihuahuan Desert.

Dr. W. B. McCallum, who joined the Mexican Rubber Company in 1910, worked continuously on guayule research until the Federal government took over the Intercontinental Rubber Company's holding in 1942. After that McCallum remained during the War period as consultant to the Emergency Rubber Project.

Dr. McCallum started his experimental studies in Torreon, Mexico, but when the Mexican Revolution broke out in 1912, he moved his operation to Valley Center, near San Diego, California, where he bought 400 acres of wildland, established a nursery, and did some field planting. McCallum soon discovered that guayule exists in an infinite variety of strains of which some were very good rubber producers and others practically worthless. For this reason he began selecting strains with desirable characteristics that would come true from seeds. He had many problems to overcome, one of the most aggravating being that some plants were sterile, never produced seeds, while others did not cross pollinate and hence new varieties could not be developed from them by breeding techniques. However, plant breeders during World War II and later overcame these difficulties and found that guayule was ideal for plant improvement.

In 1916 at McCallum's suggestion activities were moved to Arizona, where the Intercontinental Rubber Company purchased a large tract of land south of Tucson, most of which was in the wild state, but susceptible to irrigation. Here the Intercontinental Rubber Company developed a comprehensive irrigation system. However, McCallum was not satisfied with the results obtained in Arizona. He believed that the reason was the very hot summers and cold winter nights. He also had difficulty regulating the irrigation so as to obtain best results.

Because of his dissatisfaction, operations were moved to Salinas, California, where about 8,000 acres of guayule were planted principally in the Salinas Valley. Nearly half of this planting was plowed up by contracting farmers during the period of low rubber prices in the thirties; nevertheless the Company-built mill at Salinas processed between 1931 and 1941 about 4,400 acres of guayule, producing over 3,000,000 pounds of rubber.

At Salinas Dr. McCallum continued his studies of agricultural practices and plant breeding toward improvement through selection. At the time the government took over the project in 1942, several strains had been pretty well established. Because of the erratic reproductive behavior of the plant, however these varieties could not always be guaranteed to come true to form from seed. The best cultivated varieties yielded at an optimum age 20% crude rubber based on dry weight of the plant. The average of wild plants collected in the native habitat was 15% or less. McCallum conducted many studies to develop cultural methods. Unfortunately, because most of this work was carried out in the Salinas Valley with its one set of environmental conditions, some of the practices adopted were later found unnecessary under other conditions. Nevertheless, they furnished a foundation for the studies undertaken during World War II.

WORLD WAR II PROGRAM

Background

In 1930, an investigation was made by the War Department which detailed two officers to make a study of the possibility or desirability of guayule production, Major Gilbert Van Wilkes and Major Dwight D. Eisenhower. After exhaustive investigation these two officers made their report, dated June 6, 1930, including the following points:

1) It would appear that the Government might be interested in encouraging the guayule industry in the United States in the view of:

   a) the opportunity to build up a domestic source of supply for rubber so that in a grave emergency we would not be wholly dependent on Southeast Asia and the adjoining islands for this important raw material

   b) the opportunity to build up a domestic source of supply of rubber so that the American consumers would have some protection against possible commercial combines between the greater rubber producing companies of the Far East

   c) the possibility of building up an industry in the United States that would give profitable employment to some thousands of American farmers, mechanics, and laborers

   d) the precarious position in the United States in depending entirely on the continued help of Hevea trees in the Middle East now producing 96% of the world's supply of rubber

2) At present no one believes that the United States will in this or the next generation produce annually the major part of the rubber we can consume. But if the guayule industry could develop to the point where approximately 400,000 acres were devoted to the growth of guayule we would produce annually almost 160 million pounds of rubber, and have in reserve at all times not less than 250 million pounds . . .

Between that date and the legislation that followed in 1942, which provided for a takeover by the U.S. Government, the Intercontinental Rubber Company was the sole guayule grower in the U.S. Company land holdings included a 65 - acre nursery and 1,400 acres of plantation. The physical inventory included the Spence Mill for extraction of rubber, about 23,000 pounds of seed, 14,000 nursery seedlings, and 674 acres of shrub plantations.

On June 11, 1941, Representative John Z. Anderson of California introduced H. R. 5030, and Senator Sheridan Downey, also of California, later introduced an identical Senate bill. While neither of these passed at the time, a revised Senate bill providing for the planting of no more than 75,000 acres was passed

and signed by President Roosevelt on March 5, 1942, becoming Public Law 473 of the 77th Congress. In October 1942, the authorization was increased to 500,000 acres. This legislation was supported throughout by the General Tire and Rubber Company, the Goodrich Company, the Goodyear Tire and Rubber Company, and the Firestone Rubber Corporation.

On the day Public Law 473 setting up the Emergency Rubber Project was approved, the U.S. Department of Agriculture took over the properties of the Intercontinental Rubber Company as preparation for the planting of 39,000 guayule seedlings in the Salinas Valley, California. This was made possible because a month earlier a crew of U.S. Forest Service men and women from Montana, Nebraska, and Washington State, had been transferred to Salinas to lay the groundwork to start operations with minimum delay. Later others were added and the operations were in full swing before the summer of 1942.

By the time the Forest Service had arrived in Salinas, it was already time the nursery should be sown if a crop was to be produced that year. Never in the history of the country had such a nursery construction job been undertaken. Not only were nurseries needed, but also a seed treating plant capable of quickly treating 13,000 pounds of seed. Time was not to be measured in terms of months or even weeks, but in days and hours. Because the nation was already alarmed over the rubber situation, for the reason that rubber was one of the items with very great military value, the philosophy of the project dictated that nothing was to stand in the way of the ultimate in speed. It was no longer a question of cost, but would it save any time or manpower. It was argued that dollars would be no good if the Japanese gained a foothold.

So land was leased for three nurseries with a net acreage of 530 acres, the nurseries were started, a seed treating house was built, 23,000 pounds of seed were treated, approximately 11,800 seed beds 4' x 400' were sown, and 900 acres of plantation were started with seedlings grown the year before by the Intercontinental Rubber Company.

The short term objective of the Emergency Rubber Project was to produce in as short a time as possible substantial amounts of rubber to aid in the war effort. The long range objective was to develop full possibilities of assuring an independent source of rubber.

In line with the short term objective the project was operated on the basis of the need for rubber generated by the war emergency. This meant that many things were done on an emergency basis, with cost of the operations a second priority.

When the original guayule act authorized the planting of 75,000 acres, a figure based on the amount of seed then available, the original construction program was aimed at the goal, but it soon became obvious that the oncoming seed crop would be much larger than anticipated. Whereupon Congress increased the authorization to 500,000 acres. On the basis of this late authorization, it was decided to aim at 208,000 acres by the spring of 1944. This entailed a great deal of activity including the construction of additional nurseries providing 45,100 beds,

each 4' x 400' as were the original beds in 1942, for a total of 2,000 acres of nursery all under overhead irrigation. These were comprised of thirteen individual units located in three states. To take care of the labor situation, seventeen labor camps capable of housing 9,000 workers were constructed. A reconnaissance survey was made of some 32,000,000 acres of land and the classification of over five million acres for guayule culture. Land acquisition work was intensified and some 60,000 acres were leased. Because of later curtailment of the Project, the planting goal was never reached, and only some 32,000 acres were planted during the life of the Emergency Rubber Project.

The Forest Service brought to the Project a great amount of expertise that had been developed in the Prairie States Shelter Belt Program, where a large number of individuals had gained experience in nursery production and field plantations. Although Shelter Belt personnel had worked with larger trees, it took very little adaptation to take care of guayule production. The basic processes were the same, the first being to get seed supply, make sure of germination, plant the nurseries, and finally transfer the plants to the fields.

Research and Operational Investigations

It was realized at the beginning that much was unknown about the guayule plant development behavior on which information was needed, if the maximum amount of rubber was to be produced for the War. The Secretary of Agriculture assigned to the Bureau of Plant Industry, Soils, and Agricultural Engineering, as part of its regular field of endeavor, the job of undertaking an intensive and immediate research program on all phases of growing the plant and to supplement this program as well as to aid in the application of its findings to actual field production. Other Bureaus, notably Entomology and Plant Quarantine, Industrial and Agricultural Chemistry, and the Soil Conservation Service as well, were later brought into the program. Research ran concurrently with production - not the ideal way but under the emergency a necessity. Activated by the feeling common to all while the country was at war, the investigators watched with intense interest the tests and experiments for any leads that might help speed production of the program or improve the quality or quantity of rubber. Promising leads were transferred to the field administrative men as fast as they were discovered. Most frequently, at least in the beginning, these ideas were verbally expressed, resulting in informal seminars between the research production and administration men as to the advisability of trying out alternate practices in the light of the newly developed information.

The Forest Service also carried out operational investigations to make small experimental tests when necessary to check field scale operations.

Almost from the beginning it was evident that a paramount factor in determining the number of shrubs and the amount of rubber produced per acre was the type and character of the soil on which guayule would grow. Under uniform conditions of climate and treatment (irrigation and cultivation), there might be found a tenfold difference in the amount of shrub produced in different parts of the same field. In fact, it was found that soil differences dominated all other factors that influenced the amount of rubber produced. It was a constant source of comment among soil technicians and agronomists that no other agricultural crop so prominently displayed to the eye the character of the soil thay lay beneath the immediate surface.

One of the important early decisions was to use irrigated land for guayule production, despite the recommendation of the Intercontinental Rubber Company, Company officials maintaining that the percent of rubber would be much lower under irrigation, and possibly not marketable; on the other hand, there were indications that shrubs could be grown much more rapidly under irrigation, even though the percentage of rubber was less, so that total per-acre production might be much greater and a crop produced in two years as against four or more years under rainfall farming.

Climate, a factor not susceptible to manipulation, is very important, affecting not only shrub growth and rubber content, but all the operations connected with planting, cultivating, harvesting, and conditioning the shrub. Although nothing could "be done about the weather," it was found that by using detailed records for many years past, selected areas could be found in which guayule could be grown under the broad expectancies for rainfall, heat, and cold. The climatic factor was interpreted in the light of vegetative growth and rubber yield. It was found that measurable vegetative growth ceased at approximately 40°F or less. In a climate like that in the immediate vicinity of Edinburg, Texas, for example, guayule production was poor because minimum temperatures were not low enough to affect the needed change in the physiology of the plant. The high temperatures of California, Arizona, New Mexico, and Texas posed no great problem, but the cool winters were an aid to rubber production.

In the beginning, standards of limitations for guayule tolerance were based largely on inductive reasoning from the native environment and the very contrasting condition in which the shrub was grown in Salinas. Temperatures below 5°F were considered unsuitable, but above 10°F suitable. A mean annual rainfall between 11-25 inches was considered suitable, between 9-11 and above 35 doubtful, below 9 inches and above 35 unsuitable. Records acquired during the life of the Project showed that these estimates were not too far off. Probably a 15° minimum would be safer, until more hardy strains are developed. The maximum precipitation should not exceed 25 inches annually, unless the fall and winter are the driest periods of the year. Good rubber yields cannot be expected where there is a higher annual rainfall equally distributed throughout the year, along with higher minimum temperatures. It is this combination of year-long moisture and warm winters that made the Edinburg area hazardous for guayule production.

At the beginning of the Emergency Rubber Project, many methods used by the Intercontinental Rubber Company appeared to be unnecessary or unduly cumbersome or slow to the Project technicians, but there was no time to experiment and it was unsafe to disregard any practices without experimentation. One example was that in connection with the use of "duckboards" by the Company in its nursery, after they had found it impractical to work with tractors without these wooden tracks between the beds. While the Project had many skilled nurserymen who had never used them in tree nurseries, it was not considered safe to go against the Company's advice, especially since the only supply of acceptable guayule seed in existence was to be entrusted to those nurseries. Because leaders in the Company insisted they were needed, thousands of miles of duckboards were constructed and laid out in the Salinas nurseries at great cost. Later it developed that it was a soil characteristic of the Company nursery that made duckboards necessary there. They were not used in subsequent nurseries, care being taken to select soil types

that did not require them. This was one of the major advances in nursery production, as the procurement of a sufficient number of duckboards had involved not only great expense, but imposed serious problems in the acquisition of the necessary lumber needed in many other wartime activities.

Plant Breeding

Dr. McCallum observed early in his studies that there was a great variation among guayule plants as evidenced by plant structure and rubber content. By selection he segregated several desirable strains, notably number 593 which was outstanding in the Salinas area, and which formed the basis of the World War II program. It soon became apparent to the Emergency Rubber Project scientists, however, that guayule offered exceptional opportunities for the plant breeder. There was great intraspecific variation as well as possible interspecific crosses, and finally, because certain numbers of the population would produce seed without pollination, desirable strains could be manipulated so as to produce offspring with few off types.

Unfortunately breeding studies were discontinued just when they were showing great promise, and it is the opinion of plant breeders and others familiar with guayule that this field offers more promise than any other possible manipulation in growing, harvesting, and rubber extraction.

SEED AND SEED HANDLING

Seed Supply

Seed purchased by the government in 1942 from the Intercontinental Rubber Company was the only seed of its kind in existence. The success of the whole guayule program depended on its preservation and proper handling. Almost all of the 23,000 pounds of seed was of usable quality, though poorly cleaned. It had been accumulated by the Company during the previous eight years, and a portion of it had been stored in sealed metal drums. It consisted of six varieties or strains developed from selections by the Company. About three-fourths of the total consisted of variety 593, considered the best selection at that time. Experimental plantings scattered from north central California to Edinburg, Texas, and field plantations in California, later demonstrated that this strain was more adaptable than any other to a wide range of conditions.

Guayule is a very prolific seeder with nursery seedlings six months old yielding a crop of seed and field plantings of all ages blooming and setting seeds continuously throughout the summer and fall if soil moisture is adequate to support vigorous growth.

There is a great amount of variation in the proportion of the guayule "seed" that contains viable embryos. Extremes of zero to 70% have been noted, but it usually ranges from 10-45. The cause of the variation is not entirely known, the genetics of the plant are highly irregular, and a majority of the embryos are created without fertilization taking place. Lygus, insects that feed

on the blossoms, destroy their ability to form seed. Also, there is evidence that extreme high temperatures are inhibiting to the formation of good seed. The variability of the seed quality also extends to variation in the seed's peculiar dormancy, preventing normal germination of the filled seeds when freshly collected.

The Emergency Rubber Project based its plantation plans on the original 23,000 pounds of seed acquired in 1942 from the Intercontinental Rubber Company. It was thought at that time that future plantations would depend upon the collection of seed, at that time an unknown quantity. However, during the summer of 1942 approximately 180,000 pounds of seed (clean weight) were collected. This unexpected seed harvest was due in part to the use of hand collection method, more efficient in terms of percent available seed collected than the mechanical means tried. Hand picking was not only very efficient but also very reasonable in cost, when limited to large heavy-yielding plants. Collections averaged about two bushels (perhaps 20 pounds) uncleaned seed per day per worker.

In 1943 a light seed-collecting machine which could be built onto row crop (beet and bean) cultivator frames was developed by the Bureau of Agricultural Chemistry and Engineering. It consisted essentially of a shaft carrying four rotary brushes, one for each row of plants, driven by a belt from the cultivator wheels. Torpedo-shaped pans were drawn along the ground between the rows of plants, catching the seed as it was brushed from the plants. These machines proved quite successful, with more than half of the 1943 crop being harvested by this means.

With the machine covering from 12-20 acres a day, 300 pounds of seed material (field weight) was considered fair, although seed collections as high as 1,500 pounds were made occasionally. Whereas hand collection cost about thirty cents a pound in 1942, the cost of machine collection in 1943 was under ten cents a pound (uncleaned field weight).

While one million pounds of seed was collected in 1943, the quality was low. It was found that the finished product could be improved by gravity separation and by threshing. The total weight was reduced to 355,000 pounds of clean seed, of which 285,000 pounds was the current preferred variety 593.

Yields in terms of clean unthreshed seed ranged from 10-300 pounds per acre, depending on the size of the plants and the length of the blooming season as influenced by moisture. In a few cases under especially favorable conditions, yields of 1,000 pounds per acre were recorded. Such yields based on machine collections should not be confused with the total seed produced by the plants. Wind and disturbance of plants by hoeing crews dislodged some seed during cultivation of furrows, and machinery could dislodge up to half the seed then ripe; the picking machine harvested one-third to two-thirds of what was left ripe on the plant at the time of collection. On the average the collected yield of seed was from 25-30% of all the seed produced by the plants.

Cleaning and Threshing

The guayule "seed" is an achene, with attached bracts and a pair of male florets. Collections made under the Emergency Rubber Project included clusters of the florets as well, along with flower stems, dried leaves, and occasionally some soil. Weed seeds were usually few or lacking. The chaffy attachments to the seed made them too light to permit cleaning by air blast. Also, some of the male flower clusters and some of the leaves were so near the same size as the seeds as to make screening separation rather ineffective. Prior to 1942, a good seed cleaning method had not been devised, but during the fall of 1942 it was found that due to the differences in the shape of the seeds and the male flower clusters, they could be separated by a screen having oblong openings one-half inch by one-twelfth inch. In 1943, faced with a large amount of this seed, it was necessary to develop some type of cleaning in order to reduce the amount of seed handled and to solve storage problems. Preliminary trials showed that cleaning by selective screening could be supplemented by a vibrating desk machine known as a gravity separator, frequently used commercially for separating filled from empty seeds. This operation with unthreshed guayule seeds proved less efficient with other heavier seed, but good enough to double the field percent of low quality guayule seed, without serious loss to good seed.

While the Company had previously had doubts as to the possibility of threshing seed, because it was thought that it weakened germination, some consideration was given to the threshing problem, and a trial was conducted using an adapted Prater Hammermill, so that the floral parts could be removed from the achenes with the destruction of only a limited number of seeds. It was also found that the gravity separator was very much more effective with threshed seed. Nearly all the chaff and empty achenes could be discarded in one operation. Ordinarily the threshed cleaned seed was about one-tenth the bulk, and one-fifth the weight of the unthreshed seed.

Unthreshed guayule seed weighs 8-10 pounds per bushel (1 to 12 1/2 pounds per cubic foot), and threshed seeds about two and a half times as much. Extensive trials both by the Forest Service and the Bureau of Plant Industry, Soils and Agricultural Engineering showed that the threshing was not only harmless to the seed but actually beneficial. The natural dormancy of the seed, requiring special chemical treatment to secure germination, persists in varying degrees for a number of years in unthreshed seeds. Threshing the seeds causes a substantial proportion to become viable at once, and dormancy of the remainder disappears in a matter of months. The chemical treatment so eliminated was a major cost of the seed as previously used.

The threshed seed germinated more quickly than the unthreshed seeds and in most seeding trials better stands of seeding were obtained from the threshed seeds.

Storage

Prior to 1942 the Company had accumulated some experience with respect to the storage of guayule seed. Because they had lost seed after two to three years of storage in cloth bags at Salinas, while seeds similarly stored in dry inland

locations kept in good condition for many years, they adopted the general practice of drying the seed promptly after collection, cleaning to four percent moisture or less, then sealing in air-tight metal drums. Most of the seed acquired by the government was so stored, and most of it was fairly good, although a few small lots stored six to eight years in sealed drums were badly deteriorated. While subsequent investigation by the Project indicated that the Company's conclusions along this line were sound with respect to long-time storage, it is not the best practice for seed to be used within two or three years after collection. Even though exceedingly dry storage devoid of aeration kept the seeds alive for a long time, it also caused it to retain its dormancy and necessitated the expensive chemical treatment to obtain germination.

Seed Treatment

When the Intercontinental Rubber Company first started investigating the possibilities of guayule as a commercial crop, they encountered the discouraging fact that very few of the seeds would germinate naturally. One of Dr. McCallum's greatest contributions was the discovery that seed given prolonged washing, followed by soaking for several hours in a solution of calcium hypochlorite or sodium hypochlorite would germinate readily. Also, it was found that holding treated seed in a moist condition spread in shallow trays at warm temperatures, just prior to sowing until it had time to start sprouting, increased the number of seedlings. Seed in such condition could not be sown with ordinary mechanical seeders, so the sprouting seed was mixed with slightly damp sawdust, then sowed with a seeder especially designed to handle such a mixture.

The Emergency Rubber Project in the beginning followed the same system for treating seed as that developed by Dr. McCallum. Equipment was patterned closely after that used by the Company although in an expanded capacity. It consisted of 60-gallon drums of perforated metal mounted to revolve in semi-cylindrical tanks. These were rotated rapidly to bring the seed to exactly the right moisture content. The damp seed was then spread in trays in quantities predetermined as to the sowing value of the seed. Temperature and humidity were controlled, and the seed aerated by stirring several times daily. When the seeds reached the right stage of sprouting (usually about five days), the trays were moved to a mixing room where a carefully portioned quantity of graded non-toxic pine sawdust brought to correct dampness was mechanically mixed with the seed. The seed sawdust mixture was delivered to the nurseries in containers, each holding enough seed to properly sow nursery beds 4' x 400'.

Based on later studies, the treatment equipment was greatly modified by abandoning the revolving drum method in favor of large concrete vats equipped with mechanical stirring devices, along with pumps to change solution on the seed and pump out the charges of treated seed. Also, a large dryer was built to permit drying the treated seeds for storage until needed. The chemical used for treatment was changed from calcium hypochlorite to sodium hypochlorite, the latter material being readily available, less injurious to lungs and eyes of workers, less expensive, and, being in liquid form, handled conveniently by the pumps.

The old method of pre-sprouting and mixing with sawdust was abandoned. Experimental work showed that hypochlorite-treated seed could be dried and stored until needed, then remoistened with water in the amount of two to two and one-half times the dry seed, held at favorable temperatures (70°-75°) for two to four days, aerated by stirring several times a day, then sown. The water diminished somewhat by evaporation during the holding period, allowing the seed to dry enough to sow without the addition of sawdust. It was also found that this "started" seed could be held in closed containers for three to four more days without sprouting, presumably due to restriction of aeration. It did not heat because the hypochlorite disinfects the seed from mold. This proved useful in case of rainy weather interfering with nursery sowing. Furthermore, it was found seed so started could be redried to permit sowing with ordinary drill seeders, without losing the effects of pre-germination.

The investigations by McCallum which led to the adaptation of hypochlorite treatment of seed failed to settle important basic questions, namely why the seed needs this treatment, and just what it does to the seed. Both calcium hypochlorite and sodium hypochlorite are widely used as disinfectants but not for treating other kinds of seeds. The usual seed disinfectants were ineffective for hastening germination of guayule. Dr. McCallum expressed the tentative theory that the hypochlorite oxidized and eliminated some organic chemical compound which acted to inhibit germination.

Later investigations indicated that the phenomenon was primarily concerned with the structure of the seed coat. The thin membrane was only slightly permeable to the exchange of gases, though readily permeable to water. The seed intake of oxygen is greatly restricted, respiration consumes oxygen and produces carbon dioxide, thus the internal atmosphere becomes too highly charged with carbon dioxide to permit progress of germination.

Presumably plant residues are responsible in part for the impermeability of the seed coat. Oxidation and deterioration of the residues with age permit increased impermeability of the inner seed coat and consequent facility of germination. The hypochlorite breaks down great quantities of free oxygen, liberated in the presence of the seed, which is then in favorable condition to imbibe it. It was found that other oxidants such as hydrogen peroxide, perchloric acid, and nitric acid may be substituted for the hypochlorite at a greater cost. The hypochlorite also disinfects the seed from molds and other pathogens.

The seed research workers found that in addition to the impermeable seed coat dormancy, freshly collected seed has true embryo dormancy. This embryo dormancy is of little practical importance, because it disappears in about six weeks after the seed ripens. The types of dormancy operate independently.

NURSERIES

During the course of domestication of guayule, the Intercontinental Rubber Company developed a system for producing planting stock and nurseries from seeds. Essentially it was similar to the methods used in producing planting stock of other

species, but many of the details of culture were peculiar to their operations. Through trial and error the Company had come to the conclusion that a heavy loam or clay loam soil was best suited to guayule. Consequently many of the operations and much of the equipment developed by them in their Salinas nursery were influenced by the relatively heavy character of the soil.

Perhaps the outstanding piece of nursery equipment developed by the Company was the seeder. This was an ingenious machine that sowed the guayule seed at a predetermined rate in seven bands distributed across the four-foot bed, and covered each bed with a thin layer of sand. The Emergency Rubber Project adopted this machine and had additional ones built after changing the design somewhat.

In the spring of 1942, the Project faced a monumental problem in developing sufficient nursery stock to take care of planting needs. The initial nursery program called for the development of nearly 12,000 standard or 4' x 400' seed beds in three nurseries to accommodate the 23,000 pounds of seed obtained from the Intercontinental Rubber Company. Work had progressed sufficiently by March 27th to permit seeding operations, and from then until completion of the irrigation systems, sowing of the seed was synchronized with construction work. Construction and sowing were practically completed by May 15th, and all sowing by June 10th. The three nurseries, covering 540 net acres of seed beds, were the largest ever to have been built with a complete overhead sprinkler system.

By mid-summer of 1942, when it became apparent that the seed crop would greatly exceed the most optimistic previous estimate, a much greater nursery acreage was designed to care for the requirements of the expanded planting program which provided for the construction of ten additional nurseries containing approximately 33,000 standard beds, plus limited expansion of the Salinas nurseries for a total of 45,000 beds.

The experience of one season at Salinas showed that operations were more satisfactory and cheaper on lighter soil. Weather did not seriously hold up nursery work, native soil instead of imported sand could be used to cover the seed, and root rots were less prevalent and more easily controlled. The elimination of duckboards resulted in a tremendous saving, as over twelve million board feet of lumber would have been required in the proposed new nurseries, as noted previously.

Although guayule grows in a wild state in southern Texas and northern Mexico, like most other crops placed under cultivation it requires freedom from competition by weeds and grass. Especially was this true under conditions facing the Emergency Rubber Project where the earliest possible production was imperative. This made it necessary to plan for and carry out an effective weed control program as a major part of the growing operation.

During the 1942 season, weeds germinated abundantly, grew swiftly, and even before nursery construction was finished, when seeding was only about 50% completed, the Project found itself engaged in one of the bitterest campaigns of its history, the battle of the weeds. Guayule seedlings are extremely small and tender for the first few weeks of their lives. Since at that time the only known method of removing weeds from the seed bed was by hand pulling, labor was recruited and

trained as well as could be done, then put to work weeding. The situation became so serious it was necessary to consider whether the remaining beds could be sown but by an heroic recruiting job, sufficient labor was finally obtained so that all the beds were sown and the weeds controlled. At the peak of the weeding season, there were 3,000 men and women pulling weeds in the 540 nursery acres at Salinas. As the season progressed, nursery personnel developed mechanical weeding devices adapted to the use of oil sprays and selective herbicides, simplifying the weed control job and reducing not only the amount of hand labor required but costs as well. The job that required 3,000 workers in the Salinas nurseries at the peak of the 1942 weeding season was done with only 300 workers in 1943.

During the life of the project 530,731 seedlings were dug, culled, packed, and shipped from the nurseries.

Sowing Methods and Techniques

Nursery methods used in the production of guayule seedlings were not greatly different from general nursery techniques employed in the growing of many species of forest tree seedlings. Under optimum conditions, guayule seedlings normally obtained the desired size at approximately four months from the day of the seeding.

In guayule nurseries the experience proved the desirability of the band sowing arrangement used by the Intercontinental Rubber Company. Within the 2-inch bands guayule seedlings compete with each other, thus developing desirable form. The nursery bed cultivators developed by the Emergency Rubber Project made it possible to cultivate the seed beds economically during the early life of the seedlings, thus reducing considerably the hand labor required in weed control and improving the tilth of the soil.

In 1942, sand was used to cover the seed, but experimentation with the native soil coupled with the seeding machine indicated that the difficulty and expense of securing washed and dried sand could be avoided. It was found that comparatively clean sand low in moisture content of a coarser texture could be used as seed cover in the nurseries on light sandy loam soil. This made possible material savings in nursery operational costs.

Soon after the 1942 spring sowing operation, work had become systematized to the point that reduction in costs greatly exceeded all expectations. During the peak of operations it was not uncommon for a crew using three seeding machines to seed an average of one standard bed (4' x 400') each minute of the work day.

Care, Irrigation, and Fertilization

Keeping weeds under very close control was found to be imperative in the production of guayule seedlings. This was especially important during the emergence period, and until the seedlings reached a height of from one to one and one-half inches. Top growth of guayule is very slow during the first four to five weeks. If, during this period, weeds were allowed to grow much beyond the cotyledon

stage, or permitted to remain long enough to form many lateral roots, it was impossible to remove them without pulling or damaging some of the guayule seedlings.

Initially frequent light irrigations were used to sustain seedling growth. This created a disease hazard, and the plants developed an undesirable number of lateral roots near the surface. The increased lateral root growth was particularly evident in the sandy soils. The side roots were undesirable because they slowed up lifting, grading, and packing operations in the nursery, consumed space in the packing crates, and interfered with the rapid handling of the plants and transplanting.

By changing the irrigation practice to heavy applications at longer intervals so as to obtain deeper penetration of the water, it was possible to reduce the disease hazard and produce seedlings with a distinct taproot characteristic practically free of coarse laterals roots. The time and method of applying fertilizer to the seed beds were other controlling factors in the taproot formation characteristics of the seedling. Dry fertilizer placed on the soil surface was less conducive to laterial root growth than fertilizer applied in a solution of water.

Lifting, Grading, and Packing

The seedling undercutting, pulling, grading, and packing operations techniques underwent major changes during the life of the Project. Intercontinental Rubber Company practices were used by the Project during the stock distribution in the spring of 1942. The plants were topped by mowing, undercut, pulled, and placed in canvas- or burlap-covered flats or trays, and hauled to the grading shed. After grading, the usable plants were then packed in heavy redwood boxes for delivery to the planting site. Because the practice of grading the plants into three sizes was found to be expensive and time consuming, it was later dropped and in 1943 one size class was adopted for use. With improved practice, crews of unskilled laborers could lift and pack more than 10,000 seedlings per man day.

Equipment used by the Emergency Rubber Project in lifting and packing operations were the same general type as that used by the Company and in forestry nurseries, except for minor changes.

FIELD PRACTICES

Planting

The need for utmost speed in the production of the greatest possible amount of rubber yield required that in the beginning the Emergency Rubber Project follow the practices of the Intercontinental Rubber Company and the advice of Dr. McCallum with respect to ground preparation, planting, and care of field plantations. In 1942 the best season for planting was nearly over at the time the Project was authorized, and the rubber situation was too critical to attempt untried methods in planting the small amount of seed available.

The Project had to expand rapidly on a wide scale and into areas for which there was little or no background of experience or information as to how the plant would grow or produce rubber. This was a hazard that had to be accepted. While the influence of climate and soils on guayule production and the general determination of suitable areas were studied extensively during the life of the Project, in the beginning this information was not available.

Because commercial production of guayule rubber prior to 1942 was confined almost entirely to non-irrigated land, the production program of the Emergency Rubber Project was at first so limited, but during the summer of 1942 the decision was reached to shift the planting program principally to irrigated land. Since estimates indicated that the most critical rubber shortage would occur in 1944 and 1945, the objective of this change was to produce the maximum amount of rubber within that time limit.

Site Preparation

As Project personnel gained experience with guayule, it was found that the requirements for soil preparation did not differ basically from those for many other farm crops. Essentially it was necessary to loosen the soil to a depth at least equal to that of the planting stock. Next, the soil had to be relatively free of large amounts of coarse crop debris. It needed to be well pulverized and thoroughly compact. Some leveling was required on irrigated land, depending to a considerable extent on the effectiveness of previous leveling done for irrigation. In the main, however, it was found that there was very little about soil preparation for the transplanting of guayule that could be called peculiar to this crop.

Guayule seedlings were transplanted to the fields in rows 28 inches apart and spaced within the rows a distance that varied from 12-24 inches, since it was believed that a closer spacing would not produce as high an ultimate yield of rubber per acre because of competition of the plants for moisture.

On irrigated land it was decided that since additional water could be supplied, more plants could be supported per unit of ground area. Early yields would be improved by utilizing a closer spacing, thus increasing the tonnage to be obtained at the end of two or three years. At first, as noted above, irrigated plantings were spaced 28 x 20 inches (11,226 plants per acre). Later it appeared that harvesting might be done after two seasons. Accordingly, in-row spacing was reduced to 16 and in some cases 12 inches.

In the beginning, the Project used planting machines developed by the Intercontinental Rubber Company, but it was believed they could be improved. Hence Project personnel in cooperation with the Agricultural Engineering Section of the Bureau of Agricultural Chemistry and Engineering undertook a production improvement program. This resulted in the modification of a standard four-row Holland Planter which, manned by an average good crew, could plant approximately 100,000 transplants for each nine-hour day, or about one acre per hour, 28 x 20 inch spacing. The average good planter could consistently feed about 55-60 plants per minute into the machine.

Planting Season

During the life of the Emergency Rubber Project, considerable experimental work was carried out to determine the most desirable planting season. It was found that it extended from approximately December 1st to March 15th or 20th. This was true of all the areas in California and Arizona in which field planting was done. On non-irrigated land expecially, it was necessary to delay planting until sufficient fall or winter rains were received to enable good ground preparation.

Care of Plantations

Weed control of guayule plantations does not differ basically from that of other agricultural crops planted in a similar manner. It could be compared directly to the requirements of beans, cabbage, califlower, or cotton. Oil sprays as developed for nursery plantations were adapted for field use. Early oil spray practice was to mix stove oil with water, necessitating large powerful sprayers. These were costly to operate, and they could not be used on wet soils. During 1943, in a further investigation on oil sprays with the cooperation of the University of California, oil was used without water.

Removal of weeds not killed by the oil spray within the shrub rows was one of the most serious cultivation problems. The only known method was by hand hoeing, a very costly operation, complicated during the life of the Project by the general scarcity of labor and needs for manpower elsewhere. Oil sprays only partially solved the problem. In 1944 two mechanical devices described as "in-row cultivators," for lack of a more descriptive name, were developed by Project employees, which eliminated to a great extent the need for hand hoeing. These machines successfully removed all the weeds growing within the planted row with minimum damage to the shrub. The output per man day exceeded that by hand hoeing by some 300-600%, thus greatly reducing the cost of this operation.

Water Requirements: Quantity and Quality

Because little was known about the water requirements of guayule, the only guide the Project could follow was a generalized comparison with some other crops considered fairly similar. Since the primary purpose of shifting production to irrigated land was to shorten the production cycle, it was decided that the quantity of irrigation water available would need to be adequate for forcing growth in the two-year growing cycle then proposed. Later it was found that for a longer production cycle, the quantity of irrigation water required was less that at first had been believed. In fact, experimental projects indicated that for four or five-year growing cycles, guayule could be grown successfully on many lands where the supply of irrigation water was insufficient for the successful production of most agricultural crops. In addition, where water conditions were favorable and winter rains insufficient to restore adequate soil moisture, water could be applied and stored in the soil of guayule fields during the winter season when it was in little demand for other crops, and thus be made available to the deep root system during the growing season.

Experience indicated that growing the crop with limited water supplies over a four or five-year cycle would produce less tonnage per acre but with considerably higher rubber content. In most cases, more pounds per acre could be produced than under the more intensively irrigated shorter growing cycle. Shrubs of high rubber content in proportion to total dry weight have very great advantages from the standpoint of extraction of rubber hydrocarbon.

Very little is known about the quality of irrigation water required by the crop. The experience of the Company, plus some short-term research carried on in 1942, indicated that guayule is comparatively intolerant of irrigation water with a high salt content.

Irrigation Methods

Generally, little was known prior to 1943 about the irrigation of guayule. The Intercontinental Rubber Company had attempted cultivation of guayule under irrigation in Arizona, but gave up apparently because it was not possible to grow shrubs with a high rubber content at that location. The Company had also planted a number of indicator plots in various parts of Texas, Arizona, and California, on which some irrigation had been carried out, but the experimental work was not sufficiently comprehensive to be fully applicable to larger programs. Thus, the Emergency Rubber Project found itself faced with the necessity of embarking on a large-scale irrigation program with very little information on water requirements of the plant, methods of irrigation, effects of irrigation on rubber accumulation, incidence of disease, and other factors.

The Intercontinental Rubber Company experience indicated that more intensive control of irrigation water would be necessary with guayule than for most other farm crops in order to provide alternating wet and dry periods, the latter to promote formation of rubber hydrocarbon. The Company also recommended that irrigation water be applied only by the furrow method since it was believed that flooding or border irrigation would induce heavy disease losses. Project experience with water in contact with the crowns of the plants later proved that flooding on some soils was a real hazard to guayule; on the other hand, it was found that irrigation by border or flooding methods could be used, especially in Arizona and Texas, on permeable soils particularly during cool seasons.

A very limited use was made of water distribution by sprinkler systems. Such uses as were made of overhead sprinkling indicated that it would be satisfactory for guayule under the conditions tested.

It was found that irrigation immediately after planting under California conditions was of no appreciable benefit. In fact, in several cases the application of water necessary to successfully soak the soil around the young seedlings seemed to increase losses through oversaturation of the soil. This practice was found to be beneficial, however, to new plantings in Arizona, New Mexico, and Texas during dry periods.

One problem encountered late in the Project was that many fields had grown to such size as to completely close the space between the rows. Lower branches,

dead leaves, and other debris interfered with the flow of irrigation water between rows, and the remaking of the furrows was often difficult because of breakage of the brittle-growing shrub by furrowing equipment. Also, the damming of the irrigation furrows by the lower portion of the plants frequently resulted in unequal distribution of water. In one extreme case, 72 days were required to irrigate a large field that had been covered in about 25 days the previous year.

Very little was known about the relationship of irrigation to rubber formation, the experimental work which had been carried on by the Company indicating that the amount and time of irrigation had a distinct effect upon the rubber content and total rubber production. This information, however, was not complete enough to be used in carrying out irrigation on the thousands of acres being grown by the Emergency Rubber Project.

One factor was considered desirable to obtain the maximum amount of rubber under a year-round harvesting and milling schedule: Conditioning the shrub by withholding irrigation for several months in advance of harvest made it possible to obtain considerable build-up of rubber content in the shrub to be harvested during the spring, summer, and early fall. Research during the first two years of the Project showed that no irrigation should be given during the year of harvest at Salinas if the shrub was to be harvested prior to December, whereas in the hot dry Bakersfield, California, area, some irrigation was essential on most soil types to keep the shrub alive and in rubber-building condition.

INSECT AND DISEASE CONTROL

Under California conditions, the only insect problem of economic consequence in the production of the program was the annual attacks by grasshoppers. The Bureau of Entomology and Plant Quarantine closely followed grasshopper invasions and spread poison in susceptible fields. The result was that no losses of consequence were suffered by the Project from this cause. Lygus was found to be present in large numbers in most of the field plantations in California, but these insects did little damage, except by feeding on the seed. Control methods were not employed in field plantations because the profuse seeding habits of guayule made it possible to collect large amounts of seeds despite Lygus attacks.

Large-scale production under irrigation involved certain disease hazards and losses which could not be avoided entirely. Where irrigation was comparatively heavy, a number of fields were attacked by Phytophthora root rot. Verticillium also made its appearance in numerous fields in the Bakersfield district. With the able assistance of the plant pathologists connected with the Bureau of Plant Industry, Soils and Agricultural Engineering research organization, it was determined that to a large extent losses due to Phytophthora had been brought about by heavy irrigation of newly-planted fields. It was also discovered that the incidence and development of this disease was directly related to heavy watering during periods of high temperatures. By adjustment in irrigation scheduling it was possible to greatly reduce the incidence and spread of this disease. Likewise, adjustments of irrigation schedules in other areas lessened the damage caused by Verticillium.

HARVESTING

Pre-Harvesting Conditioning

In its native state in northern Mexico and southern Texas, guayule shows a buildup of rubber percent and consequently a total rubber content in the plant during the semi-dormant or non-growing season. In that region this takes place in the winter months. While all the factors which bring about this seasonal acceleration in rubber deposition are not yet known, it appears that the phenomenon is induced both by cool temperatures and high moisture stress. It has also been known that this cyclic increase in rubber content is more pronounced in immature plants.

The Company had been acquainted with this fact through its experience in harvesting wild shrub in Mexico and it found the same to be true during the harvesting and milling of cultivated shrub in Salinas. Their operations at Salinas were almost entirely confined to the growing of the shrub on non-irrigated land, with dependency on the normally dry summer and fall seasons and the relatively low winter temperatures, to produce the desired pre-harvest conditioning. Harvesting and milling by the Company in Salinas had therefore been confined to winter months to take advantage of the increased rubber content of the plant, and thus reduce the cost per pound of the rubber produced.

It was the opinion of former Intercontinental Rubber Company employees that rubber could not be successfully milled out of a two or three year old shrub. They further believed the maximum recovery of rubber could not be obtained from older or mature shrubs harvested during the growing season when the shrub was growing lushly. Experimental work, which was started very shortly after the Emergency Rubber Project was initiated, indicated that the rubber probably could be successfully milled from relatively young plant seeds during the growing season, although it might be somewhat higher in resin content than from similar aged shrub milled during the winter months. Experimental work also began to point to the fact that at least a part of the pre-harvesting conditioning or cyclic increase in rubber content could be obtained by subjecting the plant to high moisture stress for several months immediately before harvest. Thus, there developed an opportunity to partially duplicate natural conditions on irrigated land by the proper handling of irrigation.

Moisture content of the shrubs in place in the field varied considerably during the year, depending on weather conditions, the amount of moisture present in the soil, and, to some extent, on current rate of growth. However, it was found that moisture content of the plant seldom dropped below 38%, and during most of the year varied from 45-60%. Because of the difficulties encountered with storing in pre-milling conditioning, it was not considered advisable to bale the shrub at any high moisture content. Moreover, shrub with such moisture content was difficult to bale properly. Many experiments were conducted by the research agency in the Project on optimum moisture content of baled shrub from the standpoint of storage and coagulation of rubber in millability. While not all the answers to these were fully developed, it was concluded that considering 1) optimum conditions for baling, 2) safe storage without undue chance of spoiling, and 3) rapid coagulation of rubber after storage, the shrub should be dried or cured before baling to a moisture content ranging from 20-30%. Later studies favored the harvesting of fresh shrub.

Harvesting Methods

At the time the Project was initiated the standard practice followed by the Company for harvesting cultivated guayule had been to dig the shrub with a heavy two-row digger. The shrub was roughly bunched by the digger in windrows, then allowed to dry for three to five days, after which it was gathered into larger windrows with a special heavy-duty side delivery rake. The windrows thus formed were then rolled with a corrugated roller or culti-packer to dislodge the dirt from the roots. The shrub was then chopped in the field with a special-duty rotary chopper equiped with a pickup attachment, hauled to the mills, and stored in large bins until it was milled. After the guayule program was taken over by the Emergency Rubber Project, it was decided that harvesting would be done by digging the shrub and by baling with mechanical balers. The baled shrub could be stored in either field stockpiles or at the mills. This greatly facilitated shipment of the shrub from the field to factory by trucks, and made possible long-distance shipments by rail.

Lloyd was the first to suggest havesting guayule by clipping the plants instead of digging, although the Intercontinental Rubber Company tried clipping without much success. But because the method offered the advantage of not having to replant after harvesting, it was investigated by scientists of the Bureau of Plant Industry and Agricultural Engineering, who found that the quality of the rubber from clipped tops was equal to that obtained from whole plants and that there was no decrease in rubber in the roots of clipped plants. After five or six years plants clipped once and harvested by digging at the end of the period produced more than a ton per acre, exceeding the amount obtained by harvesting two crops by digging during the same period. These results were not considered conclusive, and when costs of harvesting and milling are considered, one crop harvested at five or six years might be more economical.

METHODS OF EXTRACTING RUBBER FROM THE GUAYULE PLANT

Extraction of rubber from the guayule crop presents certain difficulties not encountered in removing the rubber from most other rubber-bearing plants. These difficulties are occasioned by the anatomical structure of guayule and the manner in which the rubber is distributed through the plant system. In guayule the rubber hydrocarbon is suspended in latex as in other rubber-bearing plants. In guayule, however, the latex is not borne in long tubes or ducts, but constitutes the contents of single cells. The parenchyma cells in which the latex is found are relatively thin-walled with roughly equal dimensions along each of three axes and are found principally in the cortical tissues in the medullary rays and in the pith. Because these cells are not interconnected, the latex cannot float from one cell to the next. This form of structure has precluded the removal of rubber from guayule by tapping, as is done with Hevea, and hence necessitates the harvesting of the complete plant.

Since the rubber hydrocarbon is distributed throughout the roots, stems and branches of the shrub, some means must be found for macerating the plant tissues, thereby releasing the rubber from the individual cells for recovery. With the rubber present in the form of latex, mashing or cutting the plant will result in distribution of the latex over the macerated fragments from which it could be recovered only with great difficulty. If macerated in water, the latex would be dispersed through the water, from which recovery on a commercial scale has not proved

economically feasible. It becomes necessary therefore to put the rubber in the plant in such a form that its release from the parent tissue and its subsequent separation and recovery can be accomplished. The most feasible means has been to permit the shrub to undergo a period of "cure" during which the latex within each cell coagulates to a flocculated mass. (Parboiling fresh shrub also results in coagulation of the rubber.) The plant tissues can then be macerated freeing these masses which subsequently cohere to form the classic "rubber worms". These may be quite easily removed from most of the plant residue by flotation.

Under the process followed by the Emergency Rubber Project the entire shrub was at first chopped into pieces, then crushed with corrugated rollers, after which the material was mixed with water and fed into the first of a series of pebble mills. These mills were rotating steel tubes with a rough lining and partly filled with smooth pebbles. The movement of the pebbles against the lining macerated the shrub material and released the rubber particles from the fibers. This slurry then moved into a flotation tank where the rubber particles were conglomerated into worms, and floated to the surface, with the waterlogged bagasse sinking to the bottom. The worms were skimmed off and put through various cleansing processes to remove adhering particles of cork, dirt, and other debris, then dried and pressed into 100-pound blocks.

The Bureau of Agricultural and Industrial Engineering carried out experiments in milling young shrub. The purpose of this study was to determine the feasibility of rubber extraction from plants two years old or younger in comparison with rubber production from plants 5-10 years old. It was found that rubber could be obtained, but that there were several problems related to the young plants. First the proportion of leaves to stems was much higher than in older plants, and the leaves contained no recoverable rubber. After the leaves were removed by parboiling the shrub, the rubber could be extracted satisfactorily. However, the rubber worms from young shrub were sticky and more difficult to separate from nonrubber particles than was rubber from old shrub.

After the Emergency Rubber Project was closed, additional studies under Congressional reauthorization were conducted by the Bureau of Agricultural and Industrial Chemistry. These studies were not under pressure of time as had been the case during the World War II period, and hence could delve deeper into fundamentals.

Early during the post-war research it was found that it was not necessary to dry shrub before milling and that the rubber obtained from lush shrub was superior to that of dried or stored shrub. By parboiling, using high pressure crushing and pressing the shrub through twice, a rubber recovery of more than 85% was obtained. Milling lush shrub also resulted in reduction of insoluble material.

Under improved methods of obtaining rubber as latex by disrupting plant cells into a liquid medium, 90% of the dispersed rubber could be recovered by centrifuging, with a yield of some 76% of the total rubber in the shrub. Rubber extracted in the form of latex compared favorably with Hevea rubber.

While other tests were made using Jordan mills, studies were not carried out to a point where it could be shown definitely whether the tube mill or the Jordan was superior for milling.

The resin content of guayule rubber obtained by ordinary milling processes is responsible for some unsatisfactory characteristics and hence de-resinating studies were undertaken to determine if and how much of the resin could be eliminated. It was found that the resin could be extracted from the chopped shrub or from the rubber worms with acetone. In each case resin extraction resulted in a rubber comparable to Hevea. It was also found that when the de-resinated rubber was treated with antioxidants, it had aging characteristics superior to raw Hevea rubbers.

BIBLIOGRAPHY

PREFACE

This bibliography has been prepared primarily for participants in the International Conference on Utilization of Guayule held in Tucson, Arizona, on November 17-19, 1975. This conference was planned to explore the state of knowledge and available information on the guayule rubber plant from pre-World War II days through recent developments, to determine the availability of expertise and scope of interest, and to explore the immediate and future economic potential, particularly as related to the Indians of the Southwest.

The more than 900 documents cited in this bibliography attest to the significant amount of interest and research in guayule over the years. Brief annotations were prepared for 225 of these documents and, with few exceptions, they cover the period 1942 or later. Additional annotations for the period prior to 1942 are provided by Moyle (1942) and Blanchard (1944). Reference is made in this bibliography to all documents abstracted in Biological Abstracts, Chemical Abstracts, and Horticultural Abstracts. These abstracting journals generally provide more information than is contained in the brief annotations provided herein.

In order to provide a bibliography that is as complete as possible, a number of unpublished documents have been included. The majority of these are available from the United States Department of Agriculture Library in Washington, D.C., and/or the Oilseed and Industrial Crops Research Branch, Crops Research Division, Agricultural Research Service, Beltsville, Maryland.

Although guayule is not now grown commercially in the United States, extensive scientific research has provided the necessary methods for successful guayule culture and rubber production. We hope that this bibliographic effort will aid in the eventual establishment of guayule as a thriving commercial enterprise among Southwestern Indians and other peoples in arid and semi-arid zones.

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ANONYMOUS

1941

LEAFLET ON GUAYULE RUBBER.

CALIFORNIA CHAMBER OF COMMERCE, SALINAS. 4 P.

CALIFORNIA/CULTIVATION

111

ANONYMOUS

1941

NATURAL RUBBER IN GERMANY (TRANSLATED TITLE).

GUMMI-ZEITUNG 55:817.

ECONOMICS

112

ANONYMOUS

1941

O'NEIL BACKS GUAYULE.

TIRE REVIEW 41(11):42.

LEGISLATION

113

ANONYMOUS

1941

RUBBER SHRUB.

NEWSWEEK 17(10):48-49.

USES

114

ANONYMOUS

1941

UNITED STATES IMPORTS OF GUAYULE FROM MEXICO.

FOREIGN COMMERCE WEEKLY 3:353.

UNITED STATES/MEXICO

115

ANONYMOUS

1941

WHY OF GUAYULE.

TIME 38(26):53-54.

USES

116

ANONYMOUS

1942

ACRES FOR GUAYULE: GOVERNMENT'S PROMOTION OF RUBBER-BEARING BUSH IS LAUNCHED IN CALIFORNIA AREA WHERE CROP IS ALREADY ESTABLISHED.

BUSINESS WEEK 649:68, 70.

CALIFORNIA/CULTIVATION/LEGISLATION

117

ANONYMOUS

1942

CHILE TRIES GUAYULE.

U.S. DEPARTMENT OF COMMERCE, FOREIGN COMMERCE WEEKLY 8(8):26.

SOUTH AMERICA

118

ANONYMOUS

1942

CONGRESS APPROVES GUAYULE BILL CALLING FOR CULTIVATION OF 75,000 ACRES.

RUBBER AGE 50:367.

CULTIVATION/LEGISLATION

119

ANONYMOUS

1942

CONGRESS INCREASES PLANTING OF GUAYULE.

COMMERCIAL AND FINANCIAL CHRONICLE 156:1434

CULTIVATION/LEGISLATION

120

ANONYMOUS

1942

CONSERVATION WAR FRONT.

AMERICAN FORESTER 48:511.

ECONOMICS

121

ANONYMOUS

1942

DESERT RUBBER: NATIVE MEXICAN GUAYULE SHRUB DOES ITS BIT IN ALLIED SCRAMBLE FOR A QUICK SUPPLY OF RUBBER.

INTER-AMERICAN MONTHLY 1(3):18-24.

MEXICO/USES

122

ANONYMOUS

1942

DOWNEY GUAYULE BILL A LAW.

INDIA RUBBER WORLD 107:181.

LEGISLATION

123

ANONYMOUS

1942

EXTENSIVE SURVEY OF GUAYULE POSSIBILITY.

TEXAS AGRICULTURAL EXPERIMENT STATION, NEWS LETTER 5.

TEXAS/USES/PLANT DISTRIBUTION

124

ANONYMOUS

1942

FOR MORE GUAYULE.

INDIA RUBBER WORLD 105(4):393.

125

ANONYMOUS

1942

GUAYULE.

CHRONICA BOTANICA 7:138.

CULTIVATION/RUBBER EXTRACTION/CALIFORNIA

126

ANONYMOUS

1942

GUAYULE.

RUBBER AGE 50:286.

LEGISLATION

127

ANONYMOUS

1942

GUAYULE.

RUBBER AGE 52:55.

CULTIVATION/CALIFORNIA/RUBBER EXTRACTION

128

ANONYMOUS

1942

GUAYULE AND ITS POSSIBLE GROWTH FOR PRODUCTION OF RUBBER IN TEXAS.

COMMERCIAL FERTILIZER 64:14, 16, 18.

TEXAS/CULTIVATION

129

ANONYMOUS

1942

GUAYULE AS A SOURCE OF RUBBER.

CHEMICAL AND METALLURGICAL ENGINEERING 49:151-153.

USES/ECONOMICS

130

ANONYMOUS

1942

GUAYULE COMPOUNDED WITH SYNTHETIC AND NATURAL RUBBER.

SCIENTIFIC AMERICAN 167:208.

CHEMISTRY/USES/MEXICO/RUBBER EXTRACTION

131

ANONYMOUS

1942

GUAYULE HAS INSECT ENEMIES.

JOURNAL OF FORESTRY 40:529.

INSECTS/PLANT INJURY/MEXICO

132

ANONYMOUS

1942

GUAYULE PLANTING.

BUSINESS WEEK 654:16-17.

PLANTING MANAGEMENT/CALIFORNIA

133

ANONYMOUS

1942

GUAYULE PRODUCTION IN MEXICO: PICTORIAL PRESENTATION.

RUBBER AGE 51:491-493.

MEXICO/RUBBER EXTRACTION

134

ANONYMOUS

1942

GUAYULE RUBBER.

KEW ROYAL BOTANICAL GARDEN BULLETIN OF MISCELLANEOUS INFORMATION 6:211-212.

SEEDS/ECONOMICS

135

ANONYMOUS

1942

GUAYULE RUBBER GROWING IN CALIFORNIA.

TIMBERMAN 43(6):10-12.

CALIFORNIA

136

ANONYMOUS

1942

GUAYULE RUBBER PRODUCTION PROJECT LAUNCHED.

INDIA RUBBER WORLD 106:47-48.

LEGISLATION

137

ANONYMOUS

1942

GUAYULE RUBBER: RAPID PROGRESS MADE ON GUAYULE RUBBER PROJECT.

NEW AGRICULTURE 24(8):8.

138

ANONYMOUS

1942

GUAYULE, THE AMERICAN SOURCE OF RUBBER.

GENERAL TIRE AND RUBBER COMPANY. 15 P.

UNITED STATES

139

ANONYMOUS

1942

GUAYULE'S REBOUND.

NEWSWEEK 19(23):63-65.

140

ANONYMOUS

1942

JANUARY TIRE QUOTA IS 357,000; ONLY ESSENTIAL VEHICLES TO GET CONSIDERATION; GOVERNMENT SPEEDING OUTPUT OF SYNTHETIC, GUAYULE, WILD RUBBER.

AUTOMOTIVE NEWS 17(2701):1, 8.

USES/ECONOMICS

141

ANONYMOUS

1942

LA PRODUCCION DE CAUCHO EN EL PAIS.

ARGENTINA MINISTERIO DE AGRICULTURA DIRECCION DE PROPAGANDA Y PUBLICACION NOTICIOSO 7(160):45.

SOUTH AMERICA

142

ANONYMOUS

1942

MEXICO. DIRECCION DE GEOGRAFIA, METEOROLOGIA E HIDROLOGIA.

SECRETARIA DE AGRICULTURA Y FOMENTO, BOLETIN. 112 P.

MEXICO/PLANT DISTRIBUTION

143

ANONYMOUS

1942

OUR RUBBER PROBLEM: WHAT RUBBER RESOURCES REMAIN OPEN TO US?

FOREIGN COMMERCE WEEKLY 6(3):7, 33-34.

ECONOMICS

144

ANONYMOUS

1942

PERSPECTIVES INDUSTIRALES: HULE.

REVISTA DE ECONOMIA (MEXICO) 5(3):8-10.

CULTIVATION/MEXICO

145

ANONYMOUS

1942

PLANT-SOURCE POSSIBILITIES FOR RUBBER PRODUCTION IN COLORADO.

COLORADO AGRICULTURAL EXPERIMENT STATION, BULLETIN 96:1-15.

SEE: HA (15)180.

UNITED STATES/ECONOMICS

146

ANONYMOUS

1942

PLANTING COMPLETED IN GUAYULE RUBBER PLAN.

COMMERCIAL AND FINANCIAL CHRONICLE 155:2310

CULTIVATION/ECONOMICS

147

ANONYMOUS

1942

POTENTIAL INSECT ENEMIES OF GUAYULE.

RUBBER AGE 51:482.

INSECTS/PLANT INJURY

148

ANONYMOUS

1942

PRODUCTOS ESTRATEGICOS: O GUAIULE.

FAZENDA 37:66.

USES

149

ANONYMOUS

1942

PROGRESS REPORT ON THE GUAYULE RUBBER PROJECT.

JOURNAL OF FORESTRY 40:656-657.

CULTIVATION

150

ANONYMOUS

1942

RAPID PROGRESS OF GUAYULE PROJECT.

INDIA RUBBER WORLD 106:150.

CULTIVATION

151

ANONYMOUS

1942

RAPID PROGRESS REPORTED IN GUAYULE RUBBER PRODUCTION PROJECT: PLANTING NOW UNDERWAY.

U.S. OFFICE FOR EMERGENCY MANAGEMENT VICTORY 3(15):28.

CULTIVATION

152

ANONYMOUS

1942

REVISED GUAYULE BILL PROVIDES FOR PLANTING IN WESTERN HEMISPHERE.

RUBBER AGE 50:455.

CULTIVATION/LEGISLATION

153

ANONYMOUS

1942

RUBBER FROM GUAYULE.

CONGRESS SPEAKS 1:1-4.

LEGISLATION

154

ANONYMOUS

1942

RUBBER SOURCE SCOUTED IN WEST TEXAS: COOPERATIVE SURVEY IS MADE OF GUAYULE AREA.

TEXAS FOREST NEWS 22(5/6):1, 6.

PLANT DISTRIBUTION/TEXAS

155

ANONYMOUS

1942

RUBBER CULTIVATION PUSHED IN CONGRESS.

OIL, PAINT, AND DRUG REPORTER 141(8):5, 42.

CULTIVATION/LEGISLATION

156

ANONYMOUS

1942

SUMMARY OF DATA ON GUAYULE.

RUBBER MANUFACTURERS ASSOCIATION, INC. 21 P.

USES/ECONOMICS

157

ANONYMOUS

1942

THE GUAYULE: A NEW CROP OF GREAT VALUE (TRANSLATED TITLE).

CAMPESINO (CHILE) 74:472-475.

ECONOMICS/SOUTH AMERICA

158

ANONYMOUS

1942

THE GUAYULE RUBBER PROJECT: AT SALINAS, CALIFORNIA, FORESTERS ARE MAKING GREAT STRIDES IN THE GROWING OF A MUCH HERALDED RUBBER PLANT.

AMERICAN FORESTS 48:347-349, 380.

CALIFORNIA/CULTIVATION

159

ANONYMOUS

1942

THE RUBBER SITUATION AND GUAYULE.

BANK OF AMERICA BUSINESS REVIEW 12(3):6-8.

ECONOMICS/USES

160

ANONYMOUS

1942

TIRES FOR EVERYBODY? A PROPOSAL TO GIVE AMERICA WITHIN THREE YEARS ENOUGH REAL AND SYNTHETIC RUBBER TO MEET EVERY LIKELY NEED.

MOTOR AGE 61(4):18-19, 53.

USES

161

ANONYMOUS

1942

VAST GUAYULE RUBBER PROJECT STARTED: FEDERAL GOVERNMENT BEGINS BIG-SCALE OPERATIONS IN SALINAS REGION.

PACIFIC GAS AND ELECTRIC PROGRESS 19(5):1-2.

CALIFORNIA

162

ANONYMOUS

1942

WANTED: RUBBER; AREAS ATTACKED BY JAPAN ACCOUNT FOR 97 PERCENT OF SUPPLY; U.S. TURNS TO SYNTHETICS, GUAYULE, LATIN AMERICA.

BUSINESS WEEK 645:17-18.

ECONOMICS/UNITED STATES/SOUTH AMERICA

163

ANONYMOUS

1942

WHY WORRY ABOUT RUBBER? MEXICO AND THE UNITED STATES COULD CULTIVATE ENOUGH RUBBER IN THE FORM OF A LOWLY DESERT SHRUB TO SUPPLY THE GREATER PART OF THEIR NEEDS.

MEXICAN AMERICAN REVIEW 10(3):20-21, 66-67.

UNITED STATES/MEXICO/CULTIVATION

164

ANONYMOUS

1943

EL CULTIVO DEL GUAYULE NO ES UNA NOVEDAD EN EL PAIS.

CHACRA 13(149):40-42, 47.

CULTIVATION

165

ANONYMOUS

1943

EXPANSION OF GUAYULE PROGRAM FORECAST BY RUBBER OFFICIALS.

RUBBER AGE 53:537-:538.

166

ANONYMOUS

1943

GUAYULE.

AGROCIENCIA MEXICO 59(7):3-7.

MEXICO

167

ANONYMOUS

1943

GUAYULE: WHAT'S CALIFORNIA'S ANSWER?

PACIFIC RURAL PRESS 146:89.

CALIFORNIA/ECONOMICS

168

ANONYMOUS

1943

RUBBER FROM GUAYULE.

TROPICAL AGRICULTURE (TRINIDAD) 20:161-163.

SEE: BA(18)20391. HA (13)1540.

CULTIVATION/PLANTING MANAGEMENT/RUBBER EXTRACTION/HARVESTING/MILLING

169

ANONYMOUS

1943

RUBBER FROM GUAYULE SHRUB.

AUTOMOBILIST 27:4.

170

ANONYMOUS

1943

RUBBER FROM MEXICO.

AGRICULTURE IN THE AMERICAS 3(4):68-69.

MEXICO/CULTIVATION

171

ANONYMOUS

1943

SE IMPLANTARA EL CULTIVO DEL GUAYULE EN EL PAIS. VISITAS DE UN TECNICO NORTE-AMERICANO.

MADERIL 15(175):34.

CULTIVATION/MEXICO

172

ANONYMOUS

1943

TEXAS' WILD GUAYULE AIDS RUBBER SUPPLY.

JOURNAL OF FORESTRY 41:828.

PLANT DISTRIBUTION/TEXAS/ECONOMICS

173

ANONYMOUS

1943

U.S. RUBBER: GUAYULE AND KOK-SAGHYZ SOURCES NOW STRIDING AHEAD.

SCIENTIFIC AMERICAN 168:172-173.

UNITED STATES/ECONOMICS

174

ANONYMOUS

1944

GUAYULE RUBBER PRODUCTION BY THE EMERGENCY RUBBER PROJECT.

INDIA RUBBER WORLD 109(4):363-366, 370.

SEE: BA(19)14317. CA (38)1905.

UNITED STATES/CULTIVATION/PLANTING MANAGEMENT

175

ANONYMOUS

1944

RECOVERY OF RUBBER FROM YOUNG GUAYULE SHRUBS.

INDIA RUBBER WORLD 109:475-477.

RUBBER EXTRACTION

176

ANONYMOUS

1944

RUBBER FROM PLANT SOURCES.

COUNCIL FOR SCIENTIFIC AND INDUSTRIAL RELATIONS, AUSTRALIA, JOURNAL 17:49-58.

SEE: CA (38)3869. HA (14)1242.

PLANTING MANAGEMENT/ECONOMICS/AUSTRALIA

177

ANONYMOUS

1945

GUAYULE: COMING FARM CROP.

ARIZONA FARMER 24(13):1, 16-17, 23.

ARIZONA/CULTIVATION/ECONOMICS

178

ANONYMOUS

1945

OBSERVATIONS ON THE GROWTH OF GUAYULE UNDER GREENHOUSE CONDITIONS.

CALIFORNIA AGRICULTURAL EXPERIMENT STATION, BERKELEY. 16 P.

PLANT GROWTH

179

ANONYMOUS

1950

CAN WE GROW OUR OWN RUBBER?

CHEMURGIC DIGEST 9:25.

UNITED STATES/CULTIVATION/ECONOMICS

180

ANONYMOUS

1950

PRODUCTION OF NATURAL AND SYNTHETIC RUBBER IN ARGENTINA
(TRANSLATED TITLE).

MINISTERIA DE AGRICULTURA ESPAGNA, BOLETIN 3(23):78-80.

SEE: HA (22)761.

SOUTH AMERICA/CULTIVATION/ECONOMICS

181

ANONYMOUS

1950

RUBBER PRODUCTION IN THE UNITED STATES (TRANSLATED TITLE).

LANDBOUW WERELDNIEUWS 5:465.

SEE: HA (22)770.

UNITED STATES/CULTIVATION

182

ANONYMOUS

1951

MORE ABOUT RUBBER.

CHEMURGIC DIGEST 10:11-12.

ECONOMICS

183

ANONYMOUS

1951

NEW STRAINS OF GUAYULE FORMED TO YIELD MORE RUBBER.

CHEMISTRY AND ENGINEERING 28:4276.

RUBBER YIELD/PLANT BREEDING

184

ARREGUIN, B.

1947

STUDIES OF RUBBER FORMATION IN EXCISED GUAYULE STEMS.

AMERICAN JOURNAL OF BOTANY 34(10):597.

RUBBER YIELD/STEMS/PLANT ANATOMY/PLANT PHYSIOLOGY

185

ARREGUIN, B./BONNER, J.

1950

BIOCHEMISTRY OF RUBBER FORMATION IN GUAYULE. II: RUBBER FORMATION IN ASEPTIC TISSUE CULTURES.

ARCHIVES OF BIOCHEMISTRY AND BIOPHYSICS 26(2):178-186.

RUBBER SYNTHESIS AND ACCUMULATION IN EXCISED GUAYULE STEM SECTIONS WERE PROMOTED BY ADDITION TO THE AGAR GROWING MEDIUM OF ACETATE, ACETONE, BETA-METHYLCROTONIC ACID OR LEAF EXTRACTS FROM GUAYULE PLANTS ACTIVELY FORMING RUBBER.
SEE: BA(24)25125. CA (44)7386.

RUBBER YIELD/CHEMISTRY/PLANT PHYSIOLOGY

186

ARREGUIN, B./BONNER, J./WOOD, B.J.

1951

STUDIES ON THE MECHANISM OF RUBBER FORMATION IN GUAYULE. III: EXPERIMENTS WITH ISOTOPIC CARBON.

ARCHIVES OF BIOCHEMISTRY AND BIOPHYSICS 31:234-247.

CARBON LABELLED ACETATE WAS FOUND TO BE INCORPORATED IN RUBBER AND RESINS FORMED BY GUAYULE. HOWEVER, MOST OF THE ACETATE GIVEN WAS METABOLIZED TO AMINO ACIDS, PARTICULARLY LEUCINE, VALINE, ASPARTATE, AND GLUTAMATE.
SEE: HA (21)3822.

RESINS/RUBBER YIELD/CHEMISTRY/PLANT PHYSIOLOGY

187

ARTSCHWAGER, E.

1943

CONTRIBUTION TO THE MORPHOLOGY AND ANATOMY OF GUAYULE (PARTHENIUM ARGENTATUM).

U.S. DEPARTMENT OF AGRICULTURE, TECHNICAL BULLETIN 842:1-33.

GUAYULE FLOWER AND SEED MORPHOLOGY ARE DESCRIBED FROM PUBLISHED DATA, AND STRUCTURE OF THE SEEDLING, MATURE STEM, ROOT, AND LEAF ARE CONSIDERED IN DETAIL. RUBBER IS MOST CONSPICUOUS IN SECONDARY PHLOEM RAYS AND ALTHOUGH IT OCCURS IN ALL PLANT ORGANS, ONLY THE STEM AND ROOT HAVE SUFFICIENT QUANTITIES TO BE OF ECONOMIC INTEREST.
SEE: BA(17)22323.

PLANT ANATOMY/SEEDLINGS/LEAVES/RUBBER YIELD/ROOTS/SEEDS/STEMS

188

ARTSCHWAGER, E.

1945

GROWTH STUDIES ON GUAYULE (PARTHENIUM ARGENTATUM).

U.S. DEPARTMENT OF AGRICULTURE, TECHNICAL BULLETIN 885:1-19.

MOST NEW XYLEM FORMATION IN GUAYULE STEMS OCCURRED EARLY IN THE SEASON WHEREAS PHLOEM DEVELOPMENT WAS CONTINUOUS AND RELATED TO PROGRESSIVE INACTIVATION OF OLD PHLOEM THAT BECAME SCLEROTIC. SYNTHESIS OF RUBBER WAS CONTINGENT UPON SLOWING OR REPRESSION OF GROWTH.
SEE: BA(19)14299.

RUBBER YIELD/PLANT GROWTH/MOISTURE STRESS/PLANT ANATOMY/STEMS

189

AVAKIAN, A.M. COMP.

1942

GUAYULE: A BIBLIOGRAPHY.

U.S. FOREST SERVICE, BERKELEY, CALIFORNIA FOREST AND RANGE EXPERIMENT STATION. 2 P.

BIBLIOGRAPHIES

190

BAIRD, L.E.

1975

GUAYULE: THE VIABLE SECOND SOURCE OF NATURAL RUBBER.

RUBBER WORLD 171(6):44-49.

THE HISTORY OF GUAYULE UTILIZATION AND ITS FUTURE POTENTIAL ARE PRESENTED INCLUDING AGRICULTURAL AND ECONOMIC ASPECTS. THE SIGNIFICANT ADVANCES IN RESEARCH RESULTING FROM THE EMERGENCY RUBBER PROJECT IN THE EARLY 1940'S AS WELL AS POST-WAR RESEARCH ON BY-PRODUCTS ARE DESCRIBED.

USES/ECONOMICS/CULTIVATION

191

BALLESTEROS, J.L.

1946

INDUSTRIALIZATION OF GUAYULE.

REVISTA DE ECONOMIA 9(3):8-10.

ECONOMICS

192

BANIGAN, T.F., JR.

1953

DIFFUSION PHENOMENA IN THE SOLVENT DERESINATION OF GUAYULE RUBBER.

INDUSTRIAL AND ENGINEERING CHEMISTRY 45:577-581.

DERESINATION/CHEMISTRY/RUBBER QUALITY

193

BANIGAN, T.F., JR./MEEKS, J.W.

1953

ISOLATION OF PALMITIC, STEARIC, AND LINOLEIC ACIDS FROM GUAYULE.

AMERICAN CHEMICAL SOCIETY, JOURNAL 75:3829-3830.

CHEMISTRY

194

BANIGAN, T.F., JR./MEEKS, J.W./PLANCK, R.W.

1951

DISTRIBUTION OF WAXES IN GUAYULE.

BOTANICAL GAZETTE 113(2):231-234.

WAXES ISOLATED FROM COMMINUTED GUAYULE APPEARED TO BE LIMITED IN OCCURRENCE TO THE PHLOEM ABOVE GROUND AND ACTIVELY GROWING PARTS OF THE SHRUB. THE DISTRIBUTION OF WAXES IN THE PLANTS WAS CONSTANT FOR SHRUBS OF THE SAME AGE AND VARIETY HARVESTED AT DIFFERENT SEASONS.
SEE: BA(26)19408. CA (46)4833. HA (22)2848.

CHEMISTRY/PLANT PHYSIOLOGY

195

BANIGAN, T.F., JR./MEEKS, J.W./PLANCK, R.W.

1951

PROCESS OF ISOLATING BETAINE FROM GUAYULE EXTRACT.

U.S. PATENT 2,549,763.

THE PROCEDURE FOR PRECIPITATING BETAINE FROM A GUAYULE ALCOHOL EXTRACT IS DESCRIBED.
SEE: CA (45)8034.

CHEMISTRY/U.S. PATENTS

196

BARBER, J.

1941

POSSIBILITIES OF GUAYULE RUBBER IN AMERICA.

RUBBER AGE 49(5):327-329.

UNITED STATES

197

BATEMAN, G.F.

1942

THE ACTUAL FACTS ABOUT GUAYULE IN THE ROCKY MOUNTAIN AREA.

WESTERN FARM LIFE 44(6):5, 10.

UNITED STATES

198

BAUMHOFER, L.G.

1942

POTENTIAL INSECT ENEMIES OF GUAYULE.

U.S. BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE, WASHINGTON, D.C. 13 P.

INSECTS/PLANT INJURY

199

BECKETT, R.E./STITT, R.S./DUNCAN, E.N.

1942

GROWTH AND RUBBER CONTENT OF CRYPTOSTEGIA, GUAYULE AND MISCELLANEOUS PLANTS INVESTIGATED AT THE U.S. ACCLIMATIZATION GARDEN, BARD, CALIFORNIA, 1923-1934.

U.S. BUREAU OF PLANT INDUSTRY, WASHINGTON, D.C. 18 P.

PLANT GROWTH/RUBBER YIELD/CALIFORNIA.

200

BENEDICT, H.M.

19-

THE INTERACTIONS OF VARIOUS ENVIRONMENTAL FACTORS ON THE GROWTH, RESINS, AND RUBBER CONTENT OF GUAYULE.
(UNPUBLISHED). 17 P.

RUBBER YIELD/PLANT GROWTH/RESINS

201

BENEDICT, H.M.

1944

STUDIES ON THE EFFECTS OF STOVE OIL ON GUAYULE AND WEEDS IN THE NURSERY PLANTINGS.

U.S. FOREST SERVICE, WASHINGTON, D.C., EMERGENCY RUBBER PROJECT. 32 P. (UNPUBLISHED)

PLANTING MANAGEMENT

202

BENEDICT, H.M.

1948

THE EFFECT OF WASTE PRODUCTS FROM THE GUAYULE RUBBER MILL ON THE GROWTH OF VARIOUS CROPS.

AMERICAN SOCIETY OF AGRONOMY, JOURNAL 40:1005-1016.

GUAYULE MILL WASTE LEAVES AND EFFLUENT INCREASED AVAILABLE SOIL NITROGEN AND PLANT GROWTH. BAGASSE TENDED TO RENDER SOIL NITROGEN UNAVAILABLE TO PLANTS.
SEE: CA (43)1515.

MILLING/PLANT GROWTH/CHEMISTRY/SOIL-WATER-PLANT RELATIONSHIPS

203

BENEDICT, H.M.

1949

A FURTHER STUDY ON THE NONUTILIZATION OF RUBBER AS A FOOD RESERVE BY GUAYULE.

BOTANICAL GAZETTE 111(1):36-43.

REPEATED DEFOLIATION OF GUAYULE PLANTS RESULTED IN SIGNIFICANT DECREASES IN SUGARS, LEVULINS, INULIN, PENTOSANS, AND RESINS, BUT NO LOSS IN RUBBER HYDROCARBONS. THIS INDICATED THAT RUBBER DID NOT ACT AS A FOOD RESERVE.
SEE: BA(24)7344. CA (44)2090. HA (20)956.

DEFOLIATION/CHEMISTRY/RUBBER YIELD/PLANT PHYSIOLOGY

204

BENEDICT, H.M.

1950

FACTORS AFFECTING THE ACCUMULATION OF RUBBER IN SEEDLING GUAYULE PLANTS.

BOTANICAL GAZETTE 112(1):86-95.

EXPERIMENTS INDICATE THAT GUAYULE SEEDLINGS GROWN AT HIGHER LEVELS OF LIGHT INTENSITY, SOIL MOISTURE, TEMPERATURE AND NITROGEN SUPPLY HAD HIGH DRY WEIGHTS AND LOW LEVELS OF CARBOHYDRATES AND RUBBER. THE SAME LEVELS EXCEPT FOR A LOWER SOIL MOISTURE RESULTED IN THE GREATEST DRY WEIGHT AND RUBBER PERCENTAGE INDICATING RAPID GROWTH RATE AND HIGH RUBBER PRODUCTION ARE NOT NECESSARILY INCOMPATIBLE.
SEE: BA(25)2980. CA (45)223. HA (21)824.

SEEDLINGS/SOIL-WATER-PLANT RELATIONSHIPS/RUBBER YIELD/PLANT GROWTH/TEMPERATURE EFFECTS

205

BENEDICT, H.M.

1950

THE EFFECT OF SOIL TEMPERATURE ON GUAYULE PLANTS.

PLANT PHYSIOLOGY 25:377-388.

EXPERIMENTS INDICATE THAT IN SOIL TEMPERATURES VARYING FROM 4 TO 35 DEGREES C, THE MAXIMUM DRY WEIGHT OF ABOVE-GROUND PARTS OF GUAYULE SHRUBS OCCURRED AT 27 TO 29 DEGREES C. AND OF ROOTS AT 18 DEGREES C. THE LOWEST DRY WEIGHT OF ALL PLANT PARTS OCCURRED AT 4 TO 7 DEGREES C., BUT LOW SOIL TEMPERATURES TENDED TO INCREASE THE RUBBER PERCENTAGE.
SEE: CA (44)9011. HA (20)3049.

SOIL-WATER-PLANT RELATIONSHIPS/RUBBER YIELD/PLANT GROWTH/TEMPERATURE EFFECTS/ROOTS

206

BENEDICT, H.M./BROOKS, P.M./PUCKETT, R.F.

1950

THE MOLECULAR WEIGHT OF RUBBER IN DIFFERENT PARTS OF THE GUAYULE PLANT.

PLANT PHYSIOLOGY 25:120-134.

A PROCEDURE FOR EXTRACTING RESIN-FREE RUBBER FROM GUAYULE WITHOUT HEATING OR MILLING IS DESCRIBED. RUBBER WITH THE HIGHEST MOLECULAR WEIGHT WAS FOUND IN THE ROOTS WITH PROGRESSIVELY LOWER CONCENTRATIONS IN THE STEMS AND BRANCHES.
SEE: CA (44)3580. HA (20)1807.

RUBBER YIELD/RUBBER EXTRACTION/ROOTS/CHEMISTRY/STEMS

207

BENEDICT, H.M./KROFCHEK, A.W.

1946

THE EFFECT OF PETROLEUM OIL HERBICIDES ON THE GROWTH OF GUAYULE AND WEED SEEDLINGS.

AMERICAN SOCIETY OF AGRONOMY, JOURNAL 38:882-895.

CONTROL OF WEEDS IN GUAYULE FIELD NURSERIES WAS OBTAINED WITH A MIXTURE OF 75 PERCENT STOVE OIL AND 25 PERCENT DIESEL OIL SPRAYED AT A RATE OF 32.4 GALLONS PER ACRE TWO WEEKS AFTER SEEDING. GUAYULE WAS HIGHLY RESISTANT TO OIL INJURY.
SEE: BA(21)4335. HA (17)250.
PLANTING MANAGEMENT/SEEDLINGS/PLANT INJURY

208

BENEDICT, H.M./MCRARY, W.L./SLATTERY, M.C.

1947

RESPONSE OF GUAYULE TO ALTERNATING PERIODS OF LOW AND HIGH MOISTURE STRESSES.

BOTANICAL GAZETTE 108(4):535-549.

RUBBER CONTENT AND LEVULINS IN GUAYULE INCREASED DURING PERIODS OF HIGH MOISTURE STRESS, BUT LEVULINS DISAPPEARED AND RUBBER CONTENT WAS CONSTANT OR INCREASED SLIGHTLY DURING ALTERNATING PERIODS OF LOW MOISTURE STRESS. RESULTS INDICATED THAT LEVULINS ACT AS A FOOD RESERVE AND THAT THE GREATEST RUBBER ACCUMULATION OCCURS AT SEASONS OTHER THAN WINTER UNDER ALTERNATING FOUR-MONTH PERIODS OF HIGH AND LOW MOISTURE STRESS.
SEE: BA(47)25932. CA (41)660 . HA (17)2366.

MOISTURE STRESS/RUBBER YIELD/PLANT GROWTH/PLANT PHYSIOLOGY

209

BENEDICT, H.M./ROBINSON, J.

1946

STUDIES ON THE GERMINATION OF GUAYULE SEED.

U.S. DEPARTMENT OF AGRICULTURE, TECHNICAL BULLETIN 921:1-46.

THE OPTIMUM GERMINATION TEMPERATURE FOR GUAYULE SEED WAS 20 DEGREES C. FOR 17 HOURS AND 30 DEGREES C. FOR 7 HOURS DAILY. EMBRYO DORMANCY OCCURS FOR A PERIOD OF ABOUT TWO MONTHS FOLLOWING SEED MATURITY AND SEED COAT DORMANCY CAN BE BROKEN BY TREATMENT WITH STRONG OXIDIZING AGENTS.
SEE: BA(23)5165.
SEEDS/TEMPERATURE EFFECTS/PLANT PHYSIOLOGY

210

BENEDICTIS, A., DE

1929

GUAYULE OF ERYTHREA.

AGRICULTURA DE COLONIALES 23:16-18.

SEE: CA (24)641.

211

BERGNER, A.D.

1944

GUAYULE PLANTS WITH LOW CHROMOSOME NUMBERS.

SCIENCE 99:224-225.

MANY GUAYULE PLANTS FROM TEXAS WERE FOUND WITH DIPLOID CHROMOSOME NUMBERS OF 36 TO 39.
SEE: BA(18)9795.
TEXAS/GENETICS

212

BERGNER, A.D.

1946

POLYPLOIDY AND ANEUPLOIDY IN GUAYULE.

U.S. DEPARTMENT OF AGRICULTURE, TECHNICAL BULLETIN 918:1-36.

CHROMOSOME NUMBERS FROM 36 TO 122 WERE DETERMINED FOR GUAYULE PLANTS WITH SELECTIONS FROM SEEDS COLLECTED IN TEXAS, MEXICO AND SOME COMMERCIAL STRAINS. RESULTS INDICATED THAT DIPLOIDS REPRODUCE AMPHIMICTICALLY, 3X AND 4X MOSTLY APOMICTICALLY, AND THAT CONSIDERABLE CHROMOSOMAL IMBALANCE IS POSSIBLE FROM CROSSES.
SEE: BA(20)19258.

GENETICS/SYSTEMATICS/TEXAS/MEXICO

213

BINKLEY, A.M.

1941

ADAPTATION OF GUAYULE SHRUB, DESERT PLANT WHICH BEARS RUBBER, DOUBTFUL IN COLORADO.

COLORADO AGRICULTURAL EXPERIMENT STATION, QUARTERLY FARM BULLETIN 3(4):14-15.

SEE: CA(36):4543.

TEMPERATURE EFFECTS

214

BLANCHARD, A.J. COMP.

1942

GUAYULE: A LIST OF REFERENCES.

U.S. SOIL CONSERVATION SERVICE, WASHINGTON, D.C., BIBLIOGRAPHY 4. 53 P.

BIBLIOGRAPHIES

215

BLANCHARD, A.J. COMP.

1944

GUAYULE: A LIST OF REFERENCES. (REVISED BY A. AVAKIAN, AND R.W. MOATS)

U.S. DEPARTMENT OF AGRICULTURE, WASHINGTON, D.C., LIBRARY LIST 10. 61 P.

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216

BLANEY, H.F.

1942

RUBBER FROM GUAYULE.

ENGINEER 174:504-506.

CULTIVATION

217

BLANEY, H.F.

1943

RUBBER FROM GUAYULE.

AGRICULTURAL ENGINEERING 24:194-196.

218

BLYTHE, S.G.

1931

TAMING THE WILD GUAYULE.

SATURDAY EVENING POST 203:28, 30, 106, 109-110.

DISTRIBUTION

219

BOCHANTAOVA, Z.P.

1933

ESSAY ON THE BIOLOGY OF THE FLOWER OF PARTHENIUM ARGENTATUM, GRAY (TRANSLATED TITLE).

SREDNE - AZIATSLII GOSNDARSTVENNYI UNIVERSITET TRUDY, SER. 8-B:1-16.

PLANT ANATOMY/U.S.S.R.

220

BOESEN, V.H.

1942

CALIFORNIA'S RUBBER RUSH.

CORONET 12:79-83.

CALIFORNIA

221

BOHME, R.W.

1941

RUBBER FROM PLANTS IN THE NORTHERN LATITUDES (TRANSLATED TITLE).

UNSCHAU 45:321-323.

SEE: CA (36)6369.

U.S.S.R./CULTIVATION

222

BONNER, J.

1943

EFFECTS OF TEMPERATURE ON RUBBER ACCUMULATION BY THE GUAYULE PLANT.

BOTANICAL GAZETTE 105(2):233-243.

GUAYULE PLANTS GROWN IN THE GREENHOUSE UNDER A WIDE RANGE OF TEMPERATURES INCREASED IN RUBBER CONTENT MOST RAPIDLY AND EXTENSIVELY WITH NIGHT TEMPERATURES OF 40-45 DEGREES F. AND DAY TEMPERATURES OF 80 DEGREES F.
SEE: BA(18)9275. CA (38)1266. HA (14)718.

RUBBER YIELD/PLANT GROWTH/TEMPERATURE EFFECTS

223

BONNER, J.

1944

EFFECT OF VARYING NUTRITIONAL TREATMENTS ON GROWTH AND RUBBER ACCUMULATION IN GUAYULE.

BOTANICAL GAZETTE 105:352-364.

GUAYULE PLANTS WERE GROWN OUTDOORS IN GRAVEL CULTURE UNDER VARIOUS NUTRITIONAL TREATMENTS. NITROGEN LEVELS MARKEDLY INFLUENCED GROWTH AND RUBBER ACCUMULATION WHICH WERE ALSO DEPRESSED BY LOW LEVELS OF PHOSPHATE AND MAGNESIUM.
SEE: BA(18)14661. CA (38)3319. HA (14)1243.

PLANT GROWTH/RUBBER YIELD/PLANTING MANAGEMENT/PLANT PHYSIOLOGY

224

BONNER, J.

1946

FURTHER INVESTIGATION OF TOXIC SUBSTANCES WHICH ARISE FROM GUAYULE PLANTS: RELATION OF TOXIC SUBSTANCES TO THE GROWTH OF GUAYULE IN SOIL.

BOTANICAL GAZETTE 107(3):343-351.

GROWTH INHIBITING SUBSTANCES FOUND IN GRAVEL CULTURE WERE NOT FOUND IN SOILS WHERE GUAYULE WAS GROWN FOR SEVERAL YEARS.
SEE: BA(20)13767. CA (40)3799. HA (16)2076.
PLANT GROWTH/SOIL-WATER-PLANT RELATIONSHIPS/PLANT PHYSIOLOGY/PLANT INJURY

225

BONNER, J.

1949

CHEMICAL WARFARE AMONG THE PLANTS.

SCIENTIFIC AMERICAN 180(3):48-51.

SEE: BA(50)14148.

PLANT PHYSIOLOGY/CHEMISTRY

226

BONNER, J.

1949

SYNTHESIS OF ISOPRENOID COMPOUNDS IN PLANTS.

JOURNAL OF CHEMICAL EDUCATION 26:626-631.

A RUBBER PRECURSOR IN GUAYULE LEAVES CONTROLS RUBBER SYNTHESIS WITH ACETATE AS AN INTERMEDIATE.
SEE: BA(24)25126. CA (44)3576.

LEAVES/CHEMISTRY/PLANT PHYSIOLOGY/RUBBER YIELD

227

BONNER, J.

1950

ROLE OF TOXIC SUBSTANCES IN THE INTERACTIONS OF HIGHER PLANTS.

BOTANICAL REVIEW 16(1):51-65.

SUBSTANCES TOXIC TO GROWING PLANTS, INCLUDING THOSE PRODUCED BY GUAYULE, ARE DESCRIBED.
SEE: BA(25)229. CA (44)4186.

PLANT PHYSIOLOGY/PLANT INJURY/PLANT GROWTH

228

BONNER, J.//PREGUIN, B.

1949

THE BIOCHEMISTRY OF RUBBER FORMATION IN THE GUAYULE. I: RUBBER FORMATION IN SEEDLINGS.

ARCHIVES OF BIOCHEMISTRY 21:109-124.
RUBBER CONTENT IN GUAYULE SEEDLINGS WAS INCREASED WHEN LEAF EXTRACTS FROM PLANTS ACTIVELY MAKING RUBBER WERE ADDED TO NUTRIENT SOLUTION. THIS EFFECT WAS NOT OBTAINED IF LEAF EXTRACTS WERE TAKEN FROM PLANTS NOT ACTIVELY FORMING RUBBER.
SEE: BA(23)24820. CA (43)9176.

SEEDLINGS/RUBBER YIELD/LEAVES/PLANT PHYSIOLOGY

229

BONNER, J./GALSTON, A.

1944

TOXIC SUBSTANCES FROM THE CULTURE MEDIA OF GUAYULE WHICH MAY INHIBIT GROWTH.

BOTANICAL GAZETTE 106:185-198.

ORGANIC SUBSTANCES, FOUND IN NUTRIENT CULTURE SOLUTIONS IN WHICH GUAYULE PLANTS GREW, INHIBITED THE GROWTH OF OTHER YOUNG GUAYULE PLANTS. THE SUBSTANCES WERE ALSO FOUND IN WATER IN WHICH GUAYULE ROOTS WERE SOAKED.
SEE: BA(19)7279. CA (39)1199. HA (15)670.

PLANT GROWTH/ROOTS/PLANT PHYSIOLOGY/PLANT INJURY

230

BONNER, J./GALSTON, A.

1947

THE PHYSIOLOGY AND BIOCHEMISTRY OF RUBBER FORMATION IN PLANTS.

BOTANICAL REVIEW 13:543-596.

FACTORS AND THEORIES INVOLVED IN RUBBER PRODUCTION IN PLANTS ARE REVIEWED INCLUDING GUAYULE.
SEE: BA(22)17218. CA (42)8890.

PLANT PHYSIOLOGY/CHEMISTRY

231

BONNER, J./PARKER, M.W./MONTERMOSO, J.C.

1954

BIOSYNTHESIS OF RUBBER.

SCIENCE 120:549-551.

CHEMISTRY/PLANT PHYSIOLOGY

232

BORZI, A.

1906

STUDI ED ESPERIENZE SULLA COLTURA DEL LA PLANTE DU GOMMA ELASTICA IN SICILIA EL GUAYULE (PARTHENIUM ARGENTATUM, GRAY).

R. ORTO BOTANICO DI PALERMO, BOLLETINO 5(34):135.

CULTIVATION

233

BOSSE, G.

1928

GVAIIULA.

ZHURNAL REZINOVOI PROM'SHLENNOSTI 1928(2/3):71-77.

U.S.S.R.

234

BOUTARIC, J.

1919

SUMMARY OF A STUDY ON VARIOUS MADAGASCAR GUMS AND THEIR MIXTURE WITH GUAYULE AND BALATA (TRANSLATED TITLE).

CAOUTCHOUC ET LA GUTTA-PERCHA 16(186):9893-9900.

SEE: CA (13)3337.

USES/CHEMISTRY

235

BOUYCHOU, J.G.

1951

GUAYULE IN THE UNITED STATES: INVESTIGATIONS AND POSSIBILITIES (TRANSLATED TITLE).

REVISTA GENERAL CAOUTCHOUC 26:607-611.

SEE: CA (45)10641.

UNITED STATES/CALIFORNIA/CULTIVATION

236

BOUYCHOU, J.G.

1960

GUAYULE RUBBER: PRESENT RESULTS AND FUTURE PROSPECTS (TRANSLATED TITLE).

REVISTA GENERAL CAOUTCHOUC 37(12):1672.

USES/ECONOMICS

237

BOWERS, G.B.

1926

OUR HOME-GROWN RUBBER.

FLOWER GROWER 13:133.

UNITED STATES

238

BRANDES, E.W.

1942

GO AHEAD, GUAYULE!

AGRICULTURE IN THE AMERICAS 2(5):83-86.

SEE: BA(17)12182.

CULTIVATION/ECONOMICS

239

BRAUN, A.J.

1944

OBSERVATIONS ON SCLEROTINA ROOT ROT OF GUAYULE.

PLANT DISEASE REPORTER 28(32):982-984.

SEE: BA(19)5340.

MICROORGANISMS/PLANT INJURY/SOIL-WATER-PLANT RELATIONSHIPS

240

BRAUN, A.J.

1947

PHYTOPATHORA ROOT ROT OF GUAYULE.

OREGON STATE UNIVERSITY (PH.D. DISSERTATION). 41 P.

ROOTS/PLANT INJURY/MICROORGANISMS

241

BROYER, T.C.

1945

RENEWAL OF GROWTH BY GUAYULE TRANSPLANTS.

PLANT PHYSIOLOGY 20(1):137-141.

GUAYULE TRANSPLANTED FROM THE NURSERY TO THE GREENHOUSE VARIED IN POWER FOR REGENERATION WITH THE TIME OF YEAR, DECREASING PROGRESSIVELY FROM WINTER TO SUMMER.
SEE: BA(19)9371. HA (15)667.

PLANT GROWTH/SOIL-WATER-PLANT RELATIONSHIPS/PLANTING MANAGEMENT/SEEDLINGS

242

BUEHRER, T.F./BENSON, L.

1945

RUBBER CONTENT OF NATIVE PLANTS OF THE SOUTHWESTERN DESERT.

ARIZONA AGRICULTURAL EXPERIMENT STATION, TECHNICAL BULLETIN 108:1-33.

THE RUBBER CONTENTS OF 93 PLANT GENERA GROWN UNDER NATURAL OR IRRIGATED CONDITIONS WERE DETERMINED. SEVERAL SAMPLES OF GUAYULE WERE INCLUDED.
SEE: CA (40)6863.

RUBBER YIELD/IRRIGATION EFFECTS/UNITED STATES

243

BULLARD, W.E., JR.

1945

COMPARISON OF YIELDS OF RUBBER FROM SHRUB GROWN UNDER VARYING CONDITIONS OF IRRIGATION.

(UNPUBLISHED). 10 P.

RUBBER YIELD/IRRIGATION EFFECTS

244

BULLARD, W.E., JR.

1946

CLIMATE AND GUAYULE CULTURE.

U.S. FOREST SERVICE, WASHINGTON, D.C., EMERGENCY RUBBER PROJECT. 17 P.

WHEN MOISTURE IS AVAILABLE, GUAYULE'S BEST GROWTH IS MADE AT TEMPERATURES OF ABOUT 90-100 DEGREES F. AND MINIMUM TEMPERATURES SHOULD NOT DROP BELOW 15 DEGREES F. UNLESS WINTERS ARE DRY AND THE PLANTS ARE DORMANT. THE MINIMUM PRECIPITATION FOR SUCCESSFUL DRY-LAND FARMING IS ABOUT 15 INCHES EXCEPT WHERE COOL, FOGGY SUMMERS PREVAIL. GREATEST RUBBER ACCUMULATION OCCURS IN PLANTS THAT GROW AT MODERATE RATES WITH DEFINITE PERIODS OF DORMANCY.
SEE: BA(21)15446.

PLANT GROWTH/TEMPERATURE EFFECTS/SOIL-WATER-PLANT RELATIONSHIPS/CULTIVATION

245

BULLARD, W.E., JR.

1946

STUDIES IN GUAYLE YIELDS. I: INVENTORY TECHNIQUES. 20 P.
II: THE EFFECT OF STAND SURVIVAL ON SHRUB SAMPLING IN GUAYULE. 2 P.
III: RELATION OF STAND DENSITY TO YIELD IN GUAYULE PLANTATIONS. 13 P.
IV: FACTORS IN GROWTH AND DEVELOPMENT OF GUAYULE. 42 P.

U.S. FOREST SERVICE, WASHINGTON, D.C., EMERGENCY RUBBER PROJECT.

WHERE FIELD SURVIVAL OF GUAYULE WAS GREATER THAN 80 PERCENT, INCREASED GROWTH FROM SURVIVING PLANTS WAS USUALLY SUFFICIENT TO MAKE FILL-IN PLANTING UNNECESSARY. GROWTH WAS BEST ON DEEP, WELL-DRAINED SOILS AND HIGH RUBBER ACCUMULATION OCCURRED WHEN COOL AND DRY PERIODS CAME ON GRADUALLY.
SEE: BA(21)15447.

PLANT GROWTH/RUBBER YIELD/PLANTING MANAGEMENT/SOIL-WATER-PLANT RELATIONSHIPS

246

BURDENSKI, D./GONZALEZ-LAGUINGE, E.
1952

PETROLEUM DISTILLATES AS HERBICIDES IN GUAYULE NURSERIES.

BOLETIN DE PRODUCCION Y FOMENTO AGRICOLA (BUENOS AIRES) 4(31):2-14.

LOW COST AND SATISFACTORY WEED CONTROL IN GUAYULE NURSERIES WERE OBTAINED WITH VARIOUS PETROLEUM DISTILLATES.
SEE: BA(27)17533. HA (23)4123.

PLANTING MANAGEMENT

247

CALDWELL, M.L./SPENCE, D.

1931

CUTTING VS. PULLING IN THE HARVESTING OF SHRUB: EXPERIMENT 301S.

(UNPUBLISHED). 4 P.

HARVESTING

248

CALIFORNIA LEGISLATURE ASSEMBLY

1941

FEASIBILITY OF GROWING GUAYULE RUBBER IN CALIFORNIA.

CONGRESSIONAL RECORD 87:4496.

CALIFORNIA/CULTIVATION/LEGISTLATION

249

CALVINO, M.

1910

PROPAGATION OF GUAYULE (TRANSLATED TITLE).

MEXICO ESTACION EXPERIMENTAL DE SAN JACINTO HOJA 311-2.

MEXICO/PROPAGATION

250

CALVINO, M.

1934

ITALIAN RUBBER (TRANSLATED TITLE).

COSTA AZZURRA AGRICOLE E FLOREALE 14(8):197-203

251

CAMPBELL, W.A.

1946

SCLEROTINIA ROOT ROT OF GUAYULE.

PLANT DISEASE REPORTER 30(9):312-319.

SCLEROTINIA MINOR AND TO A LESSER EXTENT S. SCLEROTIORUM CAUSED ROOT ROT IN GUAYULE. INFECTION AND LOSS INCREASED WITH MOISTURE CONTENT IN IRRIGATED SOIL.
SEE: BA(21)10207.

IRRIGATION EFFECTS/PLANT INJURY/ROOTS/MICROORGANISMS

252

CAMPBELL, W.A.

1947

A BACTERIAL ROOT AND STEM DISEASE OF GUAYULE.

PHYTOPATHOLOGY 37(5):271-277.

ROOT AND STEM LESIONS IN GUAYULE RESULTED IN CONSIDERABLE PLANT LOSSES IN IRRIGATED PLANTATIONS AND WERE CAUSED BY A BACTERIAL INFECTION OF ERWINIA SP. OPTIMUM TEMPERATURES FOR THE DISEASE RANGED BETWEEN 75 AND 85 DEGREES F.
SEE: BA(21)18295. HA (17)2369.

MICROORGANISMS/ROOTS/STEMS/IRRIGATION EFFECTS/TEMPERATURE EFFECTS/ PLANT INJURY

253

CAMPBELL, W.A./PRESLEY, J.T.

1946

DISEASES OF CULTIVATED GUAYULE AND THEIR CONTROL.

U.S. DEPARTMENT OF AGRICULTURE, CIRCULAR 749:1-42.

EXTENSIVE OBSERVATIONS OF FIELD, NURSERY AND GREENHOUSE PLANTINGS OF GUAYULE OVER A THREE-YEAR PERIOD INDICATED THAT LOSS FROM DISEASE WAS NOT AN IMPORTANT FACTOR IN PLANT PRODUCTION. SERIOUS LOSSES, PRIMARILY FROM ROOT ROT, DID OCCUR ON POORLY DRAINED OR EXCESSIVELY IRRIGATED SOILS.
SEE: BA(20)16256.

IRRIGATION EFFECTS/PLANT INJURY/ROOTS/PLANT GROWTH

254

CAMPBELL, W.A./SLEETH, B.

1945

A ROOT ROT OF GUAYULE CAUSED BY PYTHIUM ULTIMUM.

PHYTOPATHOLOGY 35(8):636-639.

TWO STAGES OF ROOT ROT OF GUAYULE ON HEAVY OR EXCESSIVELY WET SOILS WERE DESCRIBED. SEEDLING ROOT ROT BEGINS SOON AFTER EMERGENCE AND PINK ROT DEVELOPS WHEN THE PLANTS ARE 6-16 WEEKS OLD.
SEE: BA(19)20074. HA (16)279.

MICROORGANISMS/ROOTS/SEEDLINGS/SOIL-WATER-PLANT RELATIONSHIPS/PLANT INJURY/IRRIGATION EFFECTS

255

CAMPBELL, W.A./SLEETH, B.

1946

VARIABILITY OF PYTHIUM ULTIMUM FROM GUAYULE.

MYCOLOGIA 38:24-39.

MICROORGANISMS/ROOTS/PARASITES

256

CAMPBELL, W.A. ET AL

1943

SOME DISEASES OF GUAYULE IN CALIFORNIA.
PLANT DISEASE REPORTER 27(2):63-66.
SEVERAL DISEASES OF GUAYULE IN CALIFORNIA AND THEIR PROBABLE CAUSES ARE DESCRIBED. THESE INCLUDE ROOT ROT, WILT, COLLAR ROT, TOP ROT, LEAF SPOT, AND ROOT KNOT.
SEE: BA(17)17361.

CALIFORNIA/MICROORGANISMS/PLANT INJURY

257

CARNAHAN, G.H.

1926

THE PRODUCTION OF GUAYULE RUBBER.

INDUSTRIAL AND ENGINEERING CHEMISTRY 18(11):1124-1126.

258

CARNAHAN, G.H.

1928

METHODS OF THE REMOVAL OF RUBBER FROM GUAYULE PLANT AND DIAGRAMS OF PREFERRED FORM OF PLANT OR MILL AND VERTICAL SECTION OF ONE OF THE AGITATORS.

U.S. PATENT 1,671,570.

RUBBER EXTRACTION/MILLING/U.S. PATENTS

259

CARNAHAN, G.H.

1928

RECENT GUAYULE DEVELOPMENTS - CHEMICAL, CULTURAL, AND MECHANICAL IMPROVEMENTS.

INDIA RUBBER WORLD 79(1):53-55.

CHEMISTRY/CULTIVATION

260

CARNAHAN, G.H.

1931

AMERICAN-GROWN RUBBER PRODUCED FROM GUAYULE.

CHEMICAL AND METALLURGICAL ENGINEERING 38(3):128-131.

UNITED STATES

261

CAROTHERS, G.C.

1910

GUAYULE IN NORTHERN MEXICO; THE PEBBLE METHOD OF EXTRACTING RUBBER FROM THE PLANT: PRICES AND EXPORTS OF GUAYULE AND RUBBER.

U.S. BUREAU OF MANUFACTURES MONTHLY CONSULAR AND TRADE REPORTS 353:144.

MEXICO/RUBBER EXTRACTION/ECONOMICS

262

CARRA, P./AUGE

1951

LE GUAYULE PARTHENIUM ARGENTATUM.

REVUE HORTICALE ALGERIE 55:239-243, 294-299.

SEE: HA (22)2849.

CULTIVATION

263

CASSIDY, T.P./ROMNEY, V.E./YORK, G.T.

1945

THE ROLE OF ARSENICALS IN REDUCING LYGUS INJURY TO GUAYULE SEED.

JOURNAL OF ECONOMIC ENTOMOLOGY 38(1):50-51.

FIELD EXPERIMENTS TO CONTROL LYGUS POPULATIONS, WHICH FEED ON IMMATURE GUAYULE SEED EMBRYOS, SHOWED THAT SULFUR-ARSENICAL DUST MIXTURES REDUCED THE POPULATIONS, BUT WERE NOT CONSIDERED ADEQUATE FOR EFFECTIVE CONTROL.
SEE: BA(19)14600. CA (39)2616. HA (15)1746.

SEEDS/INSECTS/PLANT INJURY

264

CASSIDY, T.P. ET AL

1950

DAMAGE TO GUAYULE BY INSECTS AND MITES WITH NOTES ON CONTROL.

U.S. DEPARTMENT OF AGRICULTURE, CIRCULAR 842:1-19.

INJURY TO GUAYULE BY INSECTS AND MITES WAS OBSERVED EXTENSIVELY IN FIELD, NURSERY, AND GREENHOUSE PLANTINGS IN THE UNITED STATES AND MEXICO.
SEE: BA(24)37938. HA (20)3051.

PLANT INJURY/INSECTS/PARASITES/SEEDLINGS/UNITED STATES/MEXICO

265

CATCHESIDE, D.G.

1950

THE B-CHROMOSOMES OF PARTHENIUM ARGENTATUM.

GENETICA IBERICA 2:139-148.

A DESCRIPTION OF B-CHROMOSOMES IN GUAYULE DURING MEIOSIS IS PROVIDED.
SEE: BA(27)8461.

GENETICS

266

CELESTINO, G.

1937

CULTIVATION OF GUAYULE AS A SECONDARY RUBBER PLANT (TRANSLATED TITLE).

COSTA AZZURRA AGRICOLE E FLOREALE 17(4):92-95.

CULTIVATION

267

CHEREPANOV, V.I.

1932

GEOGRAPHICAL PLANTING OF GUAYULE IN AZERBAIJAN (TRANSLATED TITLE).

SOVETAKU KAUCHUK 6:2.

PLANTING MANAGEMENT/U.S.S.R.

268

CHEREPANOV, V.I.

1936

MATERIALS OF REGIONAL DISTRIBUTION OF GUAYULE IN AZERBAIDZHAN (TRANSLATED TITLE).

AKADEMIYA NAUK AZERBEIDZH FILIAL BOTANICHESK INSTITUT TRUDY 2:119-146.

U.S.S.R.

269

CHUBB, R.L. ET AL

1951

DERESINATION AS A MEANS OF IMPROVING THE QUALITY OF GUAYULE RUBBER. I: SHRUB DERESINATION.

INDIA RUBBER WORLD 123:557-562, 569.

SEE: CA (45)6415.

RUBBER QUALITY/DERESINATION

270

CHUTE, H.O.

1909

THE DERESINATION OF INDIA RUBBER.

INDIA RUBBER WORLD 40:351-352.

DERESINATION

271

CLARK, F.E.

1948

DOMESTIC NATURAL RUBBERS.

CHEMICAL ENGINEERING NEWS 26:926-929.

CURRENT DEVELOPMENTS IN NATURAL RUBBER PLANT CULTURE, PRODUCTION AND PRODUCT CHARACTERISTICS ARE REVIEWED FOR SEVERAL PLANTS INCLUDING GUAYULE. SEE: CA (42)7080.

RUBBER YIELD/CULTIVATION

272

CLARK, F.E.

1952

PROCESS OF DERESINATING RUBBER FROM PLANTS.

U.S. PATENT 2,616,670.

SEE: CA (47)3024.

DERESINATION/U.S. PATENTS/RUBBER QUALITY

273

CLARK, F.E./FEUSTAL, I.C.

1954

METHOD OF TREATING RUBBER OBTAINED FROM RUBBER-BEARING PLANTS.

U.S. PATENT 2,665,317.

U.S PATENTS/RUBBER QUALITY/CHEMISTRY

274

CLARK, F.E./PLACE, W.F.L.

1945

THE COMPOUNDING OF GUAYULE RUBBERS: EFFECT OF CARBON BLACK LOADINGS.

INDIA RUBBER WORLD 112:67-72.

CHEMISTRY/RUBBER QUALITY

275

CLARK, F.E./PLACE, W.F.L.

1946

EVALUATION OF BLENDS OF GUAYULE AND GR-S RUBBERS.

INDUSTRIAL AND ENGINEERING CHEMISTRY 38:1026-1033.

SEE: CA (40)7688.

RUBBER QUALITY/USES

276

CLARK, F.E. ET AL

1953

HIGH-QUALITY RUBBER BY ACETONE DERESINATION OF GUAYULE.

INDUSTRIAL AND ENGINEERING CHEMISTRY 45:572-576.

SEE: HA (23)3290.

RUBBER QUALITY/CHEMISTRY/DERESINATION

277

CLIFFORD, E.D.

1942

REPORT ON INDIO FIELD TEST (SEPTEMBER 18, 1942).

(UNPUBLISHED). 41 P.

CULTIVATION/CALIFORNIA

278

CLIFFORD, E.D.

1949

WEED CONTROL IN GUAYULE SEEDBEDS WITH STOVE OIL.

JOURNAL OF FORESTRY 47:271-276.

SEE: CA (43)5145.

PLANTING MANAGEMENT/SEEDLINGS

279

COHAN, L.H./MYERSON, B.C.

1943

EFFECT OF SMALL AMOUNTS OF GUAYULE RUBBER ON GR-S COMPOUNDS.

RUBBER AGE 54:235-237.

CHEMISTRY

280

COMMONWEALTH SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANIZATION, AUSTRALIA

1949

FIRST ANNUAL REPORT FOR YEAR ENDING JUNE 30, 1949.

SAME AS AUTHOR.

THE COMPLETION OF SEVEN YEARS OF FIELD RESEARCH ON GUAYULE GROWTH CONDITIONS IS DESCRIBED.
SEE: HA (20)1178.

PLANT GROWTH/AUSTRALIA

281

COMPAGNO, W.M.

1942

THE RUBBER SUBSTITUTE-GUAYULE.

WESTERN UNDERWRITER 11(9):9.

PLANTING MANAGEMENT/CULTIVATION/CALIFORNIA

282

COMPTON, R.H.

1942

GROWING OUR OWN RUBBER SUPPLY.

MOTOR TRANSPORTATION 17(3):11, 22, 26.

CULTIVATION

283

CODIL, B.J.

1947

CATION-ANION BALANCE WITH REFERENCE TO POTASSIUM DEFICIENCY AND EXCESS IN GUAYULE.

UNIVERSITY OF CALIFORNIA (PH.D. DISSERTATION).

CHEMISTRY/PLANT PHYSIOLOGY

284

CODIL, B.J.

1948

POTASSIUM DEFICIENCY AND EXCESS IN GUAYULE. I: GROWTH REPONSES AND MINERAL CONTENT.

PLANT PHYSIOLOGY 23(3):287-310.

SEE: BA(22)25315. CA (42)8272.

PLANT PHYSIOLOGY/PLANT GROWTH

285

CODIL, B.J.

1948

POTASSIUM DEFICIENCY AND EXCESS IN GUAYULE. II: CATION-ANION BALANCE IN THE LEAVES.

PLANT PHYSIOLOGY 23(4):403-424.

GUAYULE PLANTS RECEIVED LOW, INTERMEDIATE, AND HIGH LEVELS OF POTASSIUM AND THE EXCESS OF CATIONS OVER ANIONS WAS NOT BALANCED BY THE NONVOLATILE ORGANIC ACIDS. MOST OF THE DISCREPANCY COULD BE ACCOUNTED FOR BY INSOLUBLE CARBONATE.
SEE: BA(23)5068. CA (43)281.

CHEMISTRY/PLANT PHYSIOLOGY

286

CODIL, B.J./SLATTERY, M.C.

1948

EFFECTS OF POTASSIUM DEFICIENCY AND EXCESS UPON CERTAIN CARBOHYDRATE AND NITROGENOUS CONSTITUENTS IN GUAYULE.

PLANT PHYSIOLOGY 23(4):425-442.

SEE: BA(23)5069. CA (43)281.

LEAVES/CHEMISTRY/PLANT PHYSIOLOGY

287

COOK, H.W.

1943

GUAYULE PLANT NURSERY IS LOCATED IN TEXAS.

TEXAS AGRICULTURAL PROGRESS 2(4):13, 24.

TEXAS/PLANTING MANAGEMENT

288

COOK, O.F.

1900

RUBBER CULTIVATION FOR PORTO RICO.

U.S. DEPARTMENT OF AGRICULTURE, WASHINGTON, D.C., DIVISION OF BOTANY, CIRCULAR 28:1-12.

CULTIVATION

289

COOKE, G.B.

1941

GUAYULE RUBBER.

CROWN 29(12):9-11.

290

COUNCIL FOR SCIENTIFIC AND INDUSTRIAL RESEARCH, AUSTRALIA

1944

SEVENTEENTH ANNUAL REPORT FOR YEAR ENDING JUNE 30, 1943.

SAME AS AUTHOR. 76 P.

GUAYULE IS DESCRIBED AS ONE OF FOUR RUBBER PLANTS UNDER INVESTIGATION IN AUSTRALIA.
SEE HA (15)369.

AUSTRALIA/PLANT GROWTH

291

COUNCIL FOR SCIENTIFIC AND INDUSTRIAL RESEARCH, AUSTRALIA

1945

EIGHTEENTH ANNUAL REPORT FOR YEAR ENDING JUNE 30, 1944.

SAME AS AUTHOR. 78 P.

EXPERIMENTS WITH GUAYULE INDICATE THAT POTENTIAL GROWTH AT CANBERRA IS LIMITED TO A 6-MONTH PERIOD IN THE WARM SEASONS.
SEE: HA (15)1348.

PLANT GROWTH/TEMPERATURE EFFECTS/AUSTRALIA

292

COUNCIL FOR SCIENTIFIC AND INDUSTRIAL RESEARCH, AUSTRALIA

1946

NINETEENTH ANNUAL REPORT FOR YEAR ENDING JUNE 30, 1945.

SAME AS AUTHOR. 164 P.

A CONTINUING GUAYULE RESEARCH PROGRAM IS DESCRIBED. GUAYULE'S POTENTIAL AS A PEACETIME RUBBER SOURCE IS BEING EVALUATED.
SEE: HA (16)2320.

RUBBER YIELD/AUSTRALIA

293

COUNCIL FOR SCIENTIFIC AND INDUSTRIAL RESEARCH, AUSTRALIA

1947

TWENTIETH ANNUAL REPORT FOR YEAR ENDING JUNE 30, 1946.

SAME AS AUTHOR. 127 P.

CONTINUING INVESTIGATIONS ON GROWTH AND RUBBER ACCUMULATION IN GUAYULE ARE DESCRIBED.
SEE: HA (18)769.

AUSTRALIA/PLANT GROWTH/RUBBER YIELD

294

COUNCIL FOR SCIENTIFIC AND INDUSTRIAL RESEARCH, AUSTRALIA

1948

TWENTY-FIRST ANNUAL REPORT FOR YEAR ENDING JUNE 30, 1947.

SAME AS AUTHOR. 139 P.

CONTINUING STUDIES ON EXPERIMENTAL GUAYULE PLANTINGS IN AUSTRALIA SHOW THAT PLANTS GROWN FROM SEED PRODUCED IN THE UNITED STATES RECEIVED 3 IRRIGATIONS PER SUMMER AND ACCUMULATED 7-8 PERCENT RUBBER.
SEE: HA (18)3125.

AUSTRALIA/UNITED STATES/RUBBER YIELD/IRRIGATION EFFECTS/CULTIVATION

295

COUNCIL FOR SCIENTIFIC AND INDUSTRIAL RESEARCH, AUSTRALIA

1948

TWENTY-SECOND ANNUAL REPORT FOR YEAR ENDING JUNE 30, 1948.

SAME AS AUTHOR. 141 P.

PROGRESS OVER 5 YEARS OF INVESTIGATION ON GROWTH AND RUBBER CONTENT IN GUAYULE ARE DESCRIBED.
SEE: HA (20)1177.

PLANT GROWTH/RUBBER YIELD/AUSTRALIA

296

COWLEY, W.R.

1945

EMERGENCE AND SURVIVAL OF GUAYULE FROM PREGERMINATED AND DRY SEED PLANTED DURING THE HOT SEASON ON IRRIGATED LAND IN THE LOWER RIO GRANDE VALLEY.

(UNPUBLISHED). 9 P.

IRRIGATION EFFECTS/SEEDS/PLANTING MANAGEMENT/SOIL-WATER-PLANT RELATIONSHIPS

297

COWLEY, W.R.

1945

THE EFFECT OF IRRIGATION AT TIME OF PLANTING ON EMERGENCE AND SURVIVAL OF PREGERMINATED GUAYULE SEED PLANTED IN A WATER FURROW.

(UNPUBLISHED). 5 P.

IRRIGATION EFFECTS/SEEDS/SOIL-WATER-PLANT RELATIONSHIPS/
PLANTING MANAGEMENT

298

COWLEY, W.R.

1945

THE EFFECT OF PREGERMINATION UPON EMERGENCE AND SURVIVAL OF GUAYULE SEEDED DIRECTLY ON IRRIGATED LAND IN THE LOWER RIO GRANDE VALLEY OF TEXAS.

(UNPUBLISHED). 9 P.

TEXAS/SEEDS/IRRIGATION EFFECTS/SOIL-WATER-PLANT RELATIONSHIPS/
PLANTING MANAGEMENT

299

COWLEY, W.R.

1945

THE EFFECT OF SPACING AND FERTILIZERS ON GROWTH AND RUBBER FORMATION IN GUAYULE PRODUCTION ON NEWLY CLEARED, BRENNAN FINE SANDY LOAM AT RAYMONDVILLE, TEXAS.

(UNPUBLISHED). 15 P.

TEXAS/PLANT GROWTH/RUBBER YIELD/PLANTING MANAGEMENT

300

COWLEY, W.R.

1946

EXPLORATORY TESTS WITH SEEDING GUAYULE DIRECTLY INTO THE FIELD ON DRY LAND AT RAYMONDVILLE, TEXAS, DURING THE 1944-45 SEASON.

(UNPUBLISHED). 17 P.

TEXAS/PLANTING MANAGEMENT/SEEDLINGS

301

CRAIN, A.W.

1946

GUAYULE RESEARCH IN THE PEARSALL, TEXAS, AREA: FINAL REPORT, 1946.

(UNPUBLISHED). 167 P.

TEXAS/PLANTING MANAGEMENT

302

CRAIN, A.W./DAVIS, C.H.

1944

ANNUAL REPORT FOR THE EXPERIMENTAL UNIT AT ANTHONY, NEW MEXICO, MARCH 1944.

(UNPUBLISHED). 53 P.

NEW MEXICO/PLANTING MANAGEMENT

303

CROCKER, R.L./TRUMBLE, H.C.

1945

INVESTIGATIONS OF GUAYULE (PARTHENIUM ARGENTATUM GRAY) IN SOUTH AUSTRALIA.

COUNCIL FOR SCIENTIFIC AND INDUSTRIAL RESEARCH, AUSTRALIA, BULLETIN 192:1-44.

FACTORS AFFECTING GUAYULE SEED GERMINATION AND FIELD ESTABLISHMENT ARE DISCUSSED. RUBBER YIELDS FROM TWO-YEAR-OLD PLANTS ON LIGHT-TEXTURED SOILS WERE ABOUT 175 POUNDS PER ACRE.
SEE: BA(21)12509. CA (40)4547. HA (17)243.

SEEDS/AUSTRALIA/SEEDLINGS/RUBBER YIELD/SOIL-WATER-PLANT RELATIONSHIPS

304

CUMMINGS, J.M./CHUBB,R.L.

1946

HIGH-PRESSURE PROCESS FOR GUAYULE SEPARATION.

CHEMICAL AND METALLURGICAL ENGINEERING 53(9):125-127.

A PROCESS FOR SEPARATION OF RUBBER FROM CORK FRAGMENTS AFTER MILLING IS DESCRIBED. THE CORK IS SATURATED WITH WATER IN A HYDRAULIC PRESSURE CHAMBER THUS FREEING THE RUBBER.
SEE: CA (40)7687.

RUBBER EXTRACTION/MILLING

305

CURTIS, O.F., JR.

1947

DISTRIBUTION OF RUBBER AND RESINS IN GUAYULE.

PLANT PHYSIOLOGY 22(4):333-359.

RUBBER AND RESIN CONTENTS OF VARIOUS PLANT SEGMENTS WERE DETERMINED FOR GUAYULE OF VARIOUS AGES AND WERE FOUND TO BE CONCENTRATED PRIMARILY IN THE BARK. ABOUT TWO-THIRDS OF THE RUBBER WAS FOUND IN ABOVE GROUND PARTS WITH 75-80 PERCENT IN THE BARK.
SEE: BA(22)12384. CA (42)1630. HA (18)1282.

RUBBER YIELD/RESINS/PLANT PHYSIOLOGY/PLANT ANATOMY

306

CURTIS, O.F., JR.

1948

MOWING (POLLARDING), AS A POSSIBLE HARVEST METHOD IN GUAYULE CULTURE.

(UNPUBLISHED). 63 P.

HARVESTING

307

CUSTER, J.R.

1942

OUR RUBBER LIFELINE.

AUTOMOTIVE INDUSTRY 86:36-39.

USES

308

CUTLER, D.A.

1925

GUAYULE RUBBER SHRUB WAS CONSIDERED A NUISANCE FOR CENTURIES UNTIL E.B. ALDRICH DISCOVERED ITS POSSIBILITIES IN 1904.

RUBBER AGE 18:202.

USES

309

DAVIS, C.C. ED.

1937

THE CHEMISTRY AND TECHNOLOGY OF RUBBER.

REINHOLD, NEW YORK. 941 P.

CHEMISTRY/USES

310

DAVIS, C.H.

1945

FINAL REPORT FOR THE EXPERIMENTAL UNIT AT ANTHONY, NEW MEXICO.

(UNPUBLISHED). 46 P

NEW MEXICO/PLANTING MANAGEMENT

311

DAVIS, C.H.

1945

REPORT ON ESTABLISHMENT OF SEEDLINGS.

(UNPUBLISHED). 15 P.

PLANTING MANAGEMENT/SEEDLINGS/SOIL-WATER-PLANT RELATIONSHIPS

312

DAVIS, C.H.

1945

SEEDING ON DRYLAND AS AFFECTED BY BED TYPE, SEED TREATMENT, AND SEASON.

(UNPUBLISHED). 8 P.

SEEDS/PLANTING MANAGEMENT

313

DAVIS, C.H.

1945

THE EFFECT OF TILLAGE AND SEEDBED PREPARATION ON THE PRODUCTION OF GUAYULE.

(UNPUBLISHED). 6 P.

CULTIVATION/PLANTING MANAGEMENT/SEEDS/SOIL-WATER-PLANT RELATIONSHIPS

314

DAVIS, C.H.

1945

TYPES OF NURSERY BEDS FOR FIELD GROWING OF TRANSPLANTS.

(UNPUBLISHED). 8 P.

PLANTING MANAGEMENT/SOIL-WATER-PLANT RELATIONSHIPS

315

DAVIS, C.H.

1945

YUMA FINAL REPORT, 1945.

(UNPUBLISHED). 77 P.

PLANTING MANAGEMENT

316

DAVIS, C.H.

1946

A HEADLAND DESIGNED TO FACILITATE IRRIGATION IN EROSIVE SOIL.

AMERICAN SOCIETY OF AGRONOMY, JOURNAL 38:859-863.

A PROCESS USING A STILLING HEADLAND IS DESCRIBED FOR CONTROLLED IRRIGATION IN RAPIDLY ERODING SOIL HAVING EXPERIMENTAL PLANTINGS OF GUAYULE. THE LOW FLOW RATE PREVENTED SERIOUS EROSION.
SEE: HA (17)246.

PLANTING MANAGEMENT/IRRIGATION EFFECTS/SOIL-WATER-PLANT RELATIONSHIPS

317

DAVIS, C.H./ABEL, G.H.

1944

FINAL REPORT FOR THE EXPERIMENTAL UNIT AT YUMA, ARIZONA.

(UNPUBLISHED). 159 P.

ARIZONA/CULTIVATION

318

DENNIS, R.E.

1966

GUAYULE PRODUCTION IN ARIZONA.

UNIVERSITY OF ARIZONA, TUCSON, COOPERATIVE EXTENSION SERVICE, AGRI-FIELD/FIELD CROPS 288(2). 8 P.

A BRIEF HISTORY OF GUAYULE UTILIZATION AND DATA ON REQUIREMENTS FOR CULTIVATION AND THE ECONOMICS OF PRODUCTION ARE PRESENTED. BECAUSE OF COMPETITION FROM SYNTHETIC RUBBER IT APPEARS UNLIKELY THAT A PROFITABLE GUAYULE INDUSTRY COULD NOW BE ESTABLISHED IN ARIZONA.

CULTIVATION/ECONOMICS/ARIZONA

319

DIANOVA, V.I./SOSNOVETS, A.A./STESHINA, N.A.

1934

COMPARATIVE CYTOEMBRYOLOGICAL ANALYSIS OF THE VARIETIES OF PARTHENIUM ARGENTATUM, GRAY AND PARTHENIUM INCANUM, GRAY (TRANSLATED TITLE).

JOURNALE DE BOTANIQUE DE L'URSS 19(5):447-466.

SEE: BA(11)1094.

SYSTEMATICS/PLANT BREEDING/U.S.S.R.

320

DICKSON, B.T./HARTLEY, W.

1946

RUBBER GROWING IN AUSTRALIA.

INSTITUTION OF THE RUBBER INDUSTRY, AUSTRALIA, TRANSACTIONS 22:17-24.

SEE: CA(40)6863.

CULTIVATION/AUSTRALIA

321

DIEGO FANTI, O.

1951

INDUSTRIALIZACION DE GUAYULE.

BOLSA DE CEREALES (BUENOS AIRES), REVISTA 38(2020):7-9.

ECONOMICS/SOUTH AMERICA

322

DITMAR, R.

1906

VULCANIZATION STUDIES ON GUAYULE RUBBER.

GUMMI-ZEITUNG 20:972.

CHEMISTRY

323

DOERING, J.H.

1934

GUAYULE RUBBER IN TIRES AND TUBES; SERVICE TESTS IN WHICH THE RUBBER WAS EXCLUSIVELY GUAYULE.

INDUSTRIAL AND ENGINEERING CHEMISTRY 26:541-543.

SEE: CA (28)4267.

USES

324

DORADO BERNAL, E.

1958

RUBBER FROM PARTHENIUM ARGENTATUM. I: CONTAINING RESIN. EFFECT OF ACCELERATORS AND CARBON BLACK ON VULCANIZATION (TRANSLATED TITLE).

REVISTA PLASTICOS (MADRID) 9(54):419-426.

USE OF MPC (A MIXTURE OF RESINOUS RUBBER AND LAMP BLACK) RESULTED IN INFERIOR PROPERTIES TO THOSE OBTAINED WITH HEVEA. CURING BEHAVIOR WAS SIMILAR TO THAT OF HEVEA AT 125 OR 135 DEGREES C. WHEN SEVERAL DIFFERENT ACCELERATORS WERE USED.
SEE: CA (53)18529.

CHEMISTRY/RESINS/RUBBER QUALITY

325

DORADO BERNAL, E.

1959

CHARACTERISTICS OF RUBBER FROM GUAYULE (PARTHENIUM ARGENTATUM) (TRANSLATED TITLE).

FARMACOGNOSIA (MADRID) 19:285-311.

THE DISTRIBUTION AND QUANTITY OF RUBBER IN THE PLANT TISSUES AND THE EFFECTS OF STORAGE AND VULCANIZATION ON CRUDE AND DERESINATED RUBBERS WERE INVESTIGATED. METHODS OF DEALING WITH HIGH RESIN CONTENTS WERE COMPARED.
SEE: CA (54)16891. HA (30)5780.

RUBBER YIELD/RESINS/DERESINATION/CHEMISTRY/RUBBER QUALITY

326

DORADO BERNAL, E.

1959

RUBBER FROM PARTHENIUM ARGENTATUM. II: DERESINATED. EFFECT OF ACCELERATORS AND CARBON BLACK ON THE MECHANICAL PROPERTIES OF THE VULCANIZATES (TRANSLATED TITLE).

REVISTA PLASTICOS (MADRID) 10(55):49-:56.

THE EFFECT OF ACCELERATORS AND CARBON BLACK INDICATED PROPERTIES TECHNICALLY USEFUL BUT SOMEWHAT INFERIOR TO HEVEA.
SEE: CA (53)18529.

DERESINATION/RUBBER QUALITY/CHEMISTRY

327

DORADO BERNAL, E.

1959

RUBBER FROM PARTHENIUM ARGENTATUM (GUAYULE). I: RESINOUS (TRANSLATED TITLE).

FARMACOGNOSIA 19:39-57.

SEE: HA (30)2527.

CHEMISTRY/RUBBER QUALITY/RESINS

328

DORADO BERNAL, E.

1959

RUBBER FROM PARTHENIUM ARGENTATUM (GUAYULE). II: DERESINATED (TRANSLATED TITLE).

FARMACOGNOSIA 19:69-84.

SEE: HA (30)2527.

DERESINATION/CHEMISTRY/RUBBER QUALITY

329

DORADO BERNAL, E.

1960

THE CHARACTERISTICS OF GUAYULE RUBBER (TRANSLATED TITLE).

REVISTA GENERAL CAOUTCHOUC 37:673-680.

THE GUAYULE PLANT WITH ANATOMICAL DETAILS IS DESCRIBED. CHEMICAL AND PHYSICAL PROPERTIES OF THE RUBBER AND METHODS OF PROCESSING ARE DISCUSSED.
SEE: HA (31)1020.

PLANT ANATOMY/CHEMISTRY/RUBBER EXTRACTION/RUBBER QUALITY

330

DORADO BERNAL, E.

1961

GUMA, A RESINOUS GUAYULE RUBBER MODIFIED WITH MALEIC ANHYDRIDE (TRANSLATED TITLE).

REVISTA DE LOS PLASTICOS (MADRID) 12(72):485-490.

CHEMISTRY/RUBBER QUALITY

331

DORADO BERNAL, E./NOMBELA, M.

1961

RESINS OF GUAYULE.

FARMACOGNOSIA (MADRID) 21:195-213.

THREE GUAYULE RESIN FRACTIONS WERE SEPARATED OUT USING A CHROMATOGRAPHIC COLUMN. POSSIBLE INDUSTRIAL APPLICATIONS OF THE RESINS ARE SUGGESTED.
SEE: CA (58)14297. HA (32)7184.

RESINS/DERESINATION/CHEMISTRY

332

DORADO BERNAL, E./NOMBELA, M./MONTIEL, P.

1962
GUAYULE RESINS: SEPARATION OF TWO DITERPENES (TRANSLATED TITLE).

CHIMIE ET INDUSTRIE (PARIS) 87:612-620.

THE EXTRACTION AND SEPARATION OF GUAYULE RESINS ARE DESCRIBED. A RHOMBIC AND A MONOCLINIC FORM OF CETOPARTHEIOL WERE PRECIPITATED BY CHROMATOGRAPHIC SEPARATION.
SEE: CA(59)3966.

DERESINATION/CHEMISTRY/RESINS

333

DORTIGNAC, E.J.

1946

GUAYULE RESPONSE TO SOIL MOISTURE UNDER DRY-LAND CULTURE IN CALIFORNIA.

U.S. FOREST SERVICE, WASHINGTON, D.C., EMERGENCY RUBBER PROJECT. 59 P.

GUAYULE ROOTS PENETRATED TO A DEPTH OF 7-8 FEET DURING THE FIRST SEASON AND 17-19 FEET BY THE THIRD SEASON WITH MAXIMUM PLANT GROWTH IN SPRING AND EARLY SUMMER. RUBBER HYDROCARBON CONCENTRATION INCREASED AT ITS HIGHEST RATE IN LATE SUMMER AND EARLY FALL AND WAS 10-10.5 PERCENT BY THE END OF THE THIRD GROWING SEASON.
SEE: BA(21)15449.

ROOTS/PLANT GROWTH/RUBBER YIELD/SOIL-WATER-PLANT RELATIONSHIPS/CULTIVATION

334

DORTIGNAC, E.J./MICKELSON, G.A.

1944

OBSERVATIONS AND RESULTS OF SOIL MOISTURE STUDIES ON THE HARVEY SMITH PLANTATION, SALINAS DISTRICT.

(UNPUBLISHED). 17 P.

CALIFORNIA/SOIL-WATER-PLANT RELATIONSHIPS

335

DORTIGNAC, E.J./MICKELSON, G.A.

1945

DRY-FARMING POSSIBILITIES FOR GUAYULE IN CALIFORNIA.

U.S. FOREST SERVICE, WASHINGTON, D.C., EMERGENCY RUBBER PROJECT. 85 P.

DRY-LAND GUAYULE CULTURE IS POSSIBLE ON ABOUT 70,000 ACRES IN CALIFORNIA IF A SINGLE 5-YEAR CROP IS GROWN OR ON ABOUT 27,000 ACRES BASED ON CONTINUOUS CULTURE. THE RIVERSIDE AREA APPEARS TO BE VERY PROMISING FOR DRY-LAND GUAYULE CULTURE IN CALIFORNIA FOLLOWED BY THE SACRAMENTO VALLEY.
SEE: BA(21)15450.

CALIFORNIA/CULTIVATION

336

DUBBS, C.A.

1946

CHEMICAL AND PHYSIOLOGICAL INVESTIGATIONS ON GUAYULE ESSENTIAL OILS.

CALIFORNIA INSTITUTE OF TECHNOLOGY (PH.D. DISSERTATION).

CHEMISTRY/PLANT PHYSIOLOGY

337

DUFRENOY, J.

1934

LE CAOUTCHOUC DE GUAYULE (PARTHENIUM ARGENTATUM, GRAY).

AGRONOMIQUE COLONIALES 23(196):168-172.

SEE: CA (29)4621.

338

DUHAIME, V.L.

1906

GUAYULE DEVELOPMENT: SUCCESSFUL USE OF HITHERTO WORTHLESS MEXICAN BUSH.

U.S. BUREAU OF MANUFACTURERS MONTHLY CONSULAR AND TRADE REPORT 311:124.

USES/MEXICO

339

DUISBERG, .C.

1952

DESERT PLANT UTILIZATION.

TEXAS JOURNAL OF SCIENCE 4(3):269-283.
THE CHEMICAL COMPONENTS OF NUMEROUS DESERT PLANTS, INCLUDING GUAYULE, ARE CONSIDERED ALONG WITH THEIR ACTUAL OR POTENTIAL ECONOMIC IMPORTANCE.
SEE: BA(27)7640.

CHEMISTRY/ECONOMICS

340

DUISBERG, P.C./HAY, J.L.

1971

ECONOMIC BOTANY OF ARID REGIONS. IN W.G. MCGINNIES, B.J. GOLDMAN AND P. PAYLORE, EDS., FOOD, FIBER, AND THE ARID LANDS, P. 247-270.

UNIVERSITY OF ARIZONA PRESS, TUCSON. 437 P.

A BRIEF HISTORY OF GUAYULE UTILIZATION IS PRESENTED. EARLIER INTENSIVE RESEARCH ON GUAYULE WOULD PROBABLY HAVE LED TO A SUCCESSFUL MODERN INDUSTRY, PARTICULARLY UNDER LESS ARID CONDITIONS.

USES/ECONOMICS

341

DUSSELDORF, A.D.

1908

ANATOMICAL STRUCTURE OF GUAYULE.

INDIA RUBBER WORLD 40:365.

PLANT ANATOMY

342

EDISON, T.A.

1929

EXTRACTION OF RUBBER FROM BARK OF PLANTS AFTER IT HAS BEEN REMOVED AND SUBJECTED TO GRINDING TREATMENT.

U.S. PATENT 1,740,079.

RUBBER EXTRACTION/U.S. PATENTS

343

ELKIN, S.I.

1939

THE CULTIVATION OF RUBBER-BEARING PLANTS (TRANSLATED TITLE).

KAUCHUK I REZINA 4/5:7-10.

SEE: CA (34)5697.

CULTIVATIONA/U.S.S.R.

344

EMPARAN, P.R.

1954

A GUAYULE AIR PRESSURE THRESHER.

AGRONOMY JOURNAL 46:335-336.

A SMALL, LIGHT WEIGHT GUAYULE THRESHER IS DESCRIBED. COMPLETE THRESHING RESULTS WITHOUT MECHANICAL DAMAGE TO THE SEEDS.
SEE: HA (24)4056.

SEEDS

345

EMPARAN, P.R./TYSDAL, H.M.

1957

THE EFFECT OF LIGHT AND OTHER FACTORS ON BREAKING THE DORMANCY OF GUAYULE SEED.

AGRONOMY JOURNAL 49:15-19.

EXPOSURE OF GUAYULE SEED TO LIGHT FOR 3 TO 4 DAYS DURING GERMINATION PLUS TREATMENTS WITH 0.75 PERCENT SODIUM HYPOCHLORITE BROKE DORMANCY SO THAT FRESHLY HARVESTED ACHENES GERMINATED AT A MAXIMUM RATE EQUAL TO THAT OBTAINED AFTER 84 DAYS STORAGE. THE EFFECTS OF LIGHT AND SODIUM HYPOCHLORITE WERE FOUND TO BE ADDITIVE.

SEEDS/PLANT PHYSIOLOGY

346

ENDLICH, R.

1903

GUAYULE-KAUTSCHUK.

TROPENPFLANZER 7(11):556-557.

347

ENDLICH, R.

1905

CAOUTCHOUC DE GUAYULE.

JOURNAL D'AGRICULTURE TROPICALE 1(54):368.

348

ENDLICH, R.

1905

GUAYULE AND ITS ECONOMIC IMPORTANCE (TRANSLATED TITLE).

TROPENPFLANZER 9(5):233-247.

ECONOMICS

349

ENDLICH, R.

1907

THE PRESENT POSITION AND PROSPECTS OF THE GUAYULE INDUSTRY (TRANSLATED TITLE).

TROPENPFLANZER 11(7):449-465.

ECONOMICS/USES

350

ENGSTROM, H.E.

1942

VARIATION IN DEPTH OF SAND COVER IN SOWING GUAYULE SEED IN NURSERIES.

(UNPUBLISHED). 1 P.

PLANTING MANAGEMENT/SEEDS

351

EPHRAIM, F.

1917

GUAYULE RUBBER.

METALLURGICAL AND CHEMICAL ENGINEERING 17(2):54.

352

ERICKSON, L.C.

1945

THE WATER FACTOR IN TRANSPLANTING GUAYULE.

AMERICAN JOURNAL OF BOTANY 32(10):634-643.

THE EFFECTS OF TOPPING GUAYULE PLANTS WERE INVESTIGATED IN BOTH WATER CULTURE AND SOIL WITH THE PRIMARY BENEFIT BEING A REDUCTION IN TRANSPIRATION. TOPPING LED TO AN IMPROVEMENT IN GENERATION OF LATERAL ROOTS.
SEE: BA(20)7338. HA (16)2073.

SOIL-WATER-PLANT RELATIONSHIPS/PLANTING MANAGEMENT/PLANT GROWTH

353

ERICKSON, L.C./BENEDICT, H.M.

1947

ORIGIN OF THE SEED COATS IN GUAYULE.

JOURNAL OF AGRICULTURAL RESEARCH 74(11/12):329-335.

THE OUTER SEED COAT IN GUAYULE IS DERIVED FROM THE OUTER CELL LAYER OF THE INTEGUMENT. THE INNER SEED COAT APPEARS TO FORM FROM MATERIAL EXCRETED BY ENDOSPERM CELLS.
SEE: BA(21)25739. HA (18)456.

SEEDS/PLANT ANATOMY/PLANT PHYSIOLOGY

354

ERICKSON, L.C./SMITH, P.F.

1947

STUDIES OF HANDLING AND TRANSPLANTING GUAYULE NURSERY STOCK.

U.S. DEPARTMENT OF AGRICULTURE, TECHNICAL BULLETIN 924:1-58.

DROUGHT OR COLD-HARDENED GUAYULE NURSERY STOCK WAS SUCCESSFULLY TRANSPLANTED EVERY MONTH OF THE YEAR. IRRIGATION OR RAIN WAS REQUIRED TO ESTABLISH TRANSPLANTS IN THE FIELD. TOPPING LEVELS REMOVING ABOUT 7/8 OF THE TOP WERE BEST.
SEE: BA(21)18169.

IRRIGATION EFFECTS/PLANTING MANAGEMENT/ROOTS/MOISTURE STRESS/SEEDLINGS/ TEMPERATURE EFFECTS

355

ERICSSON, A.A.

1946

GUAYULE - FORENTA STATERNAS INHEMSKA GUMMIVAXT OCH DESS INFORANDE I JORDBRUKSDRIFT.

LANTMANNEN 30:1223-1224.

356

ESAU, K.

1944

APOMIXIS IN GUAYULE.

NATIONAL ACADEMY OF SCIENCES, PROCEEDINGS 30:352-355.

APOMIXIS IN GUAYULE INVOLVES APOMEIOSIS OF THE TYPE OF GENERATIVE APOSPORY IN WHICH THE MEGASPORE MOTHER CELL DOES NOT FORM TETRADS BUT DEVELOPS DIRECTLY INTO A UNINUCLEATE EMBRYO SAC WITH A DIPLOID CHROMOSOME NUMBER. APOSPORY IN GUAYULE IS FACULTATIVE SINCE THE APOMICTIC 72 CHROMOSOME MATERIAL ALSO SHOWED SOME MEIOSIS.

GENETICS/PLANT ANATOMY

357

ESAU, K.

1946

MORPHOLOGY OF REPRODUCTION IN GUAYULE AND CERTAIN OTHER SPECIES OF PARTHENIUM.

HILGARDIA 17:61-120.

MORPHOLOGIC EVIDENCE IS PROVIDED INDICATING THE OCCURRENCE OF BOTH SEXUAL AND APOMICTIC REPRODUCTION IN GUAYULE. APOMIXIS PRIMARILY INVOLVES GENERATIVE APOSPORY FOLLOWED BY UNREDUCED PSEUDOGAMY AND SINCE SOME FLOWERS ON A GIVEN PLANT SHOW APOMICTIC DEVELOPMENT AND OTHERS ON THE SAME PLANT SHOW A SEXUAL REPRODUCTIVE CYCLE, APOMIXIS IN GUAYULE IS FACULTATIVE.

GENETICS/PLANT BREEDING/PLANT ANATOMY

358

ESCOBAR, R.

1910

GUAYULE AND ITS PROPAGATION (TRANSLATED TITLE).

CUIDAD JUAREZ ESTACION AGRICOLA EXPERIMENTAL, BOLETIN 25:1-30.

SEE: CA (5)2189.

PROPAGATION/MEXICO

359

ESSIG, E.O.

1944

A NEW APHID ON GUAYULE AND NOTES ON OTHER SPECIES OF CEROSIPHA.

HILGARDIA 16(4):177-184.

THE APHID CEROSIPHA CALIFORNICA WAS COLLECTED FROM GUAYULE AND VARIOUS OTHER PLANTS.
SEE BA(1914042.

INSECTS

360

EZEKIAL, W.N.

1943

CROWN ROT AND ROOT ROT OF GUAYULE.

PLANT DISEASE REPORTER 27(1):2-8.

GUAYULE PLANTS GROWN IN TEXAS WERE FOUND TO BE MODERATELY SUSCEPTIBLE TO TEXAS ROOT ROT (PHYMATOTRICHUM OMNIVORUM). THE DISEASE WAS LESS SEVERE ON OLDER PLANTS THAN THOSE ONE-YEAR-OLD.
SEE: BA(17)17288.

PLANT INJURY/ROOTS/TEXAS/MICROORGANISMS

361

FAHTI, O.D. ET AL

1961

THE EXTRACTION OF RUBBER FROM GUAYULE AND KOK-SAGHYZ GROWN IN THE COUNTRY (ARGENTINA).

REVISTA DE INVESTIGACIONES AGRICOLAS (BUENOS AIRES) 15:569-603.

TESTS WITH DERESINATED GUAYULE RUBBER THAT GAVE RESULTS COMPARABLE TO THOSE OBTAINED WITH HEVEA RUBBER ARE DESCRIBED.
SEE: HA (33)5881.

RUBBER EXTRACTION/DERESINATION/RUBBER YIELD/CHEMISTRY/SOUTH AMERICA

362

FEDCHENKO, B.A.

1941

THE BULLETIN OF DRY SUBTROPICAL CROPS (TRANSLATED TITLE).

SOVETSKAIA BOTANIKA 5/6:104-105.

SEE: BA(18)17508.

U.S.S.R./CULTIVATION

363

FEDERER, W.T.

1945

STUDIES ON SAMPLE SIZE AND NUMBER OF REPLICATES FOR GUAYULE INVESTIGATIONS.

AMERICAN SOCIETY OF AGRONOMY, JOURNAL 37(6):469-478.

COMPONENT ANALYSIS STUDIES INDICATED THAT A 12 PLANT-SAMPLE SIZE GAVE LIKE RESULTS FOR SHRUB DRY WEIGHT, WEIGHT OF RUBBER, AND PERCENT OF RUBBER ALTHOUGH COEFFICIENTS OF VARIATION WERE QUITE DIFFERENT. A SAMPLE SIZE OF GREATER THAN 12 RESULTED IN LITTLE INCREASE IN INFORMATION.
SEE: BA(19)17319. HA (15)1744.

PLANT GROWTH/RUBBER YIELD

364

FEDERER, W.T.

1946

VARIABILITY OF CERTAIN SEED, SEEDLING, AND YOUNG-PLANT CHARACTERS OF GUAYULE.

U.S. DEPARTMENT OF AGRICULTURE, TECHNICAL BULLETIN 919:1-25.

PLANT BREEDING INVESTIGATIONS ON NUMEROUS GUAYULE STRAINS SHOWED VARIATION IN MANY CHARACTERS INCLUDING PERCENT RUBBER, PLANT WEIGHT, EARLINESS OF FLOWERING, PLANT HEIGHT, PLANT SPREAD, PERCENT SEED GERMINATION, AND TIME OF EMERGENCE. SEE: BA(21)12510.

PLANT BREEDING/RUBBER YIELD/SEEDS/SEEDLINGS/PLANT GROWTH

365

FEDEROV, S.M.

1930

INSECTS INJURIOUS TO THE RESINIFEROUS PLANT GUAYULE (PARTHENIUM ARGENTATUM, GRAY).

SOVIET SUBTROPICS 2(3/4):112-114.

INSECTS/PLANT INJURY/U.S.S.R.

366

FENDLER-STEGLITZ, G.

1904

AN ANALYSIS OF CRUDE RUBBER (TRANSLATED TITLE).

DEUTSCHE PHARMAZEUTISCHE GESELLSCHAFT, BERICHE 14:208.

CHEMISTRY/RUBBER QUALITY

367

FEUSTAL, I.C.

1953

FINAL REPORT: NATURAL RUBBER EXTRACTION AND PROCESSING INVESTIGIATIONS.

U.S. BUREAU OF AGRICULTURAL AND INDUSTRIAL CHEMISTRY, WASHINGTON, D.C. 221 P.

RUBBER EXTRACTION

368

FEUSTAL, I.C./CLARK, F.E.

1951

OPPORTUNITIES TO GROW OUR OWN RUBBER.

U.S. DEPARTMENT OF AGRICULTURE, YEARBOOK 1950-1951:367.

UNITED STATES/CULTIVATION

369

FISCHER, H.

1931

RUBBER COMPOSITION EMPLOYING GUAYULE.

U.S. PATENT 1,770,360.

U.S. PATENTS/CHEMISTRY/USES

370

FISCHER, H.

1932

RUBBER COMPOSITIONS EMPLOYING GUAYULE.

U.S. PATENT 1,844,467.

U.S. PATENTS/CHEMISTRY/USES

371

FITZPATRICK, G.

1942

NEW MEXICO CAN GROW RUBBER.

NEW MEXICO 20(30):17, 26-27.

NEW MEXICO

372

FOMINA, E.

1931

KARA-KALA: THE REGION OF THE FUTURE (TRANSLATED TITLE).

TURKMENOVCEDENIE 5(5/6):9-12.

U.S.S.R.

373

FONG, C.T.O.

1946

INVESTIGATION ON PARTHENIOL, A SESQUITERPENE ALCOHOL FROM GUAYULE.

CALIFORNIA INSTITUTE OF TECHNOLOGY (PH.D. DISSERTATION).

CHEMISTRY

374

FORBIN, V.

1921

THE RUBBER PLANT OF THE MEXICAN DESERT (TRANSLATED TITLE).

NATURE 2448:148-149.

MEXICO

375

FOSKETTE, A.W.

1944

REPORT ON WILD GUAYULE HARVEST IN BIG BEND SECTION OF TEXAS.

(UNPUBLISHED).

PLANT DISTRIBUTION/TEXAS/HARVESTING

376

FOX, C.P.

1909

TECHNICAL DETERMINATION OF CAOUTCHOUC IN GUAYULE.

JOURNAL OF ENGINEERING AND INDUSTRIAL CHEMISTRY 1(10):735-736.

THE PROCEDURES FOR DETERMINING RUBBER HYDROCARBON IN GUAYULE ARE DESCRIBED ALTHOUGH PREPARATION OF UNIFORM SAMPLES WAS DIFFICULT. THE GROUND SHRUB WAS EXTRACTED WITH ACETONE FOR DEHYDRATION AND RESIN REMOVAL FOLLOWED BY BENZENE AND PRECIPITATION WITH ALCOHOL.
SEE: CA (3)3013.

RUBBER EXTRACTION/DERESINATION/CHEMISTRY

377

FOX, C.P.

1909

THE DISCOVERER OF GUAYULE.

INDIA RUBBER WORLD 39(4):130.

378

FOX, C.P.

1910

TACKINESS IN GUAYULE RUBBER.

INDIA RUBBER JOURNAL 39:108-111.

CHEMISTRY

379

FOX, C.P.

1910

THE MANUFACTURE OF MECHANICAL GUAYULE.

INDIA RUBBER REVIEW 10(2):52.

USES

380

FOX, C.P.

1911

EXCREMENT OF GUAYULE-FED ANIMALS.

SCIENCE 33:345.

USES

381

FREEMAN, G.A.

1944

OIL SPRAY EXPERIMENTAL WORK.

U.S. FOREST SERVICE, WASHINGTON, D.C., EMERGENCY RUBBER PROJECT. 9 P. (UNPUBLISHED)

PLANTING MANAGEMENT

382

FROLOV, T.V.

1933

A RADICAL CHANGE IN THE METHODS OF GUAYULE CULTIVATION (TRANSLATED TITLE).

SOVETSKII KAUCHUK 2:25-28.

CULTIVATION/U.S.S.R.

383

FROLOV, T.V.

1939

RESULTS OF GUAYULE CULTIVATION IN U.S.S.R. (TRANSLATED TITLE).

SOVIET SUBTROPICS 2/3(54-55):77-81.

SEE: HA (9)162.

CULTIVATION/U.S.S.R.

384

FROLOV, T.V.

1940

GUAYULE CULTIVATION IN U.S.S.R. (TRANSLATED TITLE).

SOVIET SUBTROPICS 4(68):35-37.

SEE: HA (10)279.

CULTIVATION/U.S.S.R.

385

FRON, G./FRANOIS,--

1901

GUAYULE, RUBBER PLANT OF MEXICO (TRANSLATED TITLE).

AGRICOLTOR PRATIQUE DES CHAUDS 1(1):105-109.

MEXICO

386

FUEHR, I.C.

1942

GUAYULE RUBBER IS THREE YEARS AWAY.

PURCHASING 13:70-73.

387

FULLER, H.J.

1951

WAR-TIME RUBBER EXPLOITATION IN TROPICAL AMERICA.

ECONOMIC BOTANY 5:311-337.

SEE: HA (22)3092.

ECONOMICS

388

FULMER, H.P.

1942

GUAYULE RUBBER.

CONGRESSIONAL RECORD 88(27):A 447-448.

LEGISLATION

389

GANDARA, G.

1913

A BOTANICAL STUDY OF GUAYULE (TRANSLATED TITLE).

MEXICO DIRECTOR GENERALE DE AGRICULTOR BOLETIN 3(4):317-320.

MEXICO/SYSTEMATICS

390

GARDNER, E.J.

1946

SEXUAL PLANTS WITH HIGH CHROMOSOME NUMBER FROM AN INDIVIDUAL PLANT SELECTION IN A NATURAL POPULATION OF GUAYULE AND MARIOLA.

GENETICS 31:117-124.

SEED COLLECTED FROM ONE INDIVIDUAL PLANT IN A NATURAL POPULATION OF GUAYULE AND MARIOLA RESULTED IN PLANTS THAT ARE COMPLETELY SEXUAL AND HAVE HIGH CHROMOSOME NUMBERS OF 80 OR MORE. SEXUALITY WAS DEMONSTRATED BY DATA SHOWING VARIATION IN PERCENTAGE OF RESIN, PERCENTAGE OF RUBBER, PERCENTAGE OF SEED GERMINATION, SIZE OF POLLEN GRAINS AND OTHER PLANT MEASUREMENTS.

SEEDS/GENETICS/PLANT BREEDING

BEST AVAILABLE

391

GARDNER, E.J.

1946

WIND POLLINATION IN GUAYULE PARTHENIUM ARGENTATUM, GRAY.

AMERICAN SOCIETY OF AGRONOMY, JOURNAL 38(3):264-272.

GUAYULE POLLEN WAS CARRIED BY THE WIND MORE THAN 850 YARDS AT SALINAS, CALIFORNIA. POLLEN GERMINATING POWER WAS FOUND TO DECREASE GRADUALLY WITH TIME UNTIL AN ABRUPT DECREASE ON DAY SEVEN.
SEE: BA(20)11072. HA (17)244.

GENETICS/POLLINATION/CALIFORNIA

392

GARDNER, E.J.

1947

INSECT POLLINATION IN GUAYULE, PARTHENIUM ARGENTATUM, GRAY.

AMERICAN SOCIETY OF AGRONOMY, JOURNAL 39(3):224-233.

INSECT COLLECTIONS IN CALIFORNIA GUAYULE PLANTINGS SHOWED THAT MANY CARRIED APPARENTLY VIABLE GUAYULE POLLEN ON THEIR BODIES. FIELD AND GREENHOUSE EXPERIMENTS SHOWED THAT LADYBIRD BEETLES, LYGUS BUGS AND CUCUMBER BEETLES WERE EFFECTIVE POLLEN CARRIERS FROM ONE PLANT TO ANOTHER.
SEE: BA(21)15451. HA (17)1507.

INSECTS/POLLINATION/CALIFORNIA

393

GARDNER, E.J.

1947

STUDIES ON THE INHERITANCE OF APOMIXIS AND STERILITY IN THE PROGENY OF TWO HYBRID PLANTS IN THE GENUS PARTHENIUM.

GENETICS 32(3):262-276.

PROGENY OF ONE GUAYULE-MARIOLA HYBRID REPRODUCED SEXUALLY, BUT PROGENY OF A SECOND GUAYULE-MARIOLA HYBRID WERE PARTIALLY APOMICTIC. DATA SUGGEST THAT FAILURE OF REDUCTION, FAILURE OF FERTILIZATION, AND PSEUDOGAMOUS DEVELOPMENT ARE CONTROLLED INDEPENDENTLY AND MAJOR FACTORS FAVORING SEXUAL PROCESSES ARE DOMINANT.
SEE: BA(21)23988.

GENETICS/PLANT BREEDING

394

GARDNER, W.R.

1960

DYNAMIC ASPECTS OF WATER AVAILABILITY TO PLANTS.

SOIL SCIENCE 89:63-73.

SEE: HA (30)4714.

SOIL-WATER-PLANT RELATIONSHIPS/MOISTURE STRESS

395

GERSTEL, D.U.

1949

HYDROCHLORIC ACID AS A FIXATIVE FOR ROOT TIP CHROMOSOMES.

STAIN TECHNOLOGY 24:95-97.

GENETICS/ROOTS

396

GERSTEL, D.U.

1950

IS RESISTANCE TO VERTICILLIUM WILT IN GUAYULE RELATED TO CHROMOSOME NUMBER?

AGRONOMY JOURNAL 42:310-311.

SEE: HA (20)3050.

GENETICS/MICROORGANISMS/PLANT INJURY

397

GERSTEL, D.U.

1950

ON THE EFFECT OF SPECIES FOREIGN POLLEN ON SELF-INCOMPATIBLE GUAYULE.

GENETICS 35:666.

GENETICS/POLLINATION

398

GERSTEL, D.U.

1950

SELF-INCOMPATIBILITY STUDIES IN GUAYULE. II: INHERITANCE.

GENETICS 35(4):482-506.

STUDIES OF A FAMILY OF DIPLOIDS INDICATED THAT PARENTS AND RECIPROCAL PROGENIES WERE SELF-INCOMPATIBLE. CROSSES BETWEEN PROGENIES OR BETWEEN PARENTS AND PROGENY WERE EITHER COMPATIBLE OR INCOMPATIBLE ONE WAY OR RECIPROCALLY, AND THERE APPEARS TO BE ONE SERIES OPPOSITIONAL ALLELES.
SEE: BA(25)115.

GENETICS/PLANT BREEDING

399

GERSTEL, D.U./HAMMOND, B.L./KIDD, C.
1953

AN ADDITIONAL NOTE ON THE INHERITANCE OF APOMIXIS IN GUAYULE.

BOTANICAL GAZETTE 115(1):89-93.

EXPERIMENTAL CROSSES WITH GUAYULE INDICATE THAT APOMIXIS IS BASED ON AT LEAST 4 RECESSIVE GENES, A MINIMUM OF 2 CONTROLLING THE OCCURRENCE OF REDUCTION AND 2 THE REQUIREMENT FOR FERTILIZATION.
SEE: BA(28)12709.

GENETICS/PLANT BREEDING

400

GERSTEL, D.U./MISHANEC, W.

1950

ON THE INHERITANCE OF APOMIXIS IN PARTHENIUM ARGENTATUM.

BOTANICAL GAZETTE 112(1):96-106.

THE RESULTS OF NUMEROUS CROSSES INDICATED THAT APOMIXIS IN GUAYULE WAS GENERALLY DETERMINED BY THE GENOTYPE, BUT THE LEVEL OF POLYPLOIDY MAY MODIFY THE EXTENT OF NON-REDUCTION AND NON-FERTILIZATION IN FACULTATIVE APOMICTS.
SEE: BA(25)114. HA (30)946.

GENETICS/SYSTEMATICS

401

GERSTEL, D.U./RINER, M.E.

1950

SELF-INCOMPATIBILITY STUDIES IN GUAYULE. I: POLLEN-TUBE BEHAVIOR.

JOURNAL OF HEREDITY 41(2):49-55.

POLLEN FROM SELF-INCOMPATIBLE DIPLOID GUAYULE GERMINATES AT A VERY LOW RATE. THE FEW POLLEN TUBES THAT ARE FORMED GENERALLY FAIL TO PASS BEYOND THE PAPILLAE OF THE STIGMATA.
SEE: BA(24)25886.

POLLINATION/PLANT BREEDING/GENETICS

402

GLEASON, S.

1931

WE NOW GROW OUR OWN RUBBER; MEXICO'S WILD WEED, GUAYULE, RAISED ON 5600 ACRES IN CALIFORNIA, YIELDS PRECIOUS LATEX.

POPULAR SCIENCE MONTHLY 119(1):18-19.

CALIFORNIA/CULTIVATION

403

GONZALEZ LAGUINGE, E.M.

1951

GUAYULE AND ITS CULTIVATION (TRANSLATED TITLE).

BOLSA DE CEREALES (BUENOS AIRES), REVISTA 38(2020):9, 16; (2021):4, 6.

CULTIVATION/SOUTH AMERICA

404

GORBATOV, P.P.

1951

MACHINES FOR HARVESTING RUBBER-BEARING PLANTS (KOK-SAGHYZ AND GUAYULE) (TRANSLATED TITLE).

SEL'KHOZMASHINA 4:10-13.

HARVESTING/U.S.S.R.

405

GOTTLIEB, S.

1943

STUDIES ON A GROWTH INHIBITOR IN GUAYULE.

CALIFORNIA INSTITUTE OF TECHNOLOGY (PH.D. DISSERTATION). 72 P.

PLANT GROWTH/PLANT PHYSIOLOGY

406

GOWANS, W.J.

1952

PREPARING CRUDE RUBBER TEST SPECIMENS FOR OXYGEN-ABSORPTION MEASUREMENTS.

ANALYTICAL CHEMISTRY 24:1648-1649.

CHEMISTRY/RUBBER QUALITY

407

GOWANS, W.J./CLARKE, F.E.

1952

DETERMINATION OF RUBBER HYDROCARBON BY A MODIFIED BROMINATION METHOD.

ANALYTICAL CHEMISTRY 24:529-532.

RUBBER EXTRACTION/CHEMISTRY

408

GREEVES-CARPENTER, C.F.

1938

AMERICAN-GROWN RUBBER.

COMPRESSED AIR MAGAZINE 43:5601-5603.

UNITED STATES

409

GRIFFITH, P.M.

1901

RUBBER FROM THE YULE PLANT IN MEXICO.

MONTHLY CONSULAR AND TRADE REPORTS 65:375.

MEXICO

410

GROCE, G.C.

1943

OUR NATIVE RUBBER.

CENTRAL MANUFACTURING DISTRICT MAGAZINE, APRIL. P. 39-41.

411

GROSS, L.S./PERRY, E.L.

1945

FORESTERS AND GUAYULE.

JOURNAL OF FORESTRY 43:871-876.

AN ACCOUNT OF GUAYULE PRODUCTION AND HARVESTING UNDER THE EMERGENCY RUBBER PROJECT IS PRESENTED. TOPICS INCLUDE GUAYULE SEED, NURSERIES, PLANTATION CARE, HARVESTING, SURVEYS AND INVENTORIES, RUBBER EXTRACTION, AND MANAGEMENT PROBLEMS.

SEEDS/CULTIVATION/PLANTING MANAGEMENT/RUBBER EXTRACTION/HARVESTING

412

GRUBERG, V.L.

1943

RUBBER.

FLIGHT 43(1776):13-18.

SEE: 8A(18)11779.

CULTIVATION/RUBBER YIELD

413

GRUNFELD, O.

1936

THE OLD AND THE NEW REGARDING RUBBER PLANTS (TRANSLATED TITLE).

KAUTSCHUK 12(9):171-174.

SEE: CA (30)7905.

U.S.S.R

414

GUGLIELMINETTI, S.

1936

GUAYULE: RUBBER PLANT CULTIVATION IN ITALY AND HER COLONIES (TRANSLATED TITLE).

COSTA AZZURRA AGRICULTOR E FLOREALE 16(2):32-40.

CULTIVATION

415

HAAGEN-SMIT, A.J/FONG, C.T.O.

1948

CHEMICAL INVESTIGATION OF GUAYULE. II: THE STRUCTURE OF PARTHENIOL A SESQUITERPENE ALCOHOL FROM GUAYULE.

AMERICAN CHEMICAL SOCIETY, JOURNAL 70:2075-2079.

PARTHENIOL, C15 H24 O, M. 127-128 DEGREES C. IS NOT REDUCED BY SODIUM IN AM OH, DOES NOT REACT WITH MALEIC ANHYDRIDE, AND DOES NOT SHOW ANY CHARACTERISTIC ABSORPTION SPECTRUM MAXIMUM OR MINIMUM IN ETHYL ALCOHOL. THE STRUCTURE IS SHOWN.
SEE: CA (42)7742.

CHEMISTRY

416

HAAGEN-SMIT, A.J./SIU, R.

1944

CHEMICAL INVESTIGATIONS IN GUAYULE. I: ESSENTIAL OIL OF GUAYULE, PARTHENIUM ARGENTATUM GRAY.

AMERICAN CHEMICAL SOCIETY, JOURNAL 66:2068-2074.

VARIOUS GUAYULE PLANT PARTS WERE ANALYZED FOR THEIR ESSENTIAL OIL WHICH WAS THEN SEPARATED BY DISTILLATION INTO 45 FRACTIONS. ESSENTIAL OIL CONTENTS RANGED FROM 0.11 PERCENT IN WOOD TO 1.04 PERCENT IN LEAVES.
SEE: BA(19)9467. CA (39)1019.

CHEMISTRY/PLANT PHYSIOLOGY

417

HAASIS, F.W.

1944

STAINING RUBBER IN GROUND OR MILLED PLANT TISSUES.

INDUSTRIAL AND ENGINEERING CHEMISTRY 16:480:481.

A STAINING TECHNIQUE USEFUL IN THE MICROSCOPIC EXAMINATION OF RUBBER IN GROUND GUAYULE TISSUES IS DESCRIBED. PRETREATMENT IS FOLLOWED BY DIFFERENTIAL STAINING WITH SUDAN IV AND IODINE GREEN.
SEE: CA (38)4470. HA (14)2002.

CHEMISTRY/PLANT ANATOMY

418

HAASIS, F.W.

1945

SOME STAINING TECHNIQUES FOR GUAYULE STUDIES.

STAIN TECHNOLOGY 20:37-44.

A VARIETY OF STAINS ARE SUGGESTED FOR MICROSCOPIC STUDIES ON TISSUES AND SECRETIONS OF GUAYULE, INCLUDING POIRRIER'S BLUE, SUDAN IV, AND TITAN YELLOW FOR PLANT SECTIONS AND GROUND TISSUES. SUDAN IV IS SUGGESTED FOR RUBBER IN PLANT SECTIONS.
SEE: BA(19)14302.

CHEMISTRY/PLANT ANATOMY

419

HAISE, H.R.

1945

DIRECT SEEDING OF GUAYULE, BELL RANCH, INDIO, CALIFORNIA.

(UNPUBLISHED). 18 P.

SEEDS/CALIFORNIA/PLANTING MANAGEMENT

420

HALL, H.M./GOODSPEED, T.H.

1919

A RUBBER PLANT SURVEY OF WESTERN NORTH AMERICA.

UNIVERSITY OF CALIFORNIA, PUBLICATIONS IN BOTANY 7:159-178.

SEE: CA (14)656.

RUBBER YIELD

421

HALL, H.M./LONG, R.L.

1921

RUBBER CONTENT OF NORTH AMERICAN PLANTS.

CARNEGIE INSTITUTION OF WASHINGTON, PUBLICATION 313:1-65.

GUAYULE WAS ONE OF 225 NORTH AMERICAN PLANTS ANALYZED FOR RUBBER CONTENT. NATIVE SHRUBS YIELDED AN AVERAGE 10 PERCENT RUBBER AND SEGREGATION OF SUPERIOR STRAINS LED TO AN INCREASE IN FIELD-GROWN PLANTS TO 18 PERCENT RUBBER.

RUBBER YIELD/PLANT BREEDING

422

HAMM, T.C.

1912

GUAYULE INDUSTRY.

U.S. BUREAU OF MANUFACTURERS DAILY CONSULAR AND TRADE REPORTS 15(188):742-743.

423

HAMMOND, B.L.

1948

1948 GUAYULE SEED COLLECTIONS FROM MEXICO.

(UNPUBLISHED). 40 P.

SEEDS/MEXICO

424

HAMMOND, B.L.

1959

EFFECT OF GIBBERELLIN, SODIUM HYPOCHLORITE, LIGHT, AND PLANTING DEPTH ON GERMINATION OF GUAYULE SEED.

AGRONOMY JOURNAL 51(10):621-623.

GUAYULE EMBRYO AND INNER SEED COAT DORMANCY WERE BROKEN BY DAYLIGHT OR GIBBERELLIN DURING A GERMINATION PERIOD OF 3 WEEKS. GERMINATION RATES INCREASE IF SEED PLANTING DEPTH IS REDUCED BECAUSE OF INCREASED EXPOSURE TO LIGHT.
SEE: BA(35)30121. HA (30)946.

SEEDLINGS/PLANT GROWTH/PLANTING MANAGEMENT/PLANT PHYSIOLOGY/SEEDS

425

HAMMOND, B.L./POLHAMUS, L.G.

1965

RESEARCH ON GUAYULE (PARTHENIUM ARGENTATUM, 1942-1959).

U.S. DEPARTMENT OF AGRICULTURE, WASHINGTON, D.C., AGRICULTURAL RESEARCH SERVICE, TECHNICAL BULLETIN 1327:1-157.

A SUMMARY OF RESEARCH ON GUAYULE BY AGENCIES OF THE U.S. DEPARTMENT OF AGRICULTURE IS PRESENTED FROM THE INITIATION OF THE EMERGENCY RUBBER PROJECT IN 1942 UNTIL THE FINAL PHASE OF POST-WAR RESEARCH IN 1959. THE LITERATURE REVIEW INCLUDES HISTORY, BOTANY, CULTIVATION, CROP RESEARCH, PRODUCTION RESEARCH, SHRUB PROCESSING, COSTS OF PRODUCTION AND AN EXTENSIVE BIBLIOGRAPHY.
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BIBLIOGRAPHIES/CULTIVATION/ECONOMICS/RUBBER EXTRACTION

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CHEMISTRY/RUBBER QUALITY

427

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1944

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(UNPUBLISHED). 20 P.

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428

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1900

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1903

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DEUTSCHE CHEMISCHE GESELLSCHAFT BERICHTE 36(9):1937-1941.

430

HASSID, W.Z. ET AL

1944

INULIN IN GUAYULE, PARTHENIUM ARGENTATUM GRAY.

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CHEMISTRY/PLANT PHYSIOLOGY

431

HAUSER, E.A.

1941

HOME-GROWN AND HOME-MADE RUBBER.

INDIA RUBBER WORLD 104(6):27-29.

432

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INDIA RUBBER WORLD 106:447-449.

CHEMISTRY

433

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1943

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INDIA RUBBER WORLD 107:568-570.

CHEMISTRY

434

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1943

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435

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1946

MOLECULAR FRACTIONATION BY DIFFUSION OF GUAYULE AND CRYPTOSTEGIA RUBBER.

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1950

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U.S. AGRICULTURAL RESEARCH ADMINISTRATION, WASHINGTON, D.C. P. 11-98.

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SEE: HA (20)3438.

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SEE: HA (22)3242.

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438

HILDRETH, A.C.

1946

RECENT ADVANCES IN GUAYULE GROWING.

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PLANTING MANAGEMENT/PLANT GROWTH/RUBBER YIELD/CULTIVATION/UNITED STATES/ HARVESTING

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1946

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440

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1907

GUAYULE RUBBER (PARTHENIUM ARGENTATUM, A. GRAY).

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1945

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SCHOOL SCIENCE AND MATHEMATICS 45:615-622.

UNITED STATES/ECONOMICS

442

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1941

AMERICA'S RUBBER FARMS.

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UNITED STATES/CULTIVATION

443

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1943

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NATION 156:520-521.

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444

HOLMES, R.L./ROBBINS, H.W.

1947

EFFICIENT APPARATUS FOR LEACHING SAMPLES WITH WATER.

INDUSTRIAL AND ENGINEERING CHEMISTRY, ANALYTICAL EDITION 19:808-809.

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445

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SEE: BA(22)7394. CA (41)4943.

RUBBER EXTRACTION/RUBBER YIELD/CHEMISTRY

446

HOLT, E.G.

1926

GUAYULE RUBBER.

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MEXICO AN IMPORTANT SOURCE OF GUAYULE RUBBER.

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448

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1946

GUAYULE RUBBER BY FERMENTATION.

U.S. PATENT 2,408,853.

U.S. PATENTS/RUBBER EXTRACTION

449

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1928

GUAYULE SHRUB AS A SOURCE OF CRUDE RUBBER SUPPLY.

DUN'S INTERNATIONAL REVIEW 51:39-41.

450

HOYMAN, W.G.

1942

PRELIMINARY EVIDENCE SUGGESTS GUAYULE MAY BE RESISTANT TO THE ROOT KNOT NEMATODE.

PLANT DISEASE REPORTER 26:476.

PLANT INJURY

451

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1944

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SEE: BA(18)20529. HA (15)183.

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452

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1949

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(UNPUBLISHED). 99 P.

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453

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1958

CLIPPING AS A METHOD OF HARVESTING GUAYULE FOR RUBBER.

U.S. DEPARTMENT OF AGRICULTURE, PRODUCTION RESEARCH REPORT 24:1-10.

CLIPPING GUAYULE PLANTS 2 INCHES ABOVE GROUND AFTER 5 TO 6 YEARS IN THE FIELD AND COMPLETE HARVESTING 1 TO 4 YEARS LATER YIELDED MORE RUBBER THAN FROM UNCLIPPED PLANTS COMPLETELY HARVESTED AFTER 5 TO 6 YEARS FOLLOWED BY REPLANTING AND COMPLETE HARVESTING 1 TO 4 YEARS LATER. PLANT REGENERATION WAS BEST IF CLIPPING WAS DONE DURING THE WINTER DORMANT PERIOD.
SEE: BA(33)19252. HA (30)2526.

RUBBER YIELD/CULTIVATION/PLANTING MANAGEMENT/HARVESTING

454

HUNTER, A.S./KELLEY, O.J.

1944

THE RESPONSES OF NURSERY-GROWN GUAYULE SEEDLINGS TO VARIOUS LEVELS AND COMBINATIONS OF N, P2O5, AND K2O APPLIED TO THE CHUALAR LOAM SOIL.

(UNPUBLISHED). 13 P.

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455

HUNTER, A.S./KELLEY, O.J.

1945

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(UNPUBLISHED). 8 P.

SEEDLINGS/SOIL-WATER-PLANT RELATIONSHIPS/PLANT PHYSIOLOGY

456

HUNTER, A.S./KELLEY, O.J.

1946

A NEW TECHNIQUE FOR STUDYING THE ABSORPTION OF MOISTURE AND NUTRIENTS FROM SOIL BY PLANT ROOTS.

SOIL SCIENCE 62:441-450.

ROOTS/SOIL-WATER-PLANT RELATIONSHIPS/PLANT PHYSIOLOGY

457

HUNTER, A.S./KELLEY, O.J.

1946

CHANGES IN CONSTRUCTION OF SOIL MOISTURE TENSIOMETERS FOR FIELD USE.

SOIL SCIENCE 61:215-217.

SOIL-WATER-PLANT RELATIONSHIPS/MOISTURE STRESS/PLANT PHYSIOLOGY

458

HUNTER, A.S./KELLEY, O.J.

1946

THE GROWTH AND RUBBER CONTENT OF GUAYULE AS AFFECTED BY VARIATIONS IN SOIL MOISTURE STRESSES.

AMERICAN SOCIETY OF AGRONOMY, JOURNAL 38(2):118-134.

THE EFFECTS OF DIFFERENT SOIL MOISTURE LEVELS ON FIELD-GROWN GUAYULE WERE INVESTIGATED AND AN INVERSE RELATIONSHIP BETWEEN SHRUB DRY WEIGHT AND PERCENT RUBBER YIELD WAS FOUND. ALTHOUGH FERTILIZATION INCREASED THE SHRUB DRY WEIGHT, THE RUBBER YIELD DECREASED AND SOIL MOISTURE DIFFERENCES HAD LITTLE EFFECT ON PERCENT RESIN.
SEE: BA(20)8961. CA (40)2868. HA (16)873.

MOISTURE STRESS/PLANT GROWTH/RUBBER YIELD/SOIL-WATER-PLANT RELATIONSHIPS/RESINS

459

HUTCHINSON, J.

1913

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HOOKERS ICONES PLANTARUM, SER.4, 10(2998):1-3.

460

INTERCONTINENTAL RUBBER COMPANY

1926

REPORT TO STOCKHOLDERS CONCERNING THE COMPANY, ITS PROPERTY AND BUSINESS.

SAME AS AUTHOR, NEW YORK. 28 P.

ECONOMICS

461

IVANOV, S. ET AL

1930

NEW FACTS ON THE STUDY OF RUBBER-BEARING PLANTS OF THE RUSSIAN SOVIET REPUBLIC (TRANSLATED TITLE).

KAUTSCHUK 6:237-239, 256-258.

SEE: CA (25)1704.

U.S.S.R.

462

JARDINE, W.M.

1931

RUBBER, A CROP WITH POSSIBILITIES.

NATION'S BUSINESS 19(1):27-30, 110, 112.

USES

463

JENKINS, M.B.

1946

COLD TOLERANCE OF GUAYULE.

U.S. FOREST SERVICE, WASHINGTON, D.C., EMERGENCY RUBBER PROJECT. 39 P.

WINTER SURVIVAL IN GUAYULE IS HIGH IF IT BECOMES HARDENED BY PROGRESSIVELY LOWER TEMPERATURES IN THE FALL AND IF THERE IS A CONTINUANCE OF LOW TEMPERATURES DURING THE WINTER SO THAT DORMANCY IS NOT BROKEN. AT ITS NORTHERN LIMITS OF DISTRIBUTION, GUAYULE SURVIVES OCCASIONAL TEMPERATURES OF 0-5 DEGREES F.
SEE: BA(21)15452.

TEMPERATURE EFFECTS/PLANT INJURY

464

JIMENEZ AIZPURUA, A.

1958

CULTIVATION OF GUAYULE AND PRODUCTION OF VIRGIN RUBBER. (TRANSLATED TITLE).

MONTES (MADRID) 14:401-409.

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SEE: BA(33)19253. HA (30)4126.

RUBBER YIELD/PLANT GROWTH/TEMPERATURE EFFECTS/CULTIVATION

465

JOHNSON, B.L.

1950

HIGH RUBBER YIELDING SELECTIONS FROM A NATURAL POPULATION OF GUAYULE.

AGRONOMY JOURNAL 42:345:350.

GUAYULE ACCESSION 4265, COLLECTED FROM 5 NATIVE PLANTS IN DURANGO, MEXICO, WAS MUCH SUPERIOR TO COMMERCIAL VARIETY 593 IN PLANT HEIGHT AND SPREAD, AND RUBBER AND RESIN CONTENT AT 2 AND 3 YEARS. THE PROBABLE OCCURRENCE OF APOMICITIC TYPES IS DISCUSSED.
SEE: HA (20)3047.

RUBBER YIELD/DISTRIBUTION/SYSTEMATICS/GENETICS/PLANT DISTRIBUTION/

466

JONES, E.P.

1948

RECOVERING RUBBER FROM GUAYULE SHRUB.

U.S. PATENT 2,424,412.

SEE: BA(22)17134.

U.S. PATENTS/RUBBER EXTRACTION

467

JONES, E.P.

1948

RECOVERY OF RUBBER LATEX FROM GUAYULE SHRUB.

INDUSTRIAL AND ENGINEERING CHEMISTRY 40(5):864-885.

RUBBER EXTRACTION

468

JONES, E.P.

1949

PROCESS OF CONCENTRATING AQUEOUS RUBBER DISPERSIONS BY CENTRIFUGING.

U.S. PATENT 2,475,141.

U.S PATENTS/RUBBER EXTRACTION

469

KALASHNIKOV, V.M.

1930

A CONTRIBUTION TO THE BIOLOGY OF FLOWERING IN PARTHENIUM ARGENTATUM, GRAY (TRANSLATED TITLE).

TRUDY PO PRIKLADNOI, GENETIKE, I SELEKTSII 24(3):83-98.

PLANT PHYSIOLOGY/U.S.S.R.

470

KALASHNIKOV, V.M.

1931

A CONTRIBUTION TO THE METHODS OF BREEDING THE GUAYULE (PARTHENIUM ARGENTATUM, GRAY) (TRANSLATED TITLE).

TRUDY PO PRIKLADNOI, GENETIKE, I SELEKTSII 27(2):509-560.

PLANT BREEDING/U.S.S.R.

471

KAUFFMAN, E.

1942

GUAYULE, THE VICTORY RUBBER.

AMERICAN FORESTS 48(2):72-73, 84, 92.

SEE: CA (36)2754.

472

KAVBA, B./ZELNICEK, A.

1936

RESULTS OF EXPERIMENTS ON THE CULTIVATION OF THE RUBBER-BEARING PLANT, PARTHENIUM ARGENTATUM, GRAY, IN THE YEARS 1932-1935 (TRANSLATED TITLE).

CESKOSLOVENSKA AKADEMIE ZEMEDELSKA PRAGUE, VESTNIK 12(6/7):475-480.

CULTIVATION

473

KEIFER, H.H.

1952

ERIOPHYID STUDIES XX.

CALIFORNIA DEPARTMENT OF AGRICULTURE, BULLETIN 41:147-148.

PLANT INJURY

474

KELLEY, O.J./HUNTER, A.S./HOBBS, C.H.

1945

FERTILITY EXPERIMENT ON FIELD-GROWN GUAYULE.

(UNPUBLISHED). 84 P.

PLANTING MANAGEMENT/SOIL-WATER-PLANT RELATIONSHIPS

475

KELLEY, O.J./HUNTER, A.S./HOBBS,C.H.

1945

THE EFFECT OF MOISTURE STRESS ON NURSERY-GROWN GUAYULE WITH RESPECT TO THE AMOUNT AND TYPE OF GROWTH AND GROWTH RESPONSE ON TRANSPLANTING.

AMERICAN SOCIETY OF AGRONOMY, JOURNAL 37(3):194-216.

EXPERIMENTS IN CALIFORNIA INDICATE THAT GUAYULE NURSERY PLANTS GROWN UNDER HIGH MOISTURE STRESS ARE SMALLER, BUT HAVE HIGHER TRANSPLANTING SURVIVAL RATES AND CAN BE TRANSPLANTED ANY TIME OF YEAR WITH LESS NEED FOR WEED AND DISEASE CONTROL THAN PLANTS FROM GENEROUSLY IRRIGATED PLOTS. ROOT PENETRATION UNDERLOW AND HIGH MOISTURE STRESS WAS ABOUT 3 1/2 TO 4 FEET.
SEE: BA(19)14303. HA (15)669.

MOISTURE STRESS/PLANT GROWTH/CALIFORNIA/PLANTING MANAGEMENT/IRRIGATION EFFECTS

476

KELLEY, O.J. ET AL

1946

INCREASED RUBBER PRODUCTION FROM THICKLY SEEDED GUAYULE.

AMERICAN SOCIETY OF AGRONOMY, JOURNAL 38(7):589-613.

UNDER EXPERIMENTAL CONDITIONS, THE GREATER THE DENSITY OF GUAYULE PLANTS, THE GREATER THE YIELD OF RUBBER. ALTHOUGH THE RESULTS OF DIFFERENCES IN IRRIGATION AND FERTILIZATION DEPEND ON SOIL AND CLIMATIC CONDITIONS, THE ADDITION OF NITROGEN GENERALLY INCREASED VEGETATIVE GROWTH, BUT DECREASED PERCENT RUBBER.
SEE: BA(20)18434. HA (17)245.

PLANTING MANAGEMENT/RUBBER YIELD/PLANT GROWTH/IRRIGATION EFFECTS/ SOIL-WATER-PLANT RELATIONSHIPS

477

KIEFFER, D.L.

1941

GUAYULE, OUR OWN WARTIME RUBBER CROP.

PACIFIC RURAL PRESS AND CALIFORNIA FARMER 14(7):276.

478

KING, A.H.

1916

GUAYULE AND INDUSTRIAL PREPAREDNESS.

METALLURGICAL AND CHEMICAL ENGINEERING 15(10):563-566.

SEE: CA (11)307.

USES

479

KING, A.H.

1917

RUBBER SITUATION.

METALLURGICAL AND CHEMICAL ENGINEERING 16:99.

480

KIRCHOFF, F.

1936

THE ROLE OF RUBBER HYDRO-CARBON IN THE PLANT (TRANSLATED TITLE).

KAUTSCHUK 12(3):45-48.

CHEMISTRY/U.S.S.R.

481

KIRKWOOD, J.E.

1909

GUAYULE RUBBER INDUSTRY.

SCIENTIFIC AMERICAN 10(2):24, 26.

482

KIRKWOOD, J.E.

1910

PROPAGATION OF GUAYULE BY SEEDS.

AMERICAN REVIEW OF TROPICAL AGRICULTURE 1:34-43, 77-84.

SEEDS/PROPAGATION

483

KIRKWOOD, J.E.

1910

THE GROWING OF GUAYULE IN RELATION TO THE SOIL.

AMERICAN REVIEW OF TROPICAL AGRICULTURE 1(5/6):142-158.

SOIL-WATER-PLANT RELATIONSHIPS

484

KIRKWOOD, J.E.

1910

THE LIFE HISTORY OF PARTHENIUM (GUAYULE).

AMERICAN REVIEW OF TROPICAL AGRICULTURE 1(7):193-205.

485

KITH TASSARA, M.

1950

CULTIVATION OF GUAYULE: THE PRODUCTION OF RUBBER IN SPAIN (TRANSLATED TITLE).

MONTES 36:710-716.

CULTIVATION

486

KITH TASSARA, M.

1951

NEW PLANTATIONS IN ANDALUCIA, PRODUCTION OF RUBBER.

CAMPO 10(107):17-18.

CULTIVATION

487

KITH TASSARA, M.

1953

SOME CONSIDERATIONS ON EXPERIENCES IN THE CULTIVATION OF GUAYULE IN SPAIN FOR RUBBER PRODUCTION (TRANSLATED TITLE).

ION 13:632-635.

CULTIVATION/ECONOMICS

488

KITH TASSARA, M.

1954

EXPERIMENTS ON THE CULTIVATION OF RUBBER PLANTS IN SPAIN (TRANSLATED TITLE).

REVISTA GENERAL CAOUTCHOUC 31:621-623.

EXPERIMENTS WITH GUAYULE ARE DESCRIBED INCLUDING CULTIVATION OF THE PLANT AND EXTRACTION AND DERESINATION OF THE RUBBER. DERESINATION BY OPEN BOILING AND DECANTATION HAS GIVEN GOOD RESULTS.
SEE: CA (48)14271. HA (25)783.

CULTIVATION/RUBBER EXTRACTION/DERESINATION

489

KITH TASSARA, M.

1955

PRODUCTS MANUFACTURED WITH SPANISH GUAYULE RUBBER IN THE NATIONAL MARKET (TRANSLATED TITLE).

MONTES 11:421-422.

USES/ECONOMICS

490

KNIGHT, H.H.

1944

LYGUS HAHN: SIX NEW SPECIES FROM WESTERN NORTH AMERICA (HEMIPTERA, MIRIDAE).

IOWA STATE COLLEGE JOURNAL OF SCIENCE 18(4):471-477.

NORTH AMERICA/SYSTEMATICS/INSECTS

491

KOKIEVA, E.

1929

THE DEVELOPMENT OF THE MALE GAMETOPHYTE IN PARTHENIUM ARGENTATUM AND P. HYSTEROPHORUS (TRANSLATED TITLE).

ASSOTSIATSII NAUCHNO-ISSLEDOVATEL'SKIKH INSTITUTOV PRI FIZ 2:145-166.

PLANT ANATOMY/U.S.S.R.

492

KOKIEVA, E.

1931

MORPHOLOGY AND DEVELOPMENT OF THE INFLORESCENCES OF PARTHENIUM ARGENTATUM AND P. HYSTEROPHORUS (TRANSLATED TITLE).

SOCIETE DES NATURALISTES DE MOSCOU SECTION BIOLOGIQUE 40(314):207-236.

SEE: BA(8)766.

PLANT ANATOMY/U.S.S.R.

493

KOKIEVA, E.

1932

THE DEVELOPMENT OF THE FEMALE GAMETOPHYTE IN PARTHENIUM ARGENTATUM, GRAY (GUAYULE) (TRANSLATED TITLE).

JOURNAL DE BOTANIQUE DE L'URSS 17(1):72-99.

PLANT ANATOMY/U.S.S.R.

494

KOLACHOV, P.J.

1941

AMERICAN RUBBER FROM AMERICAN FARMS.

NATIONAL FARM CHEMURGIC COUNCIL PAPERS 24:1-14.

UNITED STATES/CULTIVATION

495

KOPECNY, J.

1936

THE DETERMINATION OF RUBBER IN PLANTS (TRANSLATED TITLE).

CESKOSLOVENSKE AKADEMIE ZEMEDELSKE 12:65-66.

SEE: CA (31)6921.

PLANT PHYSIOLOGY/RUBBER EXTRACTION

496

KOVALENKO, V.

1933

CULTIVATION OF GUAYULE (TRANSLATED TITLE).

SOVETSKII KAUCHUK 5:24-26.

CULTIVATION/U.S.S.R.

497

KOZAK, M.P.

1933

CHARACTERISTICS OF SEED PRODUCTIVITY IN DIFFERENT FORMS OF GUAYULE (PARTHENIUM ARGENTATUM, GRAY) (TRANSLATED TITLE).

TRUDY PO PRIKLADNOI, GENETIKA, I SELEKTSII 5/6:125-135.

SEE: BA(9)871.

SEEDS/PLANT BREEDING/U.S.S.R.

498

KRAFT, D.

1935

COMPLETE UTILIZATION OF RUBBER-BEARING PLANTS (TRANSLATED TITLE).

SOVETSKII KAUCHUK 4:44.

USES/U.S.S.R.

499

KRAMER, H.H.

1946

THE EVAULATION OF INDIVIDUAL PLANT SELECTIONS FROM A NATURAL POPULATION OF GUAYULE, PARTHENIUM ARGENTATUM, GRAY.

AMERICAN SOCIETY OF AGRONOMY, JOURNAL 38(1):22-31.

PROGENIES FROM 42 SELECTED NATIVE GUAYULE PLANTS IN TEXAS THAT REPRODUCED BY FACULTATIVE APOMIXIS WERE EVALUATED. THE PROGENIES THAT INDICATED INTROGRESSION WITH PARTHENIUM INCANUM, MARIOLA, SHOWED GREAT VIGOR, LATE FLOWERING, AND A LOW RUBBER CONTENT.
SEE: 8A(20)8962.

TEXAS/GENETICS/PLANT DISTRIBUTION/RUBBER YIELD/SYSTEMATICS

500

KRASHENNIKOV, N.A./AGEEV, L.A.

1939

FROST RESISTANCE OF GUAYULE AND AGRICULTURAL PROBLEMS CONNECTED WITH RESISTANCE (TRANSLATED TITLE).

SOVIET SUBTROPICS 12:26.

PLANT GROWTH/TEMPERATURE EFFECTS/U.S.S.R.

501

KRASHENNIKOV, N.A./AGEEV, L.A.

1940

GROWING GUAYULE IN IRRIGATED NURSERY BEDS (TRANSLATED TITLE).

SOVIET SUBTROPICS 4(68):38-41.

SEE: HA (10)279.

IRRIGATION EFFECTS/U.S.S.R.

502

KRIESBERG, M.

1952

THE EMERGENCY RUBBER PROJECT: INTER-UNIVERSITY CASE PROGRAM.

UNIVERSITY OF ALABAMA PRESS, CASE SER. 3:633-648.

ECONOMICS

503

KUPTSOV, A.I.

1937

THE FIRST SELECTED VARIETIES OF GUAYULE (TRANSLATED TITLE).

SOVIET SUBTROPICS 7:35-43.

U.S.S.R./PLANT BREEDINGS

504

KUPTSOV, A.I.

1968

AMPHIMIXIS AND APOMIXIS IN THE EVOLUTION AND BREEDING OF GUAYULE. (TRANSLATED TITLE).

GENETIKA 4(2):50-61.

THE NATIVE DISTRIBUTION OF AMPHIMICTIC AND APOMICTIC POPULATIONS OF GUAYULE IN THE UNITED STATES AND MEXICO IS REVIEWED. APOMICTIC FORMS ARE CONSIDERED TO HAVE GREATER ECONOMIC VALUE AND APOMICTIC TETRAPLOIDS WERE THE FIRST CULTIVATED VARIETIES TO BE IMPROVED BY PLANT BREEDING IN BOTH THE USA AND USSR.
SEE: BA(50)10226.

UNITED STATES/GENETICS/SYSTEMATICS/PLANT DISTRIBUTION/U.S.S.R./MEXICO

505

KUSNETSOVA, M.S.

1933

RUBBER ACCUMULATION IN PARTHENIUM ARGENTATUM IN THE FIRST YEAR OF VEGETATION (TRANSLATED TITLE).

BOTANISCHE ZENTRALBLATT 165:326.

SEEDLINGS/RUBBER YIELD

506

KUZ'MIN, S.

1934

STIMULATION OF SEED GERMINATION AND THE EFFECT OF FERTILIZERS ON THE DEVELOPMENT OF THE SEEDLINGS OF GUAYULE (TRANSLATED TITLE).

SOVETSKII KAUCHUK 3:23-32.

SEEDS/SEEDLINGS/PLANT GROWTH/U.S.S.R.

507

L., M.P.

1927

GUAYULE.

NATURE 2770:296-300.

508

LABROY, O.

1907

GUAYULE RUBBER: PRESENT STATE OF GUAYULE CULTIVATION IN MEXICO (TRANSLATED TITLE).

JOURNAL D'AGRICULTURE TROPICALE 8(75):259-265.

MEXICO/CULTIVATION

509

LABROY, O.

1908

THE GUAYULE SITUATION - THE INDUSTRY'S DECLINE (TRANSLATED TITLE).

JOURNAL D'AGRICULTURE TROPICALE 8(86):232-234.

ECONOMICS

510

LANGE, W.H., JR.

1944

INSECTS AFFECTING GUAYULE WITH SPECIAL REFERENCE TO THOSE ASSOCIATED WITH NURSERY PLANTINGS IN CALIFORNIA.

JOURNAL OF ECONOMIC ENTOMOLOGY 37(3):392-399.

MORE THAN 75 SPECIES OF INSECTS AND ARACHNIDS WERE FOUND ASSOCIATED WITH GUAYULE, BUT MANY WERE TRANSIENT. ALTHOUGH MANY INSECTS CAUSED DAMAGE, GUAYULE NURSERY PLANTS WERE FOUND TOLERANT TO A NUMBER OF INSECTICIDES AND FUNGICIDES. SEE: BA(19)5486. CA (38)6473. HA (15)1.30.

INSECTS/PLANT INJURY/PARASITES/SEEDLINGS

511

LANGE, W.H., JR.

1953

ACERIA PARTHENII KEIFER, A NEW ERIOPHYID MITE INJURIOUS TO GUAYULE.

JOURNAL OF ECONOMIC ENTOMOLOGY 46:162-163.

THE MITE, WHICH WAS FOUND IN A CALIFORNIA GREENHOUSE, CAUSED LEAF DISTORTION ON GUAYULE PLANTS AND FAILURE OF NORMAL BRANCH AND FLOWER DEVELOPMENT. CONTROL WAS OBTAINED BY 3 SULFUR DUST APPLICATIONS GIVEN AT 3-DAY INTERVALS.
SEE: HA (23):4404.

INSECTS/PLANT INJURY/CALIFORNIA/LEAVES

512

LAPIN, A.K.

1936

RUBBER AND GUTTA-PERCHA PLANTS OF THE U.S.S.R. (TRANSLATED TITLE).

PRIRODA 25(7):110-123.

U.S.S.R.

513

LAWRENCE, W.A.

1911

RUBBING THE FINELY DIVIDED PLANT PARTICLES TOGETHER UNDER WATER SUFFICIENTLY TO DISCONNECT IT FROM THE REST OF SOURCE AND CAUSING TO RISE TO SURFACE.

U.S. PATENT 982,373.

U.S. PATENTS/RUBBER EXTRACTION

514

LEBEDEV, A.N.

1937

THE AGROTECHNICAL METHODS OF GUAYULE GROWING (TRANSLATED TITLE).

SOVIET SUBTROPICS 2:31-40.

CULTIVATION/U.S.S.R.

515

LEBEDEV, A.N.

1938

CULTIVATION METHODS WITH GUAYULE SEEDLINGS (TRANSLATED TITLE).

SOVIET SUBTROPICS 2(42):26-34.

SEE: CA (33)8346.

CULTIVATION/SEEDLINGS/U.S.S.R.

516

LEBEDEV, A.N.

1938

PARTHENIUM ARGENTATUM RAISED IN HOT-HOUSE (TRANSLATED TITLE).

SOVIET SUBTROPICS 2:26-34.

SEE: CA (33)6347.

CULTIVATION/U.S.S.R.

517

LEE, C.A.

1946

INTERCONTINENTAL RUBBER COMPANY'S COST EXPERIENCE AND A COMPARISON WITH (EMERGENCY RUBBER) PROJECT'S EXPERIENCE.

(UNPUBLISHED). 5 P.

ECONOMICS

518

LEGROS, J.

1937

SECONDARY RUBBER YIELDING PLANTS OF THE CAUCASUS REGION AND OF CENTRAL ASIA.

INTERNATIONAL REVIEW OF AGRICULTURE 28:468 T-481 T.

SEE: CA (32)8185. HA (8)69.

519

LEO, A., DE

1939

PRELIMINARY OBSERVATIONS ON GUAYULE AS A SOURCE OF RUBBER (TRANSLATED TITLE).

SAVORI DEL REGIO ISTITUTO BOTANICO DI PALERMO 10:78-91.

SEE: CA (34)6973.

520

LITCHFIELD, P.W.

1945

GUAYULE: ASSET OR LIABILITY?

GOODYEAR TIRE AND RUBBER CO., NOTES ON AMERICA'S RUBBER INDUSTRY 4. 4 P.

ECONOMICS

521

LLOYD, F.E.

1908

METHODS OF VEGETATIVE REPRODUCTION IN GUAYULE AND GUAYULA.

PLANT WORLD 11(9):201-208.

PLANT BREEDING/PROPAGATION

522

LLOYD, F.E.

1908

SOME FEATURES OF THE ANATOMY OF GUAYULE (PARTHENIUM ARGENTATUM, GRAY).

PLANT WORLD 11(8):172-179.

PLANT ANATOMY

523

LLOYD, F.E.

1909

THE MEXICAN GUAYULE AND ITS PRODUCT.

INTERNATIONAL RUBBER CONFERENCE, 1ST, LONDON, PROCEEDINGS 1908:126-141.

524

LLOYD, F.E.

1910

GUAYULE RUBBER SITUATION.

INDIA RUBBER WORLD 41(4):115-116.

525

LLOYD, F.E.

1910

THE RESPONSE OF THE GUAYULE, PARTHENIUM ARGENTATUM, TO IRRIGATION.

SCIENCE 31(794):434-435.

IRRIGATION EFFECTS

526

LLOYD, F.E.

1911

GUAYULE (PARTHENIUM ARGENTATUM, GRAY), A RUBBER PLANT OF THE CHIHUAHUAN DESERT.

CARNEGIE INSTITUTION OF WASHINGTON, PUBLICATION 139:1-213.

A COMPREHENSIVE ACCOUNT IS PRESENTED ON THE HISTORY OF GUAYULE UTILIZATION, ECOLOGY, REPRODUCTION, ANATOMY, PHYSIOLOGY, AND CULTIVATION. DATA WERE OBTAINED BY THE AUTHOR WHILE HE WAS ENGAGED BY THE CONTINENTAL-MEXICAN RUBBER COMPANY AND THE UNITED STATES RUBBER COMPANY.
SEE: CA (6)501.

MEXICO/USES/PLANT ANATOMY/PLANT PHYSIOLOGY/CULTIVATION/ECONOMICS

527

LLOYD, F.E.

1911

MANUFACTURE OF RUBBER FROM THE GUAYULE PLANT.

NEW YORK BOTANICAL GARDEN, JOURNAL 12(137):96-97.

528

LLOYD, F.E.

1911 (see also # 526)

GUAYULE (PARTHENIUM ARGENTATUM, GRAY), A RUBBER PLANT OF THE CHIHUAHUAN DESERT.

CARNEGIE INSTITUTION OF WASHINGTON, PUBLICATION 139:1-213.

SEE: CA (6)501.

SOIL-WATER-PLANT RELATIONSHIPS/CHEMISTRY/PLANT ANATOMY/ PLANT DISTRIBUTION/CULTIVATION

529

LLOYD, F.E.

1912

THE PROPAGATION OF GUAYULE: A CRITICISM.

INDIA RUBBER WORLD 45:164-165.

PROPAGATION

530

LLOYD, F.E.

1913

NOTES ON THE ACCLIMATIZATION AND CULTIVATION OF THE GUAYULE (PARTHENIUM ARGENTATUM, GRAY).

INDIA RUBBER WORLD 48(5):563-566.

CULTIVATION

531

LLOYD, F.E.

1914

THE RUBBER AND RESIN CONTENT OF THE DESERT RUBBER PLANT 'GUAYULE' IN RELATION TO RAINFALL.

SOCIETY OF CHEMICAL INDUSTRY, JOURNAL 33(3):107-109.

SEE: CA (8)1678.

RUBBER YIELD/RESINS/SOIL-WATER-PLANT RELATIONSHIPS

532

LLOYD, F.E.

1932

MODE OF OCCURRENCE OF CAOUTCHOUC IN GUAYULE, PARTHENIUM ARGENTATUM GRAY, AND ITS FUNCTION.

PLANT PHYSIOLOGY 7:131-138.

RUBBER IN THE GUAYULE PLANT WAS FOUND TO OCCUR AS A COLLOIDAL SUSPENSION IN CELLS OF THE PARENCHYMA. IT IS ALSO SUGGESTED THAT RUBBER MAY ACT AS A FOOD RESERVE OF THE PLANT (AN INVESTIGATION BY TRAUB, 1946, INDICATED RUBBER HYDROCARBON WAS NOT A FOOD RESERVE IN GUAYULE).

RUBBER YIELD/CHEMISTRY/PLANT PHYSIOLOGY

533

LOBENSTEIN, H.L./CHAMPAGNE, E.G.

1945

GUAYULE PRODUCTION COST ESTIMATES: CALIFORNIA.

(UNPUBLISHED). 14 P.

CALIFORNIA/ECONOMICS/CULTIVATION

534

LOBENSTEIN, H.L./WHITE, J.L.

1944

PRODUCTION COST ESTIMATES: TEXAS.

(UNPUBLISHED). 4 P.

TEXAS/ECONOMICS/CULTIVATION

535

LOPEZ BALOZOTE, A.

1957

A GENERAL PLAN OF CULTIVATION AND INDUSTRIALIZATION OF GUAYULE IN ALMERIA (TRANSLATED TITLE).

MONTES 11:421-422.

MEXICO/CULTIVATION/ECONOMICS

536

LUDEWIG, H.J.

1910

RUBBER CULTURE IN MEXICO (TRANSLATED TITLE).

TROPENPFLANZER 14(10):510-521.

MEXICO/CULTIVATION

537

LUDEWIG, H.J.

1911

RUBBER CULTIVATION IN MEXICO (TRANSLATED TITLE).

LA QUINZAINE 5(13):461.

MEXICO/CULTIVATION

538

MACDOUGAL, D.T.

1928

CAN WE GROW OUR OWN RUBBER?

SCIENTIFIC AMERICAN 139(1):16-19.

539

MACDOUGAL, D.T.

1942

DOMESTICATION IN A DECADE. THE STORY OF GUAYULE, AMERICA'S RUBBER-PRODUCING SHRUB, AND HOW IT HAS SPEEDILY BEEN BROUGHT INTO CULTIVATION FROM THE WILD.

NEW YORK BOTANICAL GARDEN, JOURNAL 43:165-168.

CULTIVATION/UNITED STATES

540

MACKU, J.

1934

WILL GUAYULE BE A CZECHOSLOVAKIAN RUBBER (TRANSLATED TITLE)?

CESKOSLOVENSKY ZEMEDELEC 16(25):296-297.

541

MACKU, J.

1937

CULTIVATION OF PARTHENIUM ARGENTATUM, A.C. (GUAYULE) IN RUSSIA AND RESULTING TESTS IN THE BOTANICAL GARDENS OF MASARYK UNIVERSITY, BRNO (CZECHOSLOVAKIA) IN 1936 (TRANSLATED TITLE).

CASOVE CTASKY ZEMEDELSKE 62:6-9.

CULTIVATION/U.S.S.R.

542

MAKAGON, V.N.

1935

RUBBER PRODUCING PLANTS IN THE SUBTROPICS (TRANSLATED TITLE).

SOVIET SUBTROPICS 3:44-48.

U.S.S.R.

543

MAKSIMOV, N.A./KUZ'MIN, S.P./IVANOVA, V.I.

1930

MATERIALS FOR THE PHYSIOLOGICAL CHARACTERISTICS OF GUAYULE (TRANSLATED TITLE).

TRUDY PO PRIKLADNOI, BOTANIKE, GENETIKE, I SELEKTSIL 24(3):99-145.

PLANT PHYSIOLOGY/U.S.S.R.

544

MALLORY, L.D.

1941

MEXICAN RUBBER SUPPLIES: A BACKGROUND REPORT.

ECONOMIC SECTION AMERICAN EMBASSY, MEXICO, D.F. 14 P.

MEXICO/ECONOMICS

545

MANNING, P.D.V.

1931

METALLURGICAL METHODS USED IN PRODUCING (GUAYULE) RUBBER.

CHEMICAL AND METALLURGICAL ENGINEERING 38(3):131-132.

CHEMISTRY

546

MARCKWALD, E./FRANK, F.

1904

A CONTRIBUTION ON THE VALUE OF GUAYULE RUBBER (TRANSLATED TITLE).

GUMMI-ZEITUNG 18(32):650-652.

ECONOMICS/USES

547

MARKOVA, L.G.

1946

EMBRYOLOGY OF PARTHENIUM ARGENTATUM GRAY AND OF RELATED SPECIES (TRANSLATED TITLE).

BOTANICHESKII ZHURAL, ACADEMIYA NAUK S.S.S.R. 31(1):19-26.

U.S.S.R./SYSTEMATICS/PLANT ANATOMY

548

MARSHUTZ, H.S.

1943

RUBBER FROM THE DESERT.

GEOGRAPHICAL MAGAZINE 16:256-264.

SOIL-WATER-PLANT RELATIONSHIPS

549

MARTIN, G.

1944

COMPETITIVE RUBBER PLANTS.

NATURE 153:212-215.

SEE: HA (14)716.

ECONOMICS/RUBBER YIELD/RUBBER QUALITY

550

MARTINEZ, M.

1926

EL GUAYULE.

TACUBAYA (MEXICO). 35 P.

SEE: BA(1)1176.

MEXICO

551

MARTINEZ, M.

1926

FOREST RESOURCES IN THE DESERT REGIONS OF MEXICO (TRANSLATED TITLE).

MEXICAN FOREST 4(1/2):1-10.

MEXICO

552

MARTINEZ, M.

1943

RUBBER PLANTS: THE GUAYULE AND CRYPTOSTEGIA GRANDIFLORA (TRANSLATED TITLE).

BOTAS (MEXICO). 110 P.

CULTIVATION/MEXICO

553

MARZARI, A.H.

1942

EL GUAYULE.

BOLSA DE CEREALES REVISTA (ARGENTINA) 30(1544):22, 24) (1545):19-20.

SOUTH AMERICA

554

MASHTAKOV, S.M.

1939

GVAIIULY.

KAUCHUK I REZINA 9:36-40.

U.S.S.R.

555

MASON, T.W.

1937

A NEW ROOT APHID (APHIDAE).

ENTOMOLOGICAL SOCIETY OF WASHINGTON, PROCEEDINGS 39:166-167.

INSECTS/ROOTS

556

MAURITIUS DEPARTMENT OF AGRICULTURE

1945

ANNUAL REPORT, 1944.

SAME AS AUTHOR. 30 P.

RESEARCH WORK IS REPORTED ON THE RUBBER CONTENT IN GUAYULE.
SEE: MA (16)1225.

RUBBER YIELD

557

MCAFEE, T.E./MILLER, L.M.

1944

ANNUAL REPORT: AGRONOMIC RESEARCH ON GUAYULE IN THE LOWER RIO GRANDE VALLEY OF TEXAS.

(UNPUBLISHED). 143 P.

TEXAS/CULTIVATION

558

MCCALLUM, W.B.

1915

THE GENETIC ANALYSIS OF GUAYULE (PARTHENIUM ARGENTATUM) UNDER CULTIVATION.

CARNEGIE INSTITUTION OF WASHINGTON, YEARBOOK 14:98-99.

CULTIVATION/GENETICS

559

MCCALLUM, W.B.

1926

THE BOTANY AND CULTURAL PROBLEMS OF GUAYULE.

INDUSTRIAL AND ENGINEERING CHEMISTRY 18:1121-1124.

CULTIVATION/SYSTEMATICS

560

MCCALLUM, W.B.

1929

METHOD OF TREATING AND SOWING GUAYULE SEED.

U.S. PATENT 1,735,035.

U.S. PATENTS/PLANTING MANAGEMENT/CULTIVATION/SEEDS

561

MCCALLUM, W.B.

1941

CULTIVATION OF GUAYULE. I AND II.

INDIA RUBBER WORLD 105:33-36, 153-156.

AN HISTORICAL ACCOUNT OF THE DOMESTICATION OF GUAYULE AND THE REQUIREMENTS FOR CULTIVATION IN THE UNITED STATES ARE PRESENTED. OVER A TEN-YEAR PERIOD A SERIES OF 53 EXPERIMENTAL GUAYULE PLANTINGS OF ONE OR MORE ACRES WAS ESTABLISHED FROM SOUTHERN TEXAS TO THE SACRAMENTO VALLEY IN CALIFORNIA TO DETERMINE REGIONAL SUITABILITY FOR PLANTATION GROWTH.
SEE: CA (35)8013; (36)3829.

CULTIVATION/UNITED STATES/PLANTING MANAGEMENT/TEXAS/CALIFORNIA/ARIZONA

562

MCCALLUM, W.B.

1941

UNCLE SAM'S RUBBER FARMER.

COUNTRY GENTLEMAN 111:16.

UNITED STATES/CULTIVATION/LEGISLATION

563

MCCALLUM, W.B.

1943

NOTES ON THE HISTORY OF GROWING GUAYULE.

(UNPUBLISHED). 7 P.

CULTIVATION

564

MCCALLUM, W.J.

1936

THE PHYSIOLOGICAL FUNCTION OF RUBBER IN THE GUAYULE PLANT.

STANFORD UNIVERSITY (M.A. THESIS). 38 P.

PLANT PHYSIOLOGY

565

MCRARY, W.L./SLATTERY, M.C.

1945

THE COLORIMETRIC DETERMINATION OF FRUCTOSANS IN PLANT MATERIAL.

JOURNAL OF BIOLOGICAL CHEMISTRY 157(1):161-167.

SEE: BA(19)9464.

CHEMISTRY/PLANT PHYSIOLOGY

566

MCRARY, W.L./TRAUB, H.P.

1944

FRUCTOSAN, A RESERVE CARBOHYDRATE IN GUAYULE, PARTHENIUM ARGENTATUM GRAY.

SCIENCE 99:435-436.

A POLYSACCHARIDE IDENTIFIED AS A FRUCTOSAN, APPARENTLY INULIN, WAS ISOLATED FROM GUAYULE. COLORIMETRIC ANALYSES INDICATE THAT IT CONSTITUTES 0.2 TO 12 PERCENT OF THE DRY WEIGHT OF STEMS AND ROOTS.
SEE: BA(18)17758. CA (38)4285. HA (14)1723.

CHEMISTRY/ROOTS/PLANT PHYSIOLOGY

567

MEEKS, J.W./BANIGAN, T.F., JR.

1956

ISOLATION OF FATTY ACIDS FROM GUAYULE RESIN.

U.S. PATENT 2,744,125.

SEE: CA (50)12512.

RESINS/CHEMISTRY/U.S. PATENTS

BEST AVAILABLE

568

MEEKS, J.W./BANIGAN, T.F., JR./PLANCK, R.W.

1950

A LOW MOLECULAR WEIGHT FRACTION OF GUAYULE RUBBER.

INDIA RUBBER WORLD 122:301-304.

ABOUT 1-2 PERCENT OF A LOW MOLECULAR WEIGHT CIS-POLYISOPRENE FRACTION SOLUBLE IN HOT ACETONE WAS FOUND IN FRESHLY PREPARED RESINOUS GUAYULE RUBBER. IT HAS A RUBBER-LIKE STRUCTURE AS SHOWN BY INFRARED SPECTROSCOPY AND APPEARS TO BE LOCATED PRIMARILY IN THE ROOTS OF THE GUAYULE PLANT.
SEE: CA (44)7085.

CHEMISTRY/ROOTS/PLANT PHYSIOLOGY

569

MEEKS, J.W./BANNIGAN, T.F., JR./PLANCK, R.W.

1951

PROCESS FOR RECOVERYING PARTHENYL CINNAMATE AND ESSENTIAL OILS FROM GUAYULE RESIN.

U.S. PATENT 2,572,046.

SEE: CA (46)1721.

U.S. PATENTS/CHEMISTRY/RESINS

570

MEEKS, J.W./FEUSTAL, I.C.

1951

THE MOLECULAR WEIGHT OF GUAYULE RUBBER AS INFLUENCED BY EXTRACTION AND PROCESSING TREATMENTS.

INDIA RUBBER WORLD 125:187.

RUBBER EXTRACTION/RUBBER QUALITY

571

MEEKS, J.W. ET AL

1953

DETERMINING RUBBER HYDROCARBON IN RUBBER-BEARING PLANTS.

ANALYTICAL CHEMISTRY 25:1535-1538.

AN IMPROVED PROCESS IS DESCRIBED FOR DETERMINING THE RUBBER HYDROCARBON CONTENT IN PLANT TISSUES BY CRUSHING THROUGH CLOSELY SET CORRUGATED ROLLS AND SHAKING WITH BENZENE IN PEBBLES. RUBBER HYDROCARBON IN THE BENZENE EXTRACT IS MEASURED BY BROMINATING AND DETERMINING THE RUBBER BROMIDE GRAVIMETRICALLY.
SEE: CA (48)1721.

CHEMISTRY/RUBBER EXTRACTION

572

MEMMLER, D.K. ED.

1934

THE SCIENCE OF RUBBER.

REINHOLD, NEW YORK. 770 P.

USES/ECONOMICS/CHEMISTRY

573

MEYER, J.R.

1945

PREFIXING WITH PARADICHLOROBENZENE TO FACILITATE CHROMOSOME STUDY.

STAIN TECHNOLOGY 20(4):121-125.

A TECHNIQUE WAS DEVELOPED FOR STUDYING GUAYULE CHROMOSOMES BY PREFIXING IN A SAUTRATED SOLUTION OF PARADICHLOROBENZENE FOR 1-4 HOURS, FIXING IN 65 PERCENT ACETIC ACID FOR 12-24 HOURS, HYDROLYZING IN 10 PERCENT HCL FOR 10-30 MINUTES AT 60 DEGREES C. AND RINSING IN WATER. THE MATERIAL IS THEN TRANSFERRED TO A DROP OF 45 PERCENT ACETIC ACID ON A SLIDE AND SMEARED AND STAINED WITH ACETO-ORCEIN.
SEE: BA(21)11114.

GENETICS/CHEMISTRY

574

MEYER, J.R.

1948

MODIFICATION OF MITOSIS BY CHEMICALS.

SCIENCE 108:188-189.

PLANT PHYSIOLOGY/GENETICS

575

MICHAELS, A.S.

1942

THE TEMPERAMENTAL GUAYULE PLANT - ONE SOLUTION TO A VITAL PROBLEM.

TECHNICAL ENGINEERING NEWS, MARCH. P. 31-32.

ECONOMICS

576

MICKELSON, G.A.

1943

PRELIMINARY REPORT ON THE ALKALI TOLERANCE OF GUAYULE.

(UNPUBLISHED). 21 P.

SALT TOLERANCE

577

MICKELSON, G.A./MOGEN, C.A.

1944

RELATIONSHIP BETWEEN SOIL CHARACTERISTICS AND GUAYULE AS SHOWN ON CERTAIN GUAYULE PLANTATIONS.

(UNPUBLISHED). 59 P.

SOIL-WATER-PLANT RELATIONSHIPS/CULTIVATION/PLANT GROWTH

578

MIKHAILOV, N.M.

1935

GUAYULE IN THE ARID SUBTROPICAL REGIONS OF CENTRAL ASIA (TRANSLATED TITLE).

SOVIET SUBTROPICS 10:55-61.

U.S.S.R.

579

MILLINGTON, A.J.

1943

RUBBER PRODUCTION IN RELATION TO WESTERN AUSTRALIA.

WESTERN AUSTRALIA DEPARTMENT OF AGRICULTURE, JOURNAL 20:196-200.

SEE: HA (14)717.

AUSTRALIA/CULTIVATION/SEEDS

580

MIL'NER, E.M.

1939

RUBBER AND GUTTA-PERCHA YIELDING PLANTS IN THE U.S.S.R.
(TRANSLATED TITLE).

SOVIET SUBTROPICS 8:34-41.

SEE: CA (36)2753.

U.S.S.R.

581

MINDERMAN, E.

1942

GUAYULE AS DOMESTIC RUBBER SOURCE.

PROGRESSIVE FARMER 57(2):39.

582

MITCHELL, J.W.

1944

WINTER HARDINESS IN GUAYULE.

BOTANICAL GAZETTE 106:95-102.

STEMS AND LEAVES OF HARDENED GUAYULE SEEDLINGS SURVIVED REPEATED EXPOSURES TO TEMPERATURES OF 5-10 DEGREES F. WITHOUT DAMAGE. SEEDLINGS WHICH WERE NOT HARDENED SUFFERED SEVERE INJURY FROM AN 8-10 HOUR EXPOSURE AT 22 DEGREES F.
SEE: CA (39)107. HA (15)661.

SEEDLINGS/TEMPERATURE EFFECTS/PLANT INJURY/SOIL-WATER-PLANT RELATIONSHIPS

583

MITCHELL, J.W./BENEDICT, H.M./WHITING, A.G.

1944

GROWTH, RUBBER STORAGE AND SEED PRODUCTION BY GUAYULE AS AFFECTED BY BORON SUPPLY.

BOTANICAL GAZETTE 106(2):148-157.

GUAYULE BORON REQUIREMENTS WERE INVESTIGATED IN GRAVEL CULTURES. THE OPTIMUM CONCENTRATION FOR VEGETATIVE GROWTH, SEED AND RUBBER PRODUCTION WAS IN THE RANGE OF 0.1 TO 2.0 PARTS PER MILLION IN NUTRIENT SOLUTION.
SEE: BA(19)7280. CA (39)1199. HA (15)671.

PLANT PHYSIOLOGY/SEEDS/PLANT GROWTH/RUBBER YIELD

584

MITCHELL, J.W./WHITING, A.G./BENEDICT, H.M.

1944

EFFECT OF LIGHT INTENSITY AND NUTRIENT SUPPLY ON GROWTH AND PRODUCTION OF RUBBER AND SEEDS OF GUAYULE.

BOTANICAL GAZETTE 106:83-95.

SHADING GUAYULE PLANTS IMPROVED SEED PRODUCTION, DECREASED RUBBER YIELD IN FERTILE SOILS, BUT DID NOT SIGNIFICANTLY AFFECT RUBBER YIELD IN LESS-FERTILE SOILS. THERE WAS A TENDENCY FOR SEED SIZE REDUCTION FROM WITHHOLDING INORGANIC NUTRIENTS.
SEE: CA (39)107. HA (15)665.

SEEDS/RUBBER YIELD/PLANTING MANAGEMENT/SOIL-WATER-PLANT RELATIONSHIPS

585

MITCHELL, J.W./WHITING, A.G./BENEDICT, H.M.

1945

RUBBER CONTENT, STEM ANATOMY, AND SEED PRODUCTION AS RELATED TO RATE OF VEGETATIVE GROWTH IN GUAYULE.

BOTANICAL GAZETTE 106(3):341-349.

GUAYULE GROWTH IN GRAVEL CULTURES WAS CONTROLLED BY VARYING CALCIUM AND NITROGEN CONCENTRATIONS. TOTAL RUBBER PRODUCTION WAS DIRECTLY RELATED TO THE AMOUNT OF PLANT GROWTH DURING THE SUMMER GROWING SEASON AND SEEDS COLLECTED DURING THE SPRING AND FALL HAD A RELATIVELY HIGH GERMINATION POTENTIAL COMPARED TO THOSE COLLECTED IN SUMMER.
SEE: BA(19)17321. CA (39)2540. HA (15)1129.

PLANT GROWTH/SEEDS/STEMS/PLANT ANATOMY/PLANT PHYSIOLOGY/RUBBER YIELD

586

MOLDENKE, H.N.

1943

NEW SOURCES OF RUBBER.

NATURAL HISTORY 52(5):226-232.

SEE: BA(18)7213.

RUBBER YIELD

587

MOORE, C.B.

1943

GUAYULE RUBBER: LONG FIGHT BROUGHT TO END BY JEFFERS DECISION.

WESTERN GROWER AND SHIPPER 14(5):13-14.

LEGISLATION

588

MOORE, C.B.

1943

GUAYULE: WHY TAKE PRODUCTIVE LAND WHEN MARGINAL AREAS CAN BE USED TO ADVANTAGE?

WESTERN GROWER AND SHIPPER 14(4):13-14.

ECONOMICS/CULTIVATION/SOIL-WATER-PLANT RELATIONSHIPS

589

MORPURGO, G.

1910

RUBBER SUBSTITUTES AND THE GUAYULE OF MEXICO (TRANSLATED TITLE).

BOLLETTINO CHIMICO FARMACEUTICO 47:327-333.

MEXICO

590

MORRIS, R.E./JAMES, R.R./WERKENTHIN, T.A.

1942
COMPOUNDING OF GUAYULE RUBBERS: EFFECT OF ACCELERATOR-CURING AGENT COMBINATIONS.

INDIA RUBBER WORLD 105:565-569.

CHEMISTRY/USES

591

MORRIS, R.E./JAMES, R.R./WERKENTHIN, T.A.

1942

COMPOUNDING OF GUAYULE RUBBERS: EFFECT OF ACCELERATOR-CURING AGENT COMBINATIONS ON THE RESISTANCE TO SUNLIGHT.

INDIA RUBBER WORLD 107:31-32.

CHEMISTRY/USES

592

MORRIS, R.E. ET AL

1942

GUAYULE RUBBERS IN WIRE AND CABLE INSULATION.

RUBBER AGE 51:479-481.

USES

593

MORRIS, R.E. ET AL

1943

COMPOUNDING OF GUAYULE RUBBERS: EFFECT OF VARIOUS FACTORS ON PHYSICAL PROPERTIES.

INDIA RUBBER WORLD 107:43-467.

CHEMISTRY

594

MORRIS, R.E. ET AL

1943

THE EFFECTS OF BLENDING GUAYULE WITH GR-S.

INDIA RUBBER WORLD 109:150-152, 192, 252-257.

CHEMISTRY

595

MORTON, M. ED.

1973

RUBBER TECHNOLOGY.

VAN NOSTRAND REINHOLD CO., NEW YORK. 603 P.

GUAYULE RUBBER HAS BEEN FOUND TO RETAIN HIGH AMOUNTS OF SULFUR AND AS A RESULT IS AN EFFECTIVE MASTERBATCHING BASE FOR FACTORY COMPOUNDING (P. 152).

CHEMISTRY/USES

596

MOSHKINA, M.S.

1939

LOCALIZATION OF ESSENTIAL OIL AND RESINS IN GUAYULE (TRANSLATED TITLE).

BIOKHIMIIA I FIZIOLOGICHESKII KAUCHUANOSNYKH RASTENII 2:108-121.

SEE: CA (36)1982.

RESINS/U.S.S.R./CHEMISTRY

597

MOSHKINA, M.S.

1940

STRUCTURAL PECULIARITIES OF THE GUAYULE RUBBER PLANT (TRANSLATED TITLE).

ACADEMIE DES SCIENCES DE L'U.R.S.S., BULLETIN SERIES BIOLOGIQUE 4:614-619.

PLANT ANATOMY/U.S.S.R.

598

MOYLE, A.I.

1942

BIBLIOGRAPHY AND COLLECTED ABSTRACTS ON RUBBER PRODUCING PLANTS (OTHER THAN SPECIES OF HEVEA).

TEXAS AGRICULTURAL EXPERIMENT STATION, CIRCULAR 99:1-228.

BIBLIOGRAPHIES

599

MULLER, C.H.

1946

ROOT DEVELOPMENT AND ECOLOGICAL RELATIONS OF GUAYULE.

U.S. DEPARTMENT OF AGRICULTURE, TECHNICAL BULLETIN 923:1-114.

ROOT EXCAVATIONS OF GUAYULE UNDER CULTIVATION IN CALIFORNIA AND IN ITS NATIVE HABITAT IN TEXAS INDICATED THAT ROOT SYSTEMS WERE BROAD AND SHALLOW UNDER CONDITIONS OF SHALLOW SOIL MOISTURE PENETRATION SUCH AS WITH HARDPAN, BUT DEEP ROOT SYSTEMS DEVELOPED UNDER FAVORABLE SOIL CONDITIONS. GUAYULE DOES POORLY IN COMPETITION WITH OTHER PLANTS OR UNDER POOR DRAINAGE CONDITIONS, BUT IS HIGHLY DROUGHT TOLERANT FOLLOWING SUCCESSFUL ESTABLISHMENT.
SEE: BA(21)15453. HA (17)2366.

TEXAS/CALIFORNIA/ROOTS/SOIL-WATER-PLANT RELATIONSHIPS/MOISTURE STRESS

600

MULLER, M.

1907

GUAYULE RUBBER INDUSTRY OF MEXICO.

KEW ROYAL BOTANICAL GARDEN, BULLETIN OF MISCELLANEOUS INFORMATION 7:286-289.

MEXICO/ECONOMICS

601

MURRAY, C.W./WALTER, E.D.

1945

ISOLATION OF BETAINE FROM GUAYULE.

AMERICAN CHEMICAL SOCIETY, JOURNAL 67:1422.

SEE: CA (39)4720.

CHEMISTRY

602

MUZZAL, A.H.

1923

AMERICA GOES INTO RUBBER FARMING.

CALIFORNIA COUNTRYMAN 9:6.

UNITED STATES/CULTIVATION

603

NAGHSKI, J./WHITE, J.W./HOOVER, S.R.

1944

AEROBIC DECOMPOSITION OF GUAYULE SHRUB (PARTHENIUM ARGENTATUM GRAY).

JOURNAL OF BACTERIOLOGY 48(2):159-178.

THE MICROFLORA INVOLVED IN AEROBIC DECOMPOSITION OF GUAYULE WAS BIOCHEMICALLY CLASSIFIED AND PREDOMINATING ORGANISMS WERE IDENTIFIED. A 20 TO 30 PERCENT LOSS IN DRY WEIGHT ALONG WITH DISINTEGRATION OF WOOD WAS OBSERVED IN 5 TO 14 DAYS.
SEE: BA(18)22264. CA (38)6325.

MICROORGANISMS/PLANT INJURY/RETTING

604

NEBOVIDSKY, H.

1938

THE PROBLEM OF CULTIVATION OF RUBBER PLANTS SEEN IN THE LIGHT OF EXPERIENCES ACQUIRED IN THE U.S.S.R. (TRANSLATED TITLE).

ACADEMIE DES SCIENCES DE L'U.R.S.S., COMPTES RENDUS 3:84-90.

CULTIVATION/PLANTING MANAGEMENT/U.S.S.R.

605

NEIMAN, G./SOSNOVETS, A.

1944

THE EFFECT OF STORAGE ON THE QUALITY OF GUAYULE RUBBER (TRANSLATED TITLE).

VSESOYUZNAYA AKADEMIYA SEL'SKOKHOZYAISTVENNYKH NAUK IM. V.I. LENINA, DOKLADY 9(11/12):15-17.

RUBBER QUALITY

606

NICHIPOROVICH, A.A.

1933

GUAYULE, A RUBBER PRODUCING PLANT OF THE SOVIET SUBTROPICS (TRANSLATED TITLE).

SOVIET SUBTROPICS 2:52-56.

U.S.S.R./CULTIVATION

607

NIKOLAEV, V.F.

1927

CULTIVATION OF THE RUBBER-BEARING PLANTS ON THE BLACK SEA SHORE (TRANSLATED TITLE).

GOSUD. INST. OPYTN. AGRON. IZV 5:469-471.

U.S.S.R./CULTIVATION

608

NIKOLAEV, V.F.

1929

THE MORPHOLOGY AND CLASSIFICATION OF THE GUAYULE PLANT (TRANSLATED TITLE).

TRUDY PO PRIKLADNOI BOTANIKE GENETIKE I SELEKTSII 22(4):207-276.

SEE: BA(7)1704.

SYSTEMATICS/U.S.S.R./PLANT ANATOMY

609

NIKOLAEV, V.F.

1930

SINGLING OUT OF BOTANICAL FORMS AND SELECTIONS IN THE RUBBER PLANT GUAYULE (PARTHENIUM ARGENTATUM, GRAY) (TRANSLATED TITLE).

VSESCIUZW. S'EZD. GENET., SELEK, SEMEN. I PLEMENN. ZHIVOTN. TRUDY 4:243-250.

U.S.S.R./SYSTEMATICS/PLANT BREEDING

610

NISHIMURA, M.S./HIROSAWA, F.N./EMERSON, R.

1947

RUBBER FROM GUAYULE.

INDUSTRIAL AND ENGINEERING CHEMISTRY 39(11):1477-1485.

AN IMPROVEMENT IN PROCESSING GUAYULE RUBBER IS DESCRIBED BASED ON A JORDAN MILL RATHER THAN A PEBBLE MILL. THE HIGHER QUALITY PRODUCT MAY BE ACCEPTABLE AS A SUBSTITUTE FOR HEVEA RUBBER.
SEE: BA(23)1895. HA (18)455.

MILLING/RUBBER EXTRACTION/RUBBER QUALITY

611

NISHIMURA, M.S. ET AL

1944

THE PROPAGATION OF GUAYULE FROM CUTTINGS.

AMERICAN JOURNAL OF BOTANY 31:412-418.

GUAYULE CUTTINGS WERE FOUND TO ROOT FREELY AT ANY TIME OF THE YEAR, ALTHOUGH BEST RESULTS WERE IN EARLY SPRING WITH CUTTINGS ABOUT TWO INCHES LONG FROM NEW GROWTH.
SEE: BA(18)20390. HA (15)564.

PLANT GROWTH/PROPAGATION/PLANTING MANAGEMENT

612

NORTON, D.C.

1953

LINEAR GROWTH OF SCLEROTIUM BATATICOLA THROUGH SOIL.

PHYTOPATHOLOGY 43(11):633-636.

THE FUNGUS, ISOLATED FROM DISEASED GUAYULE, HAD OPTIMUM GROWTH AT 35 DEGREES C. ON AGAR OR STERILE SOIL AT THE 5 PERCENT MOISTURE LEVEL. INDICATIONS ARE THAT GUAYULE CHARCOAL ROT OCCURS IN HOT DRY WEATHER BECAUSE OF REDUCED PLANT VIGOR RATHER THAN FROM FAVORABLE SOIL GROWTH CONDITIONS.
SEE: BA(28)17059.

MICROORGANISMS/SOIL-WATER-PLANT RELATIONSHIPS/PLANT INJURY/ TEMPERATURE EFFECTS

613

NORTON, D.C.

1954

FUSARIUM ROOT ROT OF GUAYULE.

PLANT DISEASE REPORTER 38(7):500-501.

SEE: BA(50)11519.

MICROORGANISMS/ROOTS/PLANT INJURY

614

NORTON, D.C.

1955

GUAYULE BOUNCES BACK.

TEXAS AGRICULTURAL PROGRESS 1:6.

TEXAS

615

NORTON, D.C./FRANK, F.A.

1953

CHARCOAL ROT (CAUSED BY SCLEROTIUM BATICOLA TAUB.) ON GUAYULE IN SOUTHWEST TEXAS IN 1951-1952.

PLANT DISEASE REPORTER 37(1):41-43.

DURING A 4-YEAR PERIOD, GUAYULE CHARCOAL ROT WAS MUCH MORE SEVERE IN PLOTS CULTIVATED ONLY IN THE FIRST YEAR COMPARED WITH PLOTS CULTIVATED 2 TO 4 YEARS. CHARCOAL ROT CAN BE CONTROLLED, EVEN DURING PERIODS OF HIGH TEMPERATURE, BY INCREASING IRRIGATION.
SEE: BA(55)1886.

TEXAS/MICROORGANISMS/CULTIVATION/TEMPERATURE EFFECTS/PLANT INJURY/ IRRIGATION EFFECTS

616

OLSON, D.S.

1942

POTENTIAL YIELDS OF RUBBER PER ACRE ON A 1 TO 5 YEAR ROTATION, AS AFFECTED BY SPACING AND IRRIGATION.

(UNPUBLISHED). 28 P.

PLANTING MANAGEMENT/RUBBER YIELD/IRRIGATION EFFECTS

617

OLSON, D.S.

1944

COMPARATIVE YIELDS FROM 2- TO 3-YEAR-OLD GUAYULE SHRUBS GROWN WITH AND WITHOUT IRRIGATION IN THE SPENCE FIELD.

(UNPUBLISHED). 15 P.

IRRIGATION EFFECTS/RUBBER YIELD/PLANTING MANAGEMENT

618

OLSSON-SEFFER, P.

1907

RUBBER PLANTING IN MEXICO AND CENTRAL AMERICA.

STRAITS AND FEDERATED MALAY STATES AGRICULTURAL BULLETIN 6(1):1-31.

MEXICO/CULTIVATION

619

O'NEIL, W.

1925

GUAYULE RUBBER AS AN EMERGENCY CROP: SUGGESTED PROVISION IN THE U.S.A. FOR TIME OF WAR.

INDIA RUBBER JOURNAL 69(10):378.

UNITED STATES/USES/CULTIVATION

620

ORDYNSKII, M.S.

1932

BASIC PROBLEMS OF MECHANIZATION OF RUBBER FARMING (TRANSLATED TITLE).

MECHANISIERUNG DER SOZIALISTISCHEN LANDWIRTSCHAFT 5:16-24; 8:14-18.

CULTIVATION

621

OZEROV, G.V.

1949

THE EFFECT OF NITROGEN, PHOSPHOROUS, AND POTASSIUM ON THE GROWTH OF GUAYULE SEEDLINGS.

DOKLADY AKADEMII NAUK S.S.S.R. 68:601-603.

SAND CULTURES WERE USED TO TEST THE EFFECT OF VARYING N, P, AND K ON GUAYULE SEEDLINGS WITH KNOP'S NUTRIENT MEDIUM AS CONTROL. INCREASED N OR P STIMULATED GROWTH WHEREAS INCREASED K DEPRESSED GROWTH, BUT DECREASED K STIMULATED GROWTH.
SEE: CA (44)710. HA (21)825.

SEEDLINGS/CHEMISTRY/PLANT GROWTH/PLANT PHYSIOLOGY/U.S.S.R.

622

OZEROV, G.V.

1950

THE ABILITY OF GUAYULE TO REGENERATE LOST ORGANS (TRANSLATED TITLE).

DOKLADY AKADEMIIA NAUK S.S.S.R. 74:841-844.

EXPERIMENTS INDICATE THAT GUAYULE PRODUCES NEW GROWTH RAPIDLY AFTER INJURIES SUCH AS LEAF OR APICAL BUD REMOVAL OR CUTTING BACK YOUNG PLANTS.
SEE: HA (21)3821.

U.S.S.R./PLANT GROWTH/PLANT INJURY/DEFOLIATION/PLANTING MANAGEMENT

623

OZEROV, G.V.

1950

THE INFLUENCE OF THE LEAVES, ROOTING MEDIUM, AND THE TIME OF CUTTING ON THE RECOVERY OF GUAYULE CUTTINGS (TRANSLATED TITLE).

DOKLADY AKADEMIIA NAUK S.S.S.R. 72:805-807.

GUAYULE CUTTINGS WITHOUT LEAVES DEVELOPED FASTER THAN THOSE ON WHICH 2 OR 4 LEAVES WERE LEFT. THE LATTER PART OF OCTOBER WAS BEST FOR TAKING CUTTINGS BECAUSE OF DISEASE RESISTANCE AND HIGH FOOD RESERVES.
SEE: HA (21)822.

U.S.S.R./LEAVES/PROPAGATION/DEFOLIATION/PLANTING MANAGEMENT

624

OZEROV, G.V.

1951

COLD RESISTANCE OF GUAYULE (TRANSLATED TITLE).

DOKLADY ADAKEMIIA NAUK S.S.S.R. 80:265-267.

GUAYULE SEEDLINGS TRANSPLANTED TO SOILS AT 30 PERCENT FIELD CAPACITY WERE CONSIDERABLY MORE RESISTANT TO ARTIFICIAL FREEZING THAN THOSE TRANSPLANTED TO SOILS OF 50 AND 70 PERCENT FIELD CAPACITY.
SEE: HA (22)4113.

U.S.S.R./TEMPERATURE EFFECTS/PLANTING MANAGEMENT/PLANT INJURY/
SOIL-WATER-PLANT RELATIONSHIPS

625

OZEROV, G.V./PAVLOV, A.N.

1950

THE EFFECT OF SOIL MOISTURE ON THE FROST RESISTANCE OF GUAYULE (TRANSLATED TITLE).

DOKLADY AKADEMIIA NAUK 73:845-848.

GUAYULE PLANTS GROWN IN SOILS AT 50 PERCENT SATURATION WERE MORE RESISTANT TO INJURY FROM ARTIFICIAL FREEZING THAN THOSE GROWN AT 30 OR 70 PERCENT SATURATION.
SEE: HA (2)3823.

U.S.S.R./TEMPERATURE EFFECTS/SOIL-WATER-PLANT RELATIONSHIPS/ PLANT INJURY/PLANTING MANAGEMENT

626

OZEROV, G.V./PAVLOV, A.N.

1951

THE AFTER-EFFECT OF LOW TEMPERATURES ON THE GROWTH OF GUAYULE PLANTS GROWING UNDER VARYING SOIL MOISTURE CONDITIONS (TRANSLATED TITLE).

DOKLADY AKADEMIIA NAUK S.S.S.R. 76:597-600.

TEMPERATURE EFFECTS/PLANT GROWTH/SOIL-WATER-PLANT RELATIONSHIPS/ U.S.S.R./PLANT INJURY

627

OZEROV, G.V./SMOLJSKII, N.V.

1951

FROST RESISTANCE OF GUAYULE IN RELATION TO THE AGE OF PLANTS AND SOIL MOISTURE DURING FREEZING (TRANSLATED TITLE).

DOKLADY AKADEMIIA NAUK S.S.S.R. 80:969-972.

ONE-YEAR OLD GUAYULE PLANTS AND THOSE WITH INFLORESCENCES WERE MORE SUSCEPTIBLE TO FROST INJURY THAN WERE 2-YEAR OLD PLANTS. FROST RESISTANCE CAN BE INCREASED BY WITHHOLDING MOISTURE FROM PLANTS EARLY IN AUTUMN AND BY DENSE PLANTINGS.
SEE: HA (23)2052.

PLANTING MANAGEMENT/U.S.S.R./TEMPERATURE EFFECTS/PLANT INJURY/ SOIL-WATER-PLANT RELATIONSHIPS

628

PAPADAKIS, J.

1951

AGRICULTURAL POSSIBILITIES FOR THE CULTIVATION OF SUGAR BEET, OPIUM POPPY AND GUAYULE IN THE ARGENTINE REPUBLIC (TRANSLATED TITLE).

MINISTERIO DE AGRICULTURA NACIONAL, BUENOS AIRES. 29 P.

EXPERIMENTAL GUAYULE PLANTINGS IN THE NORTH AND WEST OF ARGENTINA FAILED TO ACCUMULATE RUBBER IN THE ROOTS BECAUSE OF THE WARM WINTERS. THE CLIMATE OF THE PAMPAS DISTRICT SOUTHWEST OF BUENOS AIRES IS SUGGESTED AS MORE AMENABLE TO GUAYULE PLANTATION DEVELOPMENT.
SEE: HA (22)1721.
SOUTH AMERICA/ROOTS/TEMPERATURE EFFECTS/RUBBER YIELD

629

PAPADAKIS, J.S.

1950

GUAYULE AND THE PAMPAS REGION (TRANSLATED TITLE).

IDIA (INFORMACION DE INVESTIGACION AGRICULTURA) 2(25/27):12.

CULTIVATION/SOUTH AMERICA

630

PARDUCCI, M.

1937

IL PROBLEMA DELLA GOMMA ELASTICA LE PIANTE SECONDAIRE.

INGEGNERE 11:504-516; 12:2-7.

RUBBER QUALITY

631

PARKER, W.E.

1912

THE PRESENT STATUS OF GUAYULE.

INDIA RUBBER WORLD 45(4):165-166.

PLANT GROWTH/RUBBER YIELD

632

PATONI, C.

1916

EL GUAYULE (PARTHENIUM ARGENTATUM, A. GRAY).

MEXICO DEPARTAMENTO DE TALLERES GRAFICOS DE LA SECRETARIA DE FOMENTO. 70 P.

PLANT DISTRIBUTION/CULTIVATION/RUBBER YIELD/RUBBER EXTRACTION/HARVESTING

633

PEARSON, H.C.

1907

A JOURNEY THROUGH GUAYULE LAND.

INDIA RUBBER WORLD 35:173-177; 36:205-210.

ECONOMICS/PLANT DISTRIBUTION/CULTIVATION/RUBBER EXTRACTION

634

PEARSON, H.C.

1918

PRODUCTION OF GUAYULE RUBBER.

U.S. BUREAU OF FOREIGN AND DOMESTIC COMMERCE, WASHINGTON, D.C., COMMERCE REPORT 149:1172-1184.

SEE: CA (13)800.

CULTIVATION/PLANT DISTRIBUTION/RUBBER EXTRACTION/ECONOMICS/RUBBER QUALITY

635

PERRY, E.L.

1945

ANNUAL REPORT, 1945: GROWING RUBBER IN CALIFORNIA.

SMITHSONIAN INSTITUTION, WASHINGTON, D.C.

CULTIVATION/CALIFORNIA

636

PETROV, V.F./GRAMOLIN, B.

1952

PECULIARITIES OF PLANTING GUAYULE ON THE ARID LANDS OF TADZHIKISTAN (TRANSLATED TITLE).

SOVETSKAYA AGRONOMIYA 10:83-85.

U.S.S.R./PLANTING MANAGEMENT/SOIL-WATER-PLANT RELATIONSHIPS

637

PICKETT, J.E.

1942

GUAYULE GETS GOING.

PACIFIC RURAL PRESS AND CALIFORNIA FARMER 143:326.

CALIFORNIA/CULTIVATION/PLANTING MANAGEMENT/HARVESTING

638

FINCUS, J.W.

1941

THE U.S.S.R. GROWS ITS OWN RUBBER: THE SOVIET UNION IS TAKING VIGOROUS MEASURES TO FIND SUBSTITUTES FOR ONE OF ITS FEW DEFICIT RAW MATERIALS.

SOVIET RUSSIA TODAY 10(2):14-15, 34.

U.S.S.R./ECONOMICS/PLANT BREEDING

639

PISAREV, V.E.

1930

BREEDING AND METHODS OF CULTIVATION OF THE GUAYULE (TRANSLATED TITLE).

TRUDY PO PRIKLADNOI BOTANIKE, GENETIKE, I SELEKTEII 24(3):3-84.

SEE: BA(11)1555.

PLANT BREEDING/CULTIVATION/U.S.S.R.

640

PISAREV, V.E.

1930

THE PROBLEM OF GUAYULE BREEDING IN U.S.S.R.

SOVIET SUBTROPICS 2(3/4):33-50.

PLANT BREEDING/U.S.S.R.

641

PISAREV, V.E.

1932

UBER DIE METHODIK DER ZUCHTUNG DER KAUTSCHUKLIEFERNDEN PFLANZE 'GUAYULE'.

ZEITSCHRIFT FUER ZUCHTUNG, REIHE A, PFLANZENZUCHTUNG 17:583-621.

SEE: BA(8)190.

CULTIVATION

642

PLACE, W.F.L./CLARK, F.E.

1946

THE EVALUATION OF GUAYULE RUBBER: DEVELOPMENT OF TESTING FORMULAE.

INDIA RUBBER WORLD 115:370-373.

RUBBER QUALITY

643

POAGE, W.R.

1945

STUDY OF RUBBER IN THE UNITED STATES, MEXICO AND HAITI.

INDIA RUBBER WORLD 111:582-583.

UNITED STATES/MEXICO/LEGISLATION/ECONOMICS

644

POLHAMUS, L.G.

1941

GUAYULE AS AN EMERGENCY SOURCE OF CRUDE RUBBER.

U.S. BUREAU OF PLANT INDUSTRY, WASHINGTON, D.C. 4 p.

ECONOMICS

645

POLHAMUS, L.G.

1945

RUBBER FROM GUAYULE.

AGRICULTURE IN THE AMERICAS 5(2):27-30.

THE RESULTS OF RECENT EXPERIMENTAL GUAYULE PLANTINGS IN THE UNITED STATES AND LATIN AMERICA ARE DISCUSSED.
SEE: HA (15)1128.

UNITED STATES/SOUTH AMERICA/CULTIVATION/ECONOMICS

646

POLHAMUS, L.G.

1962

RUBBER: BOTANY, PRODUCTION AND UTILIZATION.

LEONARD HILL, LONDON. 448 P.

BOTH NATURAL AND SYNTHETIC RUBBER ARE TREATED IN THIS BOOK INCLUDING HISTORY, BOTANY, PRODUCTION AND UTILIZATION. THE HISTORY INCLUDES THE SUCCESS OF HEVEA AND THE EVENTUAL FAILURES OF GUAYULE AND OTHER RUBBER-BEARING CROPS.
SEE: HA (33)6255.

USES/ECONOMICS/CULTIVATION

647

POLOVENKO, I.

1946

SYR'EVAIA BAZANATURAL'NOGO KAUCHUKA IZ GVAIULY.

SOTSIALISTICHE SKOI SEL'SKOE KHOZYAISTVO UZBEKISTANA 17(3):45-48.

U.S.S.R.

648

POPTSOV, A.V./KICHUNOVA, K.V.

1951

ON INCREASING THE GERMINATION OF GUAYULE SEEDS (TRANSLATED TITLE).

MOSKOVSKII GLAVNAYA BOTANICHESKAYA SAD. 8 8:41-43.

SEEDS/PLANTING MANAGEMENT/U.S.S.R.

649

POWERS, L.

1942

SEED COLLECTIONS OF GUAYULE FROM MEXICO AND THE TRANS-PECOS AREA OF TEXAS.

(UNPUBLISHED). 30 P.

TEXAS/MEXICO/SEEDS/PLANT DISTRIBUTION

650

POWERS, L.

1945

FERTILIZATION WITHOUT REDUCTION IN GUAYULE (PARTHENIUM ARGENTATUM GRAY) AND A HYPOTHESIS AS TO THE EVOLUTION OF APOMIXIS AND POLYPLOIDY.

GENETICS 30(4):323-346.

THREE MAJOR STEPS SUGGESTED IN THE EVOLUATICN OF APOMIXIS IN GUAYULE ARE FAILURE OF CHROMOSOME REDUCTION, FAILURE OF FERTILIZATION, AND DEVELOPMENT OF NON-REDUCED EGG-CELLS WITHOUT FERTILIZATION. EVIDENCE IS CONVINCING THAT APOMIXIS AND POLYPLOIDY EVOLVED TOGETHER IN GUAYULE WITH HYBRIDIZATION PLAYING AN IMPORTANT ROLE.
SEE: BA(19)15264.

GENETICS/PLANT BREEDING

651

POWERS, L./GARDNER, E.J.

1945

FREQUENCY OF ABORTED POLLEN GRAINS AND MICROCYTES IN GUAYULE PARTHENIUM ARGENTATUM GRAY.

AMERICAN SOCIETY OF AGRONOMY, JOURNAL 37:184-193.

BOTH HETEROGENEITY AND HETEROZYGOSITY WERE FOUND TO BE IMPORTANT FACTORS IN DETERMINING GENETIC VARIABILITY IN PERCENT OF ABORTED POLLEN GRAINS AND FREQUENCY OF MICROCYTES IN GUAYULE. SELECTION FOR BOTH CHARACTERS AS A METHOD OF BREEDING WOULD BE VERY EFFECTIVE.
SEE: BA(19)12086. HA (15)663.

GENETICS/SYSTEMATICS/PLANT BREEDING

652

POWERS, L./ROLLINS, R.C.

1945

REPRODUCTICN AND POLLINATION STUDIES ON GUAYULE, PARTHENIUM ARGENTATUM GRAY AND P. INCANUM H.B.K.

AMERICAN SOCIETY OF AGRONOMY, JOURNAL 37(2):96-112.

HIGHLY SEXUAL FORMS OF GUAYULE HAVE 36+ CHROMOSOMES WITH NO HIGHLY FACULTATIVE APOMICTS AMONG THEM. POLYPLOIDS WITH 54+-, 72+- AND 108+- CHROMOSOMES ARE PREDOMINANTLY FACULTATIVE APOMICTS AND SOME PLANTS AMONG THEM MAY ARISE AS A RESULT OF REDUCED PSEUDOGAMY, NON-REDUCED PSEUDOGAMY, FERTILIZATION OF REDUCED AND UNREDUCED GAMETES, AND DIPLOSPORY.
SEE: BA(19)11469.

GENETICS/POLLINATION/SYSTEMATICS

653

PREIN, E.

1959

GUAYULE CULTIVATION IN TURKEY (TRANSLATED TITLE).

KAUTSCHUK UND GUMMI 12(4):85-87.

CULTIVATION

654

PRESCOTT, J.A.

1943

THE AUSTRALIAN HOMOCLIME OF THE ZONE OF NATURAL OCCURRENCE OF PARTHENIUM ARGENTATUM.

ROYAL SOCIETY OF SOUTH AUSTRALIA, TRANSACTIONS 67:312-318.

A CLIMATE SIMILAR TO THAT WHERE NATIVE GUAYULE OCCURS CAN ALSO BE FOUND IN AUSTRALIA FROM THE WESTERN SLOPES OF NEW SOUTH WALES TOWARD CHARLEVILLE AND BLACKALL IN QUEENSLAND.
SEE: HA (15)660.

AUSTRALIA/PLANTING MANAGEMENT/PLANT DISTRIBUTION

655

PRESLEY, J.T.

1942

SOME DISEASES AFFECTING CULTIVATED GUAYULE IN THE SOUTHWEST DURING 1942.

PLANT DISEASE REPORTER 27(3/4):94-96.

DISEASES OF GUAYULE NURSERY PLANTS INCLUDE DAMPING-OFF, WILT, CROWN-ROT, AND COTTONY ROT. DISEASES OF GUAYULE IN THE FIELD INCLUDE COTTONY ROT, AND SCLEROTIUM ROT.
SEE: BA(17)22545.

PLANT INJURY/MICROORGANISMS

656

PRESLEY, J.T.

1944

A DISEASE OF GUAYULE CAUSED BY SCLEROTIUM BATATICOLA.

PLANT DISEASE REPORTER 28(30):7391.

SEE: BA(19)7391.

PLANT INJURY/MICROORGANISMS

657

PRESLEY, J.T.

1944

OBSERVATIONS ON PHYMATOTRICHUM ROOT ROT OF GUAYULE.

PLANT DISEASE REPORTER 28(33):998-1000.

THE LOSS OF GUAYULE PLANTS FROM PHYMATOTRICHUM ROOT ROT ON INFESTED SOILS IS GREATER WHEN THE SOIL MOISTURE CONTENT IS INCREASED.
SEE: BA(19)5363.

ROOTS/PLANT INJURY/IRRIGATION EFFECTS/MICROORGANISMS

658

PRESLEY, J.T.

1945

DIPLODIA DIE-BACK OF GUAYULE.

PLANT DISEASE REPORTER 29(2):64.

SEE: BA(19)11544.

PLANT INJURY/MICROORGANISMS

659

PRESLEY, J.T.

1946

DIPLODIA DIE-BACK OF GUAYULE (PARTHENIUM ARGENTATUM GRAY).

PHYTOPATHOLOGY 36(7)565-571.

SEVERE DIE-BACK FROM DIPLODIA THEOBROMAE OCCURRED IN 2-YEAR-OLD IRRIGATED GUAYULE IN TEXAS ALTHOUGH DRY-LAND PLANTINGS WERE NOT SERIOUSLY AFFECTED. YOUNG PLANTS WERE LESS SUSCEPTIBLE THAN HARDENED PLANTS WITH OLD DRY LEAVES.
SEE: BA(20)18621. HA (17)249.

TEXAS/IRRIGATION EFFECTS/MICROORGANISMS/PLANT INJURY/PLANTING MANAGEMENT

660

PRESLEY, J.T./WESTON, L.

1944

FUNGI ISOLATED FROM DISEASED GUAYULE.

PLANT DISEASE REPORTER 28(32):984-985.

SEE: BA(19)5364.

PLANT INJURY/MICROORGANISMS

661

PROKOF'EV, A.A.

1935

DISTRIBUTION OF RUBBER IN RUBBER-BEARING PLANTS (TRANSLATED TITLE).

SOVETSKII KAUCHUK 1:19-23.

SEE: CA (30)643.

U.S.S.R./RUBBER YIELD/PLANT ANATOMY

662

PROKOF'EV, A.A.

1940

BIOLOGICAL ROLE OF CAOUTCHOUC (TRANSLATED TITLE).

ACADEMIE DES SCIENCES DE L'U.R.S.S., BULLETIN SERIES BIOLOGIQUE 4:589-607.

PLANT PHYSIOLOGY/RUBBER YIELD/U.S.S.R.

663

PROVOROV, V.

1935

EXTRACTION OF RUBBER FROM RUBBER-BEARING PLANTS BY MEANS OF SOLVENTS (TRANSLATED TITLE).

SOVETSKII KAUCHUK 3:26-34.

SEE: CA (30)643.

U.S.S.R./RUBBER EXTRACTION/CHEMISTRY

664

RAMOS, J.L.

1959

A NEW METHOD OF PROCESSING GUAYULE (TRANSLATED TITLE).

CHIMIE ET INDUSTRIE (PARIS) 81(6):89.

RUBBER EXTRACTION

665

RAMOS, J.L.

1960

NATURAL RUBBER PRODUCTION IN TEMPERATE COUNTRIES.

REVISTA GENERAL CAOUTCHOUC 37:962-965.

GUAYULE RESEARCH IN SPAIN FOR THE PAST 15 YEARS IS REVIEWED. THE PHYSICAL AND CHEMICAL PROPERTIES OF GUAYULE AND HEVEA RUBBER ARE COMPARED.
SEE: HA (31)2850.

CHEMISTRY/RUBBER YIELD/RUBBER QUALITY/CULTIVATION

666

RAMOS FIGUERAS, J.L./CABRA FERNANDEZ, A.

1953
SOLUTION TO THE NATIONAL RUBBER PROBLEM: GUAYULE.

ION 13:204-207, 258-263.

ECONOMICS/USES

667

RAMOS FIGUERAS, J.L./CABRA FERNANDEZ, A.

1955

INDUSTRIAL PROCESS FOR OBTAINING NATURAL RUBBER FROM GUAYULE (TRANSLATED TITLE).

CHIMIE ET INDUSTRIE (PARIS) 74(4):68.

RUBBER EXTRACTION

668

REEVES, R.

1942

GUAYULE RUBBER PROJECT EXPANDING RAPIDLY.

DOMESTIC COMMERCE 29(23):21-22.

CALIFORNIA/MEXICO/CULTIVATION

669

REEVES, R.

1942

RUBBER FROM AMERICAN LETTUCE FIELDS: A PROMISING SOURCE OF SUPPLY.

DOMESTIC COMMERCE 29(2):12-14.

UNITED STATES/ECONOMICS

670

REKO, V.A.

1937

GUAYULE, THE MEXICAN RUBBER TREE (TRANSLATED TITLE).

PHARMAZEUTISCHE POST 70(29):332-339.

PLANT DISTRIBUTION/CULTIVATION/MEXICO/SYSTEMATICS/USES/ECONOMICS

671

RETZER, J.L./MOGEN, C.A.

1945

SOIL-GUAYULE RELATIONSHIPS: THE SALT TOLERANCE OF GUAYULE.

(UNPUBLISHED). 55 P.

SOIL-WATER-PLANT RELATIONSHIPS/SALT TOLERANCE/PLANT GROWTH

672

RETZER, J.L./MOGEN, C.A.

1946

THE SALT TOLERANCE OF GUAYULE.

AMERICAN SOCIETY OF AGRONOMY, JOURNAL 38(8):728-742.

GUAYULE PLANTATIONS DO NOT APPEAR FEASIBLE ON SOILS HAVING IN EXCESS OF 0.3 PERCENT SALTS IN THE UPPER FIVE FEET ALTHOUGH THE PLANTS GREW WELL AT LESSER CONCENTRATIONS. GROWTH WAS INCREASINGLY RETARDED AT CONCENTRATIONS GREATER THAN 0.3 PERCENT AND PLANTS WERE KILLED OR SEVERELY RETARDED AT CONCENTRATIONS OF 0.6 PERCENT OR MORE.
SEE: BA(20)20989. CA (41)1058. HA (17)247.

CHEMISTRY/SALT TOLERANCE/PLANT PHYSIOLOGY/SOIL-WATER-PLANT RELATIONSHIPS

673

RETZER, J.L./MOGEN, C.A.

1947

SOIL-GUAYULE RELATIONSHIPS.

AMERICAN SOCIETY OF AGRONOMY, JOURNAL 39(6):483-512.

GUAYULE RUBBER PRODUCTION WAS BEST ON GOOD LOAM SOILS WITH MODERATE IRRIGATION AND ALTERNATING PERIODS OF MOISTURE STRESS AND VEGETATIVE GROWTH. LOW MOISTURE STRESS INCREASED SHRUB SIZE AND TOTAL RUBBER YIELD, BUT ALSO INCREASED PRODUCTION COSTS AND ALTHOUGH HIGH MOISTURE STRESS INCREASED THE PERCENT RUBBER YIELD PER SHRUB, SHRUB SIZE AND TOTAL RUBBER YIELD WERE DECREASED.
SEE: BA(21)25934. CA (41)6009.

SOIL-WATER-PLANT RELATIONSHIPS/IRRIGATION EFFECTS/MOISTURE STRESS/ PLANT GROWTH/RUBBER YIELD/ECONOMICS

674

RETZER, J.L. ET AL

1945

SOIL ASSOCIATIONS, RIO GRANDE PLAIN, TEXAS.

U.S. FOREST SERVICE, WASHINGTON, D.C., EMERGENCY RUBBER PROJECT. (UNPUBLISHED)

TEXAS/SOIL-WATER-PLANT RELATIONSHIPS/PLANT DISTRIBUTION

675

REYNOLDS, H.W.

1944

OBSERVATIONS ON GUAYULE RESPONSE OF INDICATOR PLOTS ESTABLISHED DURING THE SPRING OF 1942.

(UNPUBLISHED). 1 P.

PLANT GROWTH/CULTIVATION/SOIL-WATER-PLANT RELATIONSHIPS

676

RICHARDSON, A.E.V.

1942

THE UTILIZATION OF RUBBER-BEARING PLANTS.

AUSTRALIAN JOURNAL OF SCIENCE 5:11-15.

SEE: CA (37)1057.

AUSTRALIA/ECONOMICS

677

RINGLE, R.

1942

RUBBER FROM WESTERN WEEDS.

SURVEY GRAPHIC 31(2):74-78.

ECONOMICS/UNITED STATES

678

RINGUELET, A.

1942

EL GUAYULE EN MEJICO.

AGRONOMIA (BUENOS AIRES) 31(1):39-47.

MEXICO/CULTIVATION

679

RITTER, F.J.

1953

GUAYULE: THE RUBBER PLANT OF THE DESERT.

RUBBER (DELFT) 9:53-55.

680

ROBERTS, P.H.

1946

FINAL REPORT, THE EMERGENCY RUBBER PROJECT: A REPORT ON OUR WARTIME GUAYULE PROGRAM.

U.S. FOREST SERVICE, LOS ANGELES, EMERGENCY RUBBER PROJECT. 234 P.

INCLUDED IN THIS REPORT OF WORK DONE BY THE FOREST SERVICE IN THE EMERGENCY RUBBER PROJECT ARE HIGHLIGHTS OF GUAYULE HISTORY, THE BACKGROUND OF THE PROJECT, LOGISTICS, SURVEYS, LAND ACQUISITION, FINANCES, OPERATIONS OF NURSERIES AND PLANTATIONS, HARVESTING, AND PROCESSING. THE LAST PART OF THE REPORT FOCUSES ON PROGRAM FLUCTUATIONS INCLUDING PROPOSED PROGRAM CURTAILMENTS, EXPANSIONS, AND THE FINAL LIQUIDATION WITH DISPOSITION OF PROPERTY AND PERSONNEL.

LEGISLATION/PLANTING MANAGEMENT/CULTIVATION/ECONOMICS/RUBBER EXTRACTION/HARVESTING

681

ROBERTS, R.C.

1950

CHEMICAL EFFECTS OF SALT-TOLERANT SHRUBS ON SOILS.

INTERNATIONAL CONGRESS OF SOIL SCIENCE, 4TH, AMSTERDAM, TRANSACTIONS 4(1):404-406.

CHEMISTRY/SALT TOLERANCE

682

RODRIGUEZ-HAHN, L. ET AL

1970

STRUCTURES OF ARGENTATINES A AND C FROM PARTHENIUM ARGENTATUM.

REVISTA LATINOAMERICANA DE QUIMICA 1(1):24-38.

CHEMICAL AND SPECTRAL STUDIES WERE USED TO DETERMINE THE STRUCTURES OF THE TRITERPENE ARGENTATINES A, B, AND C FROM GUAYULE.
SEE: CA (74)88168.

CHEMISTRY

683

ROE, E.J.

1944

FINAL REPORT ON TESTS OF GUAYULE SEED MADE AT ST. PAUL, MINNESOTA.

(UNPUBLISHED). 5 P.

SEEDS/PLANT PHYSIOLOGY

684

ROLDEN, A.

1927

NEW DATA ON THE CULTIVATION OF GUAYULE (PARTHENIUM ARGENTATUM) IN TEHUACAN, PUEBLA (TRANSLATED TITLE).

MEXICO FORESTER 5(1/2):12-14.

SEE: BA(2)261.

MEXICO/CULTIVATION

685

ROLLINS, R.C.

1944

ANALAGOUS PLANT TYPES FROM NATURAL POPULATIONS OF GUAYULE (PARTHENIUM ARGENTATUM) AND MARIOLA (P. INCANUM), AND CERTAIN DERIVATIVES OF CROSSES BETWEEN THESE SPECIES.

AMERICAN JOURNAL OF BOTANY 31(8):13S-14S.

GENETICS/SYSTEMATICS

686

ROLLINS, R.C.

1944

EVIDENCE FOR NATURAL HYBRIDITY BETWEEN GUAYULE (PARTHENIUM ARGENTATUM) AND MARIOLA (PARTHENIUM INCANUM).

AMERICAN JOURNAL OF BOTANY 31:93-99.

A GREENHOUSE POPULATION O MORE THAN 200,000 GUAYULE PLANTS WAS GROWN FROM SEEDS COLLECTED FROM WIDELY SEPARATED AREAS IN MEXICO AND TEXAS AND 162 HYBRIDS WERE FOUND FROM IMMEDIATE CROSSES BETWEEN GUAYULE AND MARIOLA. THE MORPHOLOGY OR THE TRICHOMES WAS THE PRIMARY TAXONOMIC CHARACTER FOR IDENTIFYING THE HYBRIDS WHICH WERE GENERALLY INTERMEDIATE BETWEEN GUAYULE AND MARIOLA.
SEE: BA(18)11783.

MEXICO/TEXAS/GENETICS/SYSTEMATICS/PLANT ANATOMY/SEEDS

687

ROLLINS, R.C.

1945

EVIDENCE FOR GENETIC VARIATION AMONG APOMICTICALLY PRODUCED PLANTS OF SEVERAL F. PROGENIES OF GUAYULE (PARTHENIUM ARGENTATUM) AND MARIOLA (P. INCANUM).

AMERICAN JOURNAL OF BOTANY 32:554-560.

VARIANT GUAYULE AND MARIOLA PLANTS WITHOUT DIFFERENCES IN CHROMOSOME NUMBER WERE FOUND WITHIN THE APOMICTICALLY PRODUCED PORTION OF GIVEN PROGENIES. A SUGGESTED EXPLANATION IS THAT NUCLEAR DIVISIONS WITH SOME FEATURES OF MEIOSIS AND SOME OF MITOSIS PRECEDED GAMETOPHYTE FORMATION AND THAT DEVIATING MATERNAL PLANTS AROSE MOST FREQUENTLY BY PSEUDOGAMOUS DIPLOSPORY OR SEMICAPOSPORY.

GENTICS/SYSTEMATICS

688

ROLLINS, R.C.

1945

INTERSPECIFIC HYBRIDIZATION IN PARTHENIUM. II CROSSES BETWEEN GUAYULE (P. ARGENTATUM) AND MARIOLA (P. INCANUM).

AMERICAN JOURNAL OF BOTANY 32(7):395-404.

ARTIFICIALLY PRODUCED HYBRIDS FROM CROSSES BETWEEN GUAYULE AND MARIOLA APPROXIMATELY DUPLICATED FOUR WILD PLANT TYPES PREVIOUSLY DESCRIBED AS HAVING CHARACTERISTICS OF GUAYULE AND/OR MARIOLA, THUS EXPLAINING THE PROBABLE ORIGIN OF THE FOUR TYPES. INTERSPECIFIC HYBRIDIZATION MAY BE USED TO IMPROVE GUAYULE.
SEE: BA(19)17980. HA (16)278.

GENETICS/SYSTEMATICS/PLANT BREEDING

689

ROLLINS, R.C.

1945

SOME KNOWN AND PROBABLE LEVELS OF RECIPROCAL INTROGRESSION BETWEEN GUAYULE (PARTHENIUM ARGENTATUM) AND MARIOLA (P. INCANUM).

GENETICS 30:18-19.

GENETICS/SYSTEMATICS

690

ROLLINS, R.C.

1946

INTERSPECIFIC HYBRIDIZATION IN PARTEHNIUM. II: CROSSES INVOLVING P. ARGENTATUM, P. INCANUM, P. STRAMONIUM, P. TOMENTOSUM AND P. HYSTEROPHORUS.

AMERICAN JOURNAL OF BOTANY 33:21-30.

A SERIES OF VIGOROUS HYBRIDS WERE OBTAINED FROM CROSSES BETWEEN VARIOUS SPECIES OF PARTHENIUM. THE MOST LIKELY HYBRIDS FOR IMMEDIATE UTILIZATION TESTS FOR RUBBER PRODUCTION WERE 2N=90 FROM CROSSES BETWEEN 72 CHROMOSOME P. ARGENTATUM AND 36 CHROMOSOME P. STRAMONIUM.

SYSTEMATICS/PLANT BREEDING/GENETICS

691

ROLLINS, R.C.

1946

THE OCCURRENCE OF SUBLETHAL DWARFED HYBRIDS IN PARTHEIUM AND THEIR CHIMERIC MUTATION TO NORMALCY.

AMERICAN JOURNAL OF BOTANY 33:825.

GENETICS

692

ROLLINS, R.C.

1949

SOURCES OF GENETIC VARIATION IN PARTHENIUM ARGENTATUM GRAY.

EVOLUTION 3:358-368.

CYTOGENETIC EVIDENCE INDICATES THAT THE SPECIES ORIGINATED IN EASTERN DURANGO, MEXICO AND GENETIC SEGREGATION WAS FOUND OPERATIVE IN POPULATIONS WITHIN BOTH THE SEXUAL DIPLOID AND THE POLYPLOID FACULTATIVELY APOMICTIC PORTION OF THE SPECIES. INTROGRESSION WITH MARIOLA HAS PLAYED A MAJOR ROLE IN EXTENDING HETEROGENEITY MUCH BEYOND THE LIMITS OTHERWISE TO BE EXPECTED IN GUAYULE.
SEE: BA(24)8293.

PLANT DISTRIBUTION/MEXICO/GENETICS/SYSTEMATICS

693

ROLLINS, R.C.

1950

THE GUAYULE RUBBER PLANT AND ITS RELATIVES.

CONTRIBUTIONS OF THE GRAY HERBARIUM 172:3-73.

A TAXONOMIC TREATMENT OF 16 SPECIES AND THEIR VARIETIES IN THE GENUS PARTHENIUM IS PRESENTED WITH A WORKING KEY TO THE SPECIES. DISCUSSION INCLUDES GEOGRAPHICAL DISTRIBUTION, REPRODUCTION, GENETICS, MORPHOLOGY, ECONOMICS, AND PHYLOGENETIC TRENDS.
SEE: BA(25)2646.

GENETICS/PLANT DISTRIBUTION/SYSTEMATICS

694

ROLLINS, R.C./CATCHESIDE, D.G.

1951

A NOTE ON SOME TECHNIQUES OF OBTAINING GENETIC SEGREGATION IN APOMICTIC STRAINS OF THE GUAYULE RUBBER PLANT.

GENETICS 36(5)435-440.

A METHOD OBTAINING GENETIC SEGREGATION IN APOMICTIC STRAINS OF GUAYULE WITHOUT LOSING THE APOMICTIC FEATURE IS DESCRIBED. IT MAY BE POSSIBLE TO INCREASE THE RUBBER CONTENT OF APOMICTIC STRAINS WITH THIS METHOD.
SEE: BA(26)7914.

GENETICS/RUBBER YIELD/PLANT BREEDING

695

ROMAGNOLI, M.

1935

CULTIVATION OF GUAYULE IN THE (ITALIAN) COLINIES (TRANSLATED TITLE).

AGRICULTURA COLONIALE 29:330-353.

SEE: CA(29)7120.

CULTIVATION/RESINS

696

ROMNEY, V.E.

1946

CONTROL OF LYGUS BUGS WITH DDT AS RELATED TO GUAYULE SEED PRODUCTION.

JOURNAL OF ECONOMIC ENTOMOLOGY 39(5):664-665.

A 2.5 PERCENT DDT DUST WAS APPLIED TO GUAYULE SEED PLOTS AT THE RATES OF 30-35 PERCENT PER ACRE, KILLING MOST ADULTS AND NYMPHS BUT REQUIRING A SECOND APPLICATION 10 DAYS LATER TO CONTROL NYMPHS THAT HATCHED AFTER THE INITIAL DUSTING. A FILLED-SEED COUNT IN TREATED PLOTS WAS 40.6 PERCENT COMPARED TO 14.3 PERCENT IN CONTROLS.
SEE: BA(21)18350. CA (41)1378. HA (17)1509.

INSECTS/PARASITES/PLANT INJURY/SEEDS

697

ROMNEY, V.E.

1946

CONTROL OF LYGUS BUGS WITH DDT DUST AS RELATED TO GUAYULE SEED PRODUCTION.

U.S. BUREAU OF ENTOMLOGY AND PLANT QUARANTINE, WASHINGTON, D.C. 8 P.

INSECTS/PLANT INJURY/SEEDS

698

ROMNEY, V.E.

1946

INSECTS FOUND IN GUAYULE IN NORTHERN MEXICO.

JOURNAL OF ECONOMIC ENTOMOLOGY 39(5):670-671.

INSECTS ATTACKING NATIVE AND CULTIVATED GUAYULE IN NORTHERN MEXICO DURING A 9-DAY SURVEY IN JUNE 1945 ARE REPORTED. REPRODUCING INSECTS INCLUDED FOUR SCALES, LARVAE OF FOUR BEETLES, LARVAE OF TWO MOTHS, TWO MEALY-BUGS, A LEAF-HOPPER AND A FULGORID.
SEE: BA(21)18351.

INSECTS/MEXICO/PLANT INJURY

699

ROMNEY, V.E.

1947

DDT EMULSION TO CONTROL RED SPIDER AND MEALY BUGS ON GUAYULE.

JOURNAL OF ECONOMIC ENTOMOLOGY 40(4):480-483.

RED SPIDER MITES AND ALL ACTIVE FORMS OF MEALY-BUGS WERE CONTROLLED BY AN EMULSION OF 0.3 PERCENT DDT, 0.6 PERCENT BENZENE, 0.3 PERCENT WHITE PETROLEUM OIL, AND 0.01 PERCENT VATSOL O.T. REPEATED APPLICATIONS WITH A PAINT GUN WERE MADE TO GUAYULE PLANTS IN THE GREENHOUSE.
SEE: BA(22)10107. CA (42)312.

INSECTS/PLANT INJURY

700

ROMNEY, V.E./CASSIDY, T.P.

1945

ANAPHES OVIJENTATUS AN EGG-PARASITE OF LYGUS HESPERUS.

JOURNAL OF ECONOMIC ENTOMOLOGY 38(4):497-498.

SEE: BA(20)7520.

PARASITES/PLANT INJURY

701

ROMNEY, V.E./CASSIDY, T.P./YORK, G.T.
1945

EXPERIMENTS WITH DDT AGAINST INSECTS ATTACKING GUAYULE.

U.S. AGRICULTURAL RESEARCH ADMINISTRATION, WASHINGTON, D.C.
E-672:1-16.

DDT DUSTS, 0.3 PERCENT DDT EMULSIONS OR KEROSENE SOLUTIONS WITH 2.5 TO 5 PERCENT DDT PROVIDED EFFECTIVE CONTROLS AGAINST MOST INSECTS FOUND ATTACKING GUAYULE. SULPHUR, TARTAR EMETIC-GLYCEROL, DN-111, AND TRITON B-1956 WERE FOUND LESS EFFECTIVE.
SEE: CA (40)667.

INSECYS/PARASITES/PLANT INJURY

702

ROMNEY, V.E./YORK, G.T./CASSIDY, T.P.
1945

EFFECT OF LYGUS SPP. ON SEED PRODUCTION AND GROWTH OF GUAYULE IN CALIFORNIA.

JOURNAL OF ECONOMIC ENTOMOLOGY 38(1):45-50.

LYGUS HESPERUS DIRECTLY ATTACKS IMMATURE GUAYULE SEED IN CALIFORNIA OR FEEDS ON TERMINAL SHOOTS INHIBITING SUBSEQUENT FLOWERING OR GROWTH. LYGUS SALLEI FEEDS PRIMARILY ON TERMINAL SHOOTS ALONG CALIFORNIA COASTAL AREAS CAUSING PLANT GROWTH RETARDATION.
SEE: BA(19)14308. HA (15)1745.

CALIFORNIA/SEEDS/INSECTS/PLANT INJURY

703

ROMO, J. ET AL

1970

GUAYULINES A AND B, NEW SESQUITERPENES FROM PARTHENIUM ARGENTATUM.

REVISTA LATINOAMERICANA DE QUIMICA 1(3):132-135.

THE STRUCTURES OF THE SESQUITERPENES GUAYULIN A AND GUAYULIN B WERE DETERMINED MAINLY ON THE BASIS OF SPECTRAL STUDIES. THEY ARE CLOSELY RELATED TO BICYCLOGERMACRENE.
SEE: CA (74)108147.

CHEMISTRY

704

ROSS, H.

1908

THE ANATOMICAL STRUCTURE OF THE MEXICAN RUBBER PLANT GUAYULE, PARTHENIUM ARGENTATUM, GRAY (TRANSLATED TITLE).

DEUTSCHE BOTANISCHE GESELLSCHAFT BERICHTE 26A(3):248-263.

PLANT ANATOMY

705

ROTTY, R.

1944

COMPARATIVE YIELDS FROM 2- TO 3-YEAR-OLD GUAYULE SHRUBS GROWN WITH AND WITHOUT IRRIGATION IN THE SPENCE FIELD.

(UNPUBLISHED). 8 P.

RUBBER YIELD/IRRIGATION EFFECTS

706

ROWNTREE, L.

1942

RUBBER FROM AMERICAN WEEDS.

FLOWER GROWER 29:316-317.

ECONOMICS

707

ROYO MARTINEZ, J./VASQUEZ VALERO, M.
1961

UTILIZATION OF GUAYULE RUBBER DERIVED FROM PARTHENIUM ARGENTATUM (TRANSLATED TITLE).

REVISTA DE LOS PLASTICOS (MADRID) 12(71):391-395.

USES/RUBBER QUALITY/RESINS/CHEMISTRY

708

ROZIN, I.

1932

GVAUILA V S.S.S.R.

SOVETSKII KAUCHUK 1:27-26.

U.S.S.R.

709

RUSBY, H.H.

1909

THE RUBBER PLANTS OF MEXICO.

TORREYANA 9:177-184.

MEXICO/ECONOMICS

710

RUSSELL, M.W.

1928

LE GUAYULE (PARTHENIUM ARGENTATUM, GRAY).

REVUE DE BOTANIQUE APPLIQUE ET D'AGRICULTURE COLONIALE 8(82):445-447.

CULTIVATION/ECONOMICS

711

SALTER, R.M.

1948

RUBBER PLANTS AND POLICY IN AMERICA: REPORT OF THE ADMINISTRATOR OF AGRICULTURAL RESEARCH, 1947.

U.S. BUREAU OF INDUSTRY, SOILS, AND AGRICULTURAL ENGINEERING, WASHINGTON, D.C. P. 305-306.

LONG-TERM OBJECTIVES OF A NATIONAL RUBBER POLICY INCLUDE ENCOURAGEMENT OF A COMPETITIVE HEVEA RUBBER INDUSTRY IN LATIN AMERICA AND THE BREEDING AND SELECTION OF DOMESTIC RUBBER PLANTS SUCH AS GUAYULE AND KOK-SAGHYZ IN THE UNITED STATES. SEED STOCKPILES FROM GUAYULE AND KOK-SAGHYZ COULD BE USED IN FUTURE EMERGENCIES.
SEE: HA (18)2052.

SEEDS/ECONOMICS/SOUTH AMERICA/UNITED STATES

712

SALTER, R.M.

1948

RUBBER PLANTS AND POLICY IN AMERICA: REPORT OF THE ADMINISTRATOR OF AGRICULTURAL RESEARCH, 1947.

U.S. BUREAU OF INDUSTRY, SOILS, AND AGRICULTURAL ENGINEERING, WASHINGTON, D.C. P. 313-410.

RUBBER YIELDS FROM INTERSPECIFIC HYBRIDS OF GUAYULE ARE REPORTED.
SEE: HA (20)3440.

UNITED STATES/RUBBER YIELD/PLANT BREEDING

713

SAN MILLAN, J.M.

1927

THE IMPORTANCE OF GUAYULE FOR THE PRODUCTION OF RUBBER (TRANSLATED TITLE).

HACIENDA 22(11):332-333.

CULTIVATION/RUBBER QUALITY/ECONOMICS

714

SAUCEDO, V.

1929

POSSIBILITIES OF THE RUBBER AND GUAYULE INDUSTRY IN MEXICO (TRANSLATED TITLE).

MEXICO FORESTER 7(1):8-13.

SEE: BA(3)2007.

MEXICO/ECONOMICS

715

SAUCHELLI, V.

1926

MACHINE GROWN RUBBER IN THE UNITED STATES - RUBBER GROWING BY AMERICAN FARMERS - PLANT BREEDING AND MECHANICAL EFFICIENCY - AMERICA'S ANSWER TO CHEAP COOLIE LABOR.

INDIA RUBBER WORLD 75(2):67-69.

UNITED STATES/PLANT BREEDING/ECONOMICS

716

SAUCHELLI, V.

1928

GUAYULE RUBBER A HOME INDUSTRY; RECENT FINDINGS BY DR. D. SPENCE SHOW THAT GUAYULE RUBBER IS A COLLOIDAL SUSPENSION IN THE PLANT JUICES LIKE LATEX OF THE HEVEA TREE: IMPORTANT DEVELOPMENTS FOLLOW.

INDIA RUBBER WORLD 78(3):55-56.

CHEMISTRY/CULTIVATION/ECONOMICS

717

SCHIDROWITZ, P.

1941

GUAYULE IN THE PAST.

INDIA RUBBER JOURNAL 102(22):3-4.

ECONOMICS/PLANT DISTRIBUTION/HARVESTING/RUBBER EXTRACTION

718

SCHILLER, J.

1916

INDIGENOUS RUBBER PLANT, HIGH IN RUBBER CONTENT.

GUMMI-ZEITUNG 30:500-501.

SEE: CA (19)1288.

RUBBER YIELD

719

SCHMID, L./STOHR, R.

1926

STEARIN FROM PARTHENIUM ARGENTATUM.

DEUTSCHE CHEMISCHE GESELLSCHAFT BERICHTE 59(7):1408-1410.

CHEMISTRY

720

SCHNEIDER, H.

1944

VERTICILLIUM WILT OF GUAYULE.

PHYTOPATHOLOGY 34(10):936.

MICROORGANISMS/PLANT INJURY

721

SCHNEIDER, H.

1945

SURVEYS AND OBSERVATIONS ON VERTICILLIUM WILT OF GUAYULE IN CALIFORNIA FROM 1943 TO 1945.

PLANT DISEASE REPORTER 29(22):615-617.

OLDER AND MORE HARDENED GUAYULE PLANTS SHOW LESS INTENSIVE EXTERNAL SYMPTOMS OF VERTICILLIUM WILT WHEN INFECTED THAN DO YOUNGER PLANTS. MOST MODERATELY INFECTED PLANTS RECOVER ALTHOUGH GROWTH IS RETARDED. SEE: BA(20)14016.

CALIFORNIA/PLANT INJURY/MICROORGANISMS/PLANT GROWTH

722

SCHNEIDER, H.

1948

SUSCEPTIBILITY OF GUAYULE TO VERTICILLIUM WILT AND INFLUENCE OF SOIL TEMPERATURE AND MOISTURE ON DEVELOPMENT OF INFECTION.

JOURNAL OF AGRICULTURAL RESEARCH 76(5/6):129-143.

EXPERIMENTS IN CALIFORNIA INDICATE THAT COMMERCIAL STRAINS OF GUAYULE DIFFER IN THEIR SUSCEPTIBILITY TO VERTICILLIUM WILT. THE FUNGUS IS ACTIVE AT ALL MOISTURE LEVELS ABOVE THE WILTING POINT AND BECOMES INACTIVE AT CONSTANT SOIL TEMPERATURES BETWEEN 80 AND 85 DEGREES F. SEE: BA(22)17269. HA (18)2841.

CALIFORNIA/PLANT INJURY/MICROORGANISMS/TEMPERATURE EFFECTS

723

SCHOFFELMAYER, V.H.

1950

NEW GUAYULE HYBRIDS UNDER TEST IN SOUTH TEXAS.

TEXAS CHEMURGIC NEWS 6(6):1-2.

PLANT BREEDING/TEXAS

724

SCHOLL, E.E.

1945

GUAYULE DEVELOPMENT IN THE UNITED STATES.

RUBBER AGE 56:507-510.

SEE: CA (39)2217.

UNITED STATES/ECONOMICS

725

SCHULTZ, E.F.

1942

EL GUAYULE EN TUCUMAN.

ESTACION EXPERIMENTAL AGRICOLA TUCUMAN, CIRCULAR 107:1-4.

THE POSSIBILITIES FOR CULTIVATION OF GUAYULE IN TUCUMAN ARE DISCUSSED INCLUDING TEMPERATURE AND SOIL REQUIRMENTS. IT HAS BEEN CULTIVATED AT THE TUCUMAN EXPERIMENT STATION, BUT THERE WAS LITTLE INTEREST IN GROWING IT LOCALLY.
SEE: BA(19)11470. HA (13)609.

CULTIVATION/MEXICO/TEMPERATURE EFFECTS/SOIL-WATER-PLANT RELATIONSHIPS/ PLANTING MANAGEMENT

726

SCOBELL, G./HOLMS,--

1911

AGRICULTURE IN CHIHUAHUA, DURANGO, AND GUADALAJARA.

DIPLOMATIC AND CONSULAR REPORTS 4742:1-17.

TEXAS/CULTIVATION/ECONOMICS

727

SEVERIN, H.H.P.

1945

VIRUS DISEASES OF GUAYULE.

PHYTOPATHOLOGY 35(9):737-738.

GUAYULE SEEDLINGS WERE EXPERIMENTALLY INFECTED BY MECHANICAL INOCULATION WITH TOBACCO-MOSAIC AND TOBACCO-RINGSPOT VIRUSES. THE SEEDLINGS WERE NONSUSCEPTIBLE TO SEVERAL OTHER VIRUSES.
SEE: BA(19)22887.

SEEDLINGS/MICROORGANISMS/PLANT INJURY

728

SHAPTER, R.E.

1952

RUBBER ACCUMULATION IN GUAYULE (PARTHENIUM ARGENTATUM GRAY) IN SOUTH AUSTRALIA.

COMMONWEALTH SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANIZATION, AUSTRALIA, BULLETIN, 270:1-31.

THE ACCUMULATION AND PRODUCTION OF RUBBER FROM GUAYULE PLANTATIONS IN SOUTH AUSTRALIA WERE INVESTIGATED. UNDER IRRIGATION, 1600 TO 1800 POUNDS PER ACRE WERE PRODUCED COMPARED TO 430 TO 1000 POUNDS PER ACRE UNIRRIGATED.
SEE: BA(55)21968. HA (23)3289.

RUBBER YIELD/IRRIGATION EFFECTS/AUSTRALIA

729

SHERBAKOFF, C.D.

1949

BREEDING FOR RESISTANCE TO FUSARIUM AND VERTICILLIUM WILTS.

BOTANICAL REVIEW 15(6):377-422.

SEE: BA(24)5099.

MICROORGANISMS/PLANT BREEDING/PLANT INJURY

730

SLATTERY, M.C./TYSDAL, H.M.

19-

THE GUAYULE METHOD AS A MEANS OF ESTIMATION OF RUBBER IN GUAYULE.

(UNPUBLISHED). 13 P.

RUBBER YIELD

731

SLEETH, B.

1944

PRE-MERGENCE LOSSES AND SEEDLING ROOT ROT AND THEIR CONTROL IN GUAYULE NURSERIES.

PLANT DISEASE REPORTER 38(31):954-955.

PRE-EMERGENCE DAMPING-OFF LOSSES IN GUAYULE WERE SIGNIFICANTLY REDUCED IN THE GREENHOUSE AFTER SEED TREATMENTS WITH 1 PERCENT BY WEIGHT FERMATE, SPERGON OR THIOSAN, BUT THE OCCURRENCE OF SEEDLING ROOT ROT WAS NOT SIGNIFICANTLY AFFECTED.
SEE: BA(19)5465. CA (39)544.

SEEDLINGS/ROOTS/PLANT INJURY/MICROORGANISMS

732

SLEETH, B.

1945

AGAR MEDIUM AND TECHNIQUE FOR ISOLATING PYTHIUM FREE OF BACTERIA.

PHYTOPATHOLOGY 35:1030-1031.

MICROORGANISMS/CHEMISTRY/PARASITES

733

SLEETH, B.

1945

PRE-EMERGENCE DAMPING-OFF CONTROL IN GUAYULE WITH PHENYL MERCURIC FUNGICIDES.

PLANT DISEASE REPORTER 29(5):139-140.

PRE-EMERGENCE DAMPING-OFF IN GUAYULE CAUSED BY PYTHIUM ULTIMUM IN THE GREENHOUSE WAS CONTROLLED BY PHENYL MERCURIC FUNGICIDES APPLIED TO THE SEED AS DUSTS BEFORE PLANTING.
SEE: BA(19)20172. CA (39)1957.

MICROORGANISMS/SEEDS/PLANTING MANAGEMENT/PLANT INJURY

734

SLEETH, B.

1946

EFFECT OF FUNGICIDAL SEED TREATMENTS ON GUAYULE SEEDLING EMERGENCE.

PHYTOPATHOLOGY 36(12):999-1010.

PRE-EMERGENCE LOSSES IN GUAYULE CAUSED BY PYTHIUM ULTIMUM AND RHIZOCTONIA SP. IN GREENHOUSE, NURSERY, AND FIELD TESTS WERE CONTROLLED BY FUNGICIDAL SEED TREATMENTS. THE MOST PROMISING FUNGICIDES WERE CRASAN (50 PERCENT TETRAMETHYL THIURAM DISULFIDE) AND NO. 604 (2,3-DICLORO-1- NAPHTHOQUINONE).
SEE: BA(21)7274. CA (41)2195. HA (17)847.

MICROORGANISMS/SEEDS/PLANT INJURY/PLANTING MANAGEMENT

735

SMITH, G.B.

1972

RUBBER FOR AMERICANS: THE SEARCH FOR AN ADEQUATE SUPPLY OF RUBBER AND THE POLITICS OF STRATEGIC MATERIALS, 1934-42.

BRYN MAWR COLLEGE (PH.D. DISSERTATION). 311 P.

SUCCESS OF THE U.S. RUBBER PROGRAM DURING WORLD WAR II IS DESCRIBED, INCLUDING A 500,000 TON STOCKPILE AND A BILLION DOLLAR SYNTHETIC RUBBER INDUSTRY. THE FAILURE OF EFFORTS TO INCREASE PRODUCTION OF GUAYULE AND OTHER SOURCES OF RUBBER IS ASCRIBED TO CONGRESSIONAL STINGINESS.

UNITED STATES/ECONOMICS/LEGISLATION

736

SMITH, G.E.P.

1942

THE PRODUCTION OF GUAYULE RUBBER UNDER CULTIVATION.

AGRICULTURAL ENGINEERING 23:312, 324.

CULTIVATION/ARIZONA/CALIFORNIA

737

SMITH, P.F.

1944

INHIBITION OF GROWTH IN GUAYULE AS AFFECTED BY TOPPING AND DEFOLIATION.

AMERICAN JOURNAL OF BOTANY 31(6):328-336.

DEFOLIATION OR SEVERE PRUNING OF GUAYULE BEFORE TRANSPLANTING WAS FOLLOWED BY NEW GROWTH IN A FEW DAYS, BUT IF LEAVES WERE NOT REMOVED, THERE WAS MARKED SUPPRESSION OF STEM BUDS AND ROOT DEVELOPMENT AND TRANSPLANTS WERE SEVERELY RETARDED IN THEIR RE-ESTABLISHMENT. LEAVES WERE DEPENDENT ON LIGHT FOR THEIR GROWTH-INHIBITING ACTION, SUGGESTING THE INVOLVEMENT OF AUXIN.
SEE: BA(18)20460. HA (15)181.

LEAVES/DEFOLIATION/PLANTING MANAGEMENT/ROOTS/PLANT GROWTH

738

SMITH, P.F.

1944

ROOTING OF GUAYULE STEM CUTTINGS IN AERATED WATER.

AMERICAN SOCIETY FOR HORTICULTURAL SCIENCE, PROCEEDINGS 44:527-528.

FALL GUAYULE STEM CUTTINGS ROOTED AT ABOUT 90 PERCENT IN AERATED WATER VERSUS APPROXIMATELY 50 PERCENT IN SAND. CUTTINGS WERE PRE-COOKED IN INDOLE BUTYRIC ACID FOR 12 HOURS.
SEE: BA(18)17399. HA (14)1722.

STEMS/ROOTS/PLANT GROWTH/PROPAGATION/PLANT PHYSIOLOGY

739

SMITH, P.F.

1945

AUXIN IN LEAVES AND ITS INHIBITORY EFFECT ON BUD GROWTH IN GUAYULE.

AMERICAN JOURNAL OF BOTANY 32(5):270-276.

EXPERIMENTS INDICATE THAT GROWTH OF GUAYULE STEM BUDS IS INHIBITED BY THE PRESENCE OF MATURE LEAVES WHICH CONTAIN MORE AUXIN THAN ANY OTHER PORTION OF THE PLANT. LATERAL BUD GROWTH FOLLOWS AFTER A DECREASE IN AUXIN CONCENTRATION IN STEMS IMMEDIATELY ABOVE THE BUD.
SEE: BA(19)17414. CA (39)38134.

LEAVES/PLANT GROWTH/PLANT PHYSIOLOGY

740

SMITH, P.F.

1945

AUXIN PRODUCTION BY LEAVES AND ITS INHIBITORY EFFECTS IN GUAYULE.

UNIVERSITY OF CALIFORNIA (PH.D. DISSERTATION). 132 P.

LEAVES/PLANT PHYSIOLOGY/PLANT GROWTH

741

SORGES, F.

1925

GUAYULE: RESEARCH AND OBSERVATIONS ON THE PLANTS, PARTHENIUM ARGENTATUM ACCLIMATIZED IN THE ROYAL COLONIAL GARDEN (PALERMO) (TRANSLATED TITLE). 8 PTS.

PALERMO R. GIARDINO COLONIALE, BOLETIN 2(2):45-54.

RUBBER YIELD/RESINS

742

SPENCE, D.

1908

THE METHODS OF ANALYSIS OF RAW RUBBER (TRANSLATED TITLE).

GUMMI-ZEITUNG 22:188.

RUBBER EXTRACTION/CHEMISTRY

743

SPENCE, D.

1926

THE CHEMISTRY OF GUAYULE.

INDUSTRIAL AND ENGINEERING CHEMISTRY 18:1126-1128.

CHEMISTRY/RUBBER YIELD/RUBBER QUALITY

744

SPENCE, D.

1930

CULTIVATION AND PREPARATION OF RUBBER IN THE UNITED STATES.

INDUSTRIAL AND ENGINEERING CHEMISTRY 22(4):384-387.

SEE: BA (5)2904. CA (24)2914.

CULTIVATION/UNITED STATES/RUBBER EXTRACTION

745

SPENCE, D.

1930

GUAYULE RUBBER.

SCIENCE NEWS LETTER 18(501):318.

ECONOMICS

746

SPENCE, D.

1930

PRESERVATION OR STABILIZING AGENT TO PREVENT DETERIORATION OF PLANT'S RUBBER AFTER HARVESTING.

U.S. PATENT 1,753,184.

U.S. PATENTS/CHEMISTRY/RUBBER QUALITY

747

SPENCE, D.

1930

TREATMENT OF SHRUB AND OF EXTRACTION TO IMPROVE RUBBER AND MINIMIZE DETERIORATION.

U.S. PATENT 1,753,185.

CHEMISTRY/U.S. PATENTS/RUBBER EXTRACTION/RUBBER QUALITY

748

SPENCE, D.

1933

RETTS GUAYULE SHRUB BEFORE MILL.

U.S. PATENT 1,918,671.

RETTING/MILLING/U.S. PATENTS/RUBBER EXTRACTION

749

SPENCE, D.

1935

BACTERIAL DECOMPOSITION OF THE RUBBER IN THE LATEX OF HEVEA IN RELATION TO THE QUESTION OF THE FUNCTION OF THE RUBBER IN THE LIVING PLANT.

RESEARCH ASSOCIATION OF BRITISH RUBBER MANUFACTURERS INFORMATION BUREAU, JOURNAL 4(8):87-91.

SEE: CA (30)323.

RUBBER YIELD/PLANT PHYSIOLOGY

750

SPENCE, D.

1938

GUAYULE LATEX USE PH OF 7 AND A BUFFER.

U.S. PATENT 2,119,030.

CHEMISTRY/U.S. PATENTS

751

SPENCE, D./BOONE, C.E.

1927

SOME VULCANIZATION TESTS OF GUAYULE RUBBER.

U.S. NATIONAL BUREAU OF STANDARDS, TECHNICAL PAPER 353:1-8.

SEE: CA (22)333.

CHEMISTRY/RUBBER QUALITY/USES

752

SPENCE, D./CALDWELL, M.L.

1933

DETERMINATION OF RUBBER IN RUBBER-BEARING PLANTS.

INDUSTRIAL AND ENGINEERING CHEMISTRY, ANALYTICAL EDITION 5:371-375.

AFTER EXTENSIVE EXPERIMENTATION A NEW RUBBER CONTENT DETERMINATION METHOD FOR GUAYULE WAS DEVELOPED. THE PROCESS INVOLVES GRINDING, BOILING WITH 1 PERCENT SULFURIC ACID, STEAMING, WASHING WITH WATER, EXTRACTION WITH ACETONE, EXTRACTION WITH BENZENE, AND DRYING OF THE EXTRACT AFTER A KNOWN AMOUNT OF ANTIOXIDANT IS ADDED.
SEE: CA (28)365.

RUBBER YIELD/RUBBER EXTRACTION/CHEMISTRY

753

SPENCE, D./MCCALLUM, W.J.

1928

RECENT SCIENTIFIC ADVANCES IN CONNECTION WITH GUAYULE.

RUBBER AGE 23:133-134.

SEE: CA (22)2492.

PLANT PHYSIOLOGY/PLANT ANATOMY

754

SPENCE, D./MCCALLUM, W.J.

1935

THE FUNCTION OF THE RUBBER HYDROCARBON IN THE LIVING PLANT.

INSTITUTE OF RUBBER INDUSTRY, TRANSACTIONS 11:119-134.

EXPERIMENTS WITH DEFOLIATION AND IRRIGATION INDICATED THAT OVER 30 PERCENT OF THE RUBBER IN A GROWING GUAYULE PLANT CAN BE MADE TO DISAPPEAR. IT IS CONCLUDED THAT CONSIDERABLE RESERVE RUBBER IS CONSUMED BY THE PLANT IN SPRING GROWTH UNDER NORMAL CONDITIONS.
(TRAUB, 1946 FOUND NO SUCH LOSS AND CONCLUDED THAT RESERVE RUBBER HYDROCARBON IS APPARENTLY NOT A FOOD RESERVE)
SEE: CA (29)8393.

DEFOLIATION/IRRIGATION EFFECTS/PLANT PHYSIOLOGY

755

STACOM, M.J.

1942

RECOVERY OF RUBBER.

U.S. PATENT 2,281,336.

U.S. PATENTS/RUBBER EXTRACTION

756

STARR, H.P.

1947

THE CAUSAL AGENT OF BACTERIAL ROOT AND STEM DISEASE OF GUAYULE.

PHYTOPATHOLOGY 37(5):291-300.

SEE: BA(21)18302.

PLANT INJURY/ROOTS/STEMS/MICROORGANISMS

757

STEBBINGS, G.L./KODANI, M.

1944

CHROMOSOMAL VARIATION IN GUAYULE AND MARIOLA.

JOURNAL OF HEREDITY 35:162-172.

SOMATIC CHROMOSOME NUMBERS REPORTED FOR GUAYULE ARE 36, 38, 54, 58, 72, 74, AND 108-111. GUAYULE PLANTS WITH 108-111 CHROMOSOMES ARE CONSIDERED AUTOTRIPLOID AND THOSE WITH 54, 72, AND 74 CHROMOSOMES ARE BELIEVED TO BE AUTOPOLYPLOID IN ORIGIN, BUT PROBABLY HAVE BEEN MODIFIED THROUGH REARRANGEMENT OF CHROMOSOME SEGMENTS AND INTROGRESSION WITH MARIOLA.

GENETICS

758

STEMBERGER, P./ESKEW, R.K./HANSLICK, R.S.

1946

TREATMENT OF RUBBER.

U.S. PATENT 2,399,156.

U.S. PATENTS/RUBBER QUALITY

759

STREETS, R.B.

1943

THE SUSCEPTIBILITY OF GUAYULE TO PHYMATOTRICHUM ROOT ROT.

PLANT DISEASE REPORTER 27(2):66-68.

ONLY A TRACE OF INFECTION FROM PHYMATOTRICHUM ROOT ROT WAS FOUND DURING THE FIRST YEAR IN AN IRRIGATED ARIZONA GUAYULE PLANTING GROWN ON INFESTED SOIL. DATA FROM THE SECOND YEAR WERE NOT YET AVAILABLE.
SEE: BA(17)17303.

ROOTS/PLANT INJURY/IRRIGATION EFFECTS/SOIL-WATER-PLANT RELATIONSHIPS/ MICROORGANISMS

760

SWENSEN, M./BULLARD, W.D., JR.

1945

SALIENT FEATURES OF CLIMATE WITH RESPECT TO THE CULTURE OF GUAYULE IN THE UNITED STATES.

(UNPUBLISHED). 6 P.

UNITED STATES/PLANTING MANAGEMENT

761

SWETT, C.E.

1909

EXTRACTIVES FROM GUAYULE (PARTHENIUM ARGENTATUM).

JOURNAL OF ENGINEERING AND INDUSTRIAL CHEMISTRY 1:315-316.

SEE: CA (3)3012.

RUBBER EXTRACTION/RESINS

762

TAVERNETTI, A.A.

1926

MONTEREY COUNTY EXPERIMENTS WITH RUBBER PLANT.

CALIFORNIA CULTIVATOR 67(16):420.

CALIFORNIA/CULTIVATION/ECONOMICS

763

TAYLOR, C.A.

1946

THE PROPAGATION OF GUAYULE.

U.S. FOREST SERVICE, WASHINGTON, D.C., EMERGENCY RUBBER PROJECT. 85 P.

SEED COAT DORMANCY IN GUAYULE MAY PERSIST FOR SEVERAL YEARS. SUCCESSFUL SEEDLING ESTABLISHMENT REQUIRES SHALLOW SEED SOWING AND MAINTENANCE OF SURFACE SOIL MOISTURE. DORMANT SEEDLINGS CAN BE TRANSPLANTED OR STORED AND TRANSPORTED IN A DRY CONDITION WITHOUT INJURY AND ALTHOUGH DIRECT SEEDING IS POSSIBLE, COSTS ARE MORE FAVORABLE THAN TRANSPLANTING ONLY IN THE CASE OF VERY CLOSE PLANT SPACINGS.
SEE: BA(21)15454.

PROPAGATION/SEEDS/CULTIVATION/SOIL-WATER-PLANT RELATIONSHIPS/ECONOMICS

764

TAYLOR, C.A./BENEDICT, H.M.

1950

STIMULATION OF GROWTH IN GUAYULE BY ETIOLATION.

AMERICAN SOCIETY OF HORTICULTURAL SCIENCE, PROCEEDINGS 55:438-440.

GUAYULE PLANTS WERE REMOVED FROM LIGHT BY BURYING IN DRY SOIL OR GRAVEL. PLANTS GROWN UNDER DARKENED CONDITIONS GREW SHOOTS UP TO 10 TIMES LONGER THAN CONTROLS.
SEE: HA (21)823.

PLANT GROWTH/PLANT PHYSIOLOGY

765

TAYLOR, C.A./CHAMPAGNE, E.G.

1946

SEED AND NURSERY OPERATIONS HANDBOOK, REVISED.

U.S. DEPARTMENT OF AGRICULTURE, HANDBOOK. 85 P.

SEEDS/PLANTING MANAGEMENT

766

TAYLOR, C.A. ET AL

1951

INTERSPECIFIC AND INTERGENERIC GRAFTS, WITH SPECIAL REFERENCE TO THE FORMATION OF RUBBER IN GUAYULE.

U.S. DEPARTMENT OF AGRICULTURE, TECHNICAL BULLETIN 1040:1-38.

RECIPROCAL GRAFTS OF GUAYULE WITH P. INCANUM, P. STRAMONIUM, HELIANTHUS ANNUUS AND H. TUBEROSUS INDICATE THAT SUBSTANCES NECESSARY FOR RUBBER PRODUCTION IN THE STEMS AND ROOTS OF GUAYULE ARE NOT SPECIFIC, SINCE GUAYULE UNDERSTOCKS WITH SCION TOPS OF OTHER SPECIES PRODUCED AS MUCH RUBBER AS GUAYULE ALONE. GUAYULE PLANT LEAVES DO NOT INDUCE RUBBER PRODUCTION IN UNDERSTOCKS OF OTHER SPECIES.
SEE: BA(26)32196. CA (47)9429.

PLANT PHYSIOLOGY/LEAVES/RUBBER YIELD/SYSTEMATICS/STEMS/PROPAGATION

767

TAYLOR, F.J.

1941

UNCLE SAM'S RUBBER FARMER.

COUNTRY GENTLEMAN 111(6):16, 57-58.

CULTIVATION/UNITED STATES/ECONOMICS/RUBBER YIELD

768

TAYLOR, K.W.

1946

THE PROCESSING OF GUAYULE FOR RUBBER.

U.S. FOREST SERVICE. 46 P.

RUBBER EXTRACTION

769

TAYLOR, K.W.

1951

GUAYULE: AN AMERICAN SOURCE OF RUBBER.

ECONOMIC BOTANY 5:255-273.

A GENERAL REVIEW OF THE POTENTIAL FOR DEVELOPMENT OF GUAYULE IN THE UNITED STATES IS PROVIDED AND COMPARISONS ARE MADE BETWEEN THE CHEMICAL AND PHYSICAL PROPERTIES OF HEVEA AND GUAYULE RUBBER. THE CURRENT U.S. DEPARTMENT OF AGRICULTURE RESEARCH PROGRAM ON GUAYULE IS DESCRIBED, PARTICULARLY EFFORTS TO EXTRACT A HIGH GRADE OF RUBBER AND INCREASE YIELDS.
SEE: BA(26)16347. CA (45)9907. HA (22)760.

CHEMISTRY/RUBBER YIELD/RUBBER QUALITY/UNITED STATES

770

TAYLOR, K.W./CHUBB, R.L.

1952

DEVELOPMENT OF PILOT-PLANT CONTROL FOR MILLING GUAYULE SHRUB.

INDUSTRIAL AND ENGINEERING CHEMISTRY 44:883-887.

THE GUAYULE MILLING PROCESS WAS EXPERIMENTALLY CONTROLLED IN ORDER TO SEGREGATE AND MEASURE THE EFFECTS OF UNCONTROLLABLE VARIATIONS. EVALUATIONS INCLUDED MATERIALS AND PROCEDURES AS WELL AS QUALITATIVE AND QUANTITATIVE SAMPLING OF PLANT PARTS, RUBBER, AND BY-PRODUCTS.
SEE: CA (46)10657.

MILLING/RUBBER EXTRACTION/RUBBER QUALITY

771

TAYLOR, K.W./CHUBB, R.L.

1952

RUBBER RECOVERY FROM FRESHLY HARVESTED GUAYULE.

INDUSTRIAL AND ENGINEERING CHEMISTRY 44:879-882.

RUBBER RECOVERY IN FRESHLY HARVESTED GUAYULE IS SUCCESSFUL WITHOUT THE USE OF CHEMICAL COAGULANTS, THE LATEX BEING COAGULATED BY PARBOILING AND MECHANICAL TREATMENT. THE YIELD OF RUBBER HYDROCARBON IN A COMMERCIAL OPERATION DECREASES WITH INCREASES IN STORAGE TIME.
SEE: CA (46)10657.

RUBBER EXTRACTION/RUBBER YIELD

772

TAYLOR, R.H.

1951

FIXTURES AID IN SHARPENING DIES USED TO CUT RUBBER TENSILE TEST SPECIMENS.

INDIA RUBBER WORLD 123:441, 449.

RUBBER QUALITY

773

TAYLOR, R.H./BALL, W.P.

1951

TEMPERATURE MEASUREMENTS IN THE MOONEY VISCOMETER.

AMERICAN SOCIETY FOR TESTING MATERIALS, BULLETIN 176:60-66.

RUBBER QUALITY

774

TAYLOR, R.H./CLARK, F.E./BALL, W.P.

1954

EFFECT OF MOISTURE ON RATE OF CURE OF NATURAL RUBBER.

INDIA RUBBER WORLD 129:751-755.

RUBBER QUALITY

775

TERRY, H.L.

1907

INDIA RUBBER AND ITS MANUFACTURE.

ARCHIBALD CONSTABLE AND CO., LONDON. 287 P.

CHEMISTRY/RUBBER QUALITY

776

THONE, F.

1942

GUAYULE RUBBER.

SCIENCE 95(2456):9. (SUPPLEMENT)

RUBBER EXTRACTION/RESINS

777

THORNBER, J.J.

1912

WORK WITH GUAYULE.

ARIZONA AGRICULTURAL EXPERIMENT STATION, REPORT 23:673-674.

CULTIVATION/PLANTING MANAGEMENT/SEEDLINGS/PLANT INJURY

778

TINGEY, D.C.

1943

THE COMPARATIVE VALUE OF DRY, PREGERMINATED, AND THRESHED GUAYULE SEED IN DIRECT FIELD PLANTING.

(UNPUBLISHED). 9 P.

SEEDS/PLANTING MANAGEMENT

779

TINGEY, D.C.

1945

THE EFFECT OF DEPTH OF SEEDING AND FREQUENCY OF IRRIGATION ON THE NUMBER OF SEEDLINGS EMERGING IN GUAYULE AS COMPARED WITH LETTUCE AND CELERY.

(UNPUBLISHED). 12 P.

SEEDS/IRRIGATION EFFECTS/SOIL-WATER-PLANT RELATIONSHIPS/ PLANTING MANAGEMENT

780

TINGEY, D.C.

1945

THE EFFECT OF SEEDING IN DRY AND MOIST SOIL AT VARIOUS DEPTHS, WITH AND WITHOUT SEEDER PRESS WHEELS, AND FREQUENCY OF IRRIGATION ON EMERGENCE IN GUAYULE, LETTUCE, AND CELERY.

(UNPUBLISHED). 12 P.

SEEDS/IRRIGATION EFFECTS/SOIL-WATER-PLANT RELATIONSHIPS/ PLANTING MANAGEMENT

781

TINGEY, D.C.

1945

THE EFFECT OF SPACING ON THE COMPARATIVE PRODUCTION OF RUBBER IN GUAYULE FROM PARTIAL AND COMPLETE HARVESTING.

(UNPUBLISHED). 11 P.

HARVESTING/PLANTING MANAGEMENT/RUBBER YIELD

782

TINGEY, D.C.

1952

EFFECT OF SPACING, IRRIGATION, AND FERTILIZATION ON RUBBER PRODUCTION IN GUAYULE SOWN DIRECTLY IN THE FIELD.

AGRONOMY JOURNAL 44:298-302.

THERE WAS LITTLE OR NO EFFECT ON GUAYULE RUBBER OR SHRUB YIELDS IN THE FIELD WITH ADDITIONS OF COMMERCIAL FERTILIZER ALTHOUGH BOTH INCREASED WITH THE NUMBER OF PLANTS PER UNIT AREA. LIGHT IRRIGATIONS RESULTED IN INTERMEDIATE SHRUB YIELDS AND RUBBER PERCENTAGES AND THE HIGHEST YIELD OF RUBBER PER ACRE.
SEE: BA(26)29069. CA (46)9242.
IRRIGATION EFFECTS/RUBBER YIELD/PLANT GROWTH/PLANTING MANAGEMENT

783

TINGEY, D.C./CLIFFORD, E.D.

1946

COMPARATIVE YIELDS OF RUBBER FROM SEEDING GUAYULE DIRECTLY IN THE FIELD AND TRANSPLANTING NURSERY STOCK.

AMERICAN SOCIETY OF AGRONOMY, JOURNAL 38(12):1068-1072.

AT THE USUAL PLANT SPACINGS USED IN GROWING GUAYULE, RUBBER YIELDS 12-18 MONTHS AFTER PLANTING WERE VERY LITTLE HIGHER FROM USING TRANSPLANTS THAN FROM PLANTS STARTED BY DIRECT SEEDING. THUS, BY DIRECT SEEDING IT WAS POSSIBLE TO SHORTEN THE PERIOD TO HARVEST BY NEARLY A YEAR.
SEE: BA(21)10091. HA (17)846.

RUBBER YIELD/PLANTING MANAGEMENT/CULTIVATION

784

TINGEY, D.C./FOOTE, W.H.

1946

EFFECT OF IRRIGATION ON THE RESUMPTION OF GROWTH OF GUAYULE TRANSPLANTS.

AMERICAN SOCIETY OF AGRONOMY, JOURNAL 38(10):896-904.

RE-GROWTH OF A HIGH PERCENTAGE OF GUAYULE SEEDLINGS AFTER TRANSPLANTING IN THE FIELD REQUIRED IRRIGATION EVEN THOUGH SOIL MOISTURE WAS AVAILABLE AT THE TIME OF TRANSPLANTING. ALTHOUGH TOPPING HASTENED THE RATE OF NEW GROWTH, PERCENT PLANT SURVIVAL WAS NOT INCREASED.
SEE: BA(21)4336. HA (17)246.

SEEDLINGS/IRRIGATION EFFECTS/PLANT GROWTH/PLANTING MANAGEMENT

785

TINGEY, D.C /FOOTE, W.

1947

EFFECT OF PLANT SPACING, FALL IRRIGATION, AND FERTILIZATION ON RUBBER PRODUCTION DURING THE WINTER IN 1-YEAR-OLD GUAYULE.

AMERICAN SOCIETY OF AGRONOMY, JOURNAL 39(3):234-239.

ONE-YEAR-OLD GUAYULE PLANTS PRODUCED THE MAXIMUM RUBBER DURING THE WINTER FROM NOVEMBER 20 TO MARCH 1 WITH CLOSE PLANT SPACING, FALL IRRIGATION AND FERTILIZATION.
SEE: BA(21)15455. HA (17)1508.

PLANTING MANAGEMENT/IRRIGATION EFFECTS/RUBBER YIELD/CULTIVATION

786

TINT, H./CUMMING, J.M.

1946

METHODS OF APPLYING CERTAIN ANTIOXIDANTS TO GUAYULE CRUDE RUBBER FOR PRESERVATION DURING STORAGE.

INDIA RUBBER WORLD 113:509-512, 520.

CHEMISTRY/RUBBER QUALITY

787

TINT, H./MURRAY, C.W.

1949

METHOD OF EXTRACTING RUBBER FROM PLANTS.

U.S. PATENT 2,459,369.

U.S. PATENTS/RUBBER EXTRACTION

788

TORRES, F.G.

1954

NATURAL AND SYNTHETIC [RUBBER] (TRANSLATED TITLE).

REVISTA GENERAL CAOUTCHOUC 31:173, 226.
GUAYULE PLANTATIONS COVERING 200 HECTARES NOW EXIST IN SPAIN AND CONSTRUCTION OF A PILOT FACTORY IS UNDER CONSIDERATION. GUAYULE EXPERIMENTS ARE UNDERWAY IN SPANISH MOROCCO.
SEE: HA (24)2902.

CULTIVATION/ECONOMICS

789

TOWER, R.

1908

GUAYULE RUBBER.

KEW ROYAL BOTANICAL GARDEN, BULLETIN OF MISCELLANEOUS INFORMATION 6:255-256.

ECONOMICS

790

TRAUB, H.P.

1946

CONCERNING THE FUNCTION OF RUBBER HYDROCARBON IN THE GUAYULE PLANT, PARTHENIUM ARGENTATUM A. GRAY.

PLANT PHYSIOLOGY 21(4):425-444.

GUAYULE PLANTS WERE GROWN UNDER A VERY LOW LEVEL OF CARBON ASSIMILATION BY REPEATED REMOVAL OF NEW TOP GROWTH. ALTHOUGH FREE SUGARS AND OTHER RESERVES WERE DEPLETED, RUBBER HYDROCARBON LEVELS WERE NOT REDUCED. DATA INDICATE THAT RUBBER HYDROCARBON DOES NOT FUNCTION AS A GUAYULE FOOD RESERVE.
SEE: BA(21)4438. CA (41)1285. HA (17)2367.

PLANT PHYSIOLOGY/RUBBER YIELD

791

TRAUB, H.P.

1946

RAPID PHOTOMETRIC METHODS FOR DETERMINING RUBBER AND RESINS IN GUAYULE TISSUE AND RUBBER IN CRUDE-RUBBER PRODUCTS.

U.S. DEPARTMENT OF AGICULTURE, TECHNICAL BULLETIN 920:1-37.

THE DETERMINATION OF RUBBER AND RESINS IN SMALL GUAYULE TISSUE SAMPLES USING RAPID SEMI-MICRO PHOTOMETRIC METHODS IS DESCRIBED. PROCEDURES INCLUDE GRINDING TISSUE, CLARIFYING THE EXTRACT, TRIAL READINGS, AND FINAL READINGS PLOTTED AGAINST A STANDARD.
SEE: BA(21)1808. CA (49)7687.

RUBBER YIELD/RUBBER EXTRACTION/CHEMISTRY/RESINS

792

TRAUB, H.P./SLATTERY, M.C.

1946

ANALYSIS OF LEVULINS, INULIN, AND MONOSACCARIDES IN GUAYULE.

BOTANICAL GAZETTE 108(2):295-299.

METHODS ARE DESCRIBED FOR THE DETERMINATION OF FREE SUGARS, LEVULINS, AND INULIN IN EXTRACTS FROM DRIED AND GROUND GUAYULE TISSUE. SEASONAL STUDIES WERE MADE TO DETERMINE CARBOHYDRATE TRANSFORMATIONS.
SEE: BA(21)12629. CA (41)2124. HA (17)848.

PLANT PHYSIOLOGY/CHEMISTRY

793

TRAUB, H.P./SLATTERY, M.C.

1947

LEVULINS AND INULIN IN GUAYULE, PARTHENIUM ARGENTATUM A. GRAY.

PLANT PHYSIOLOGY 22(1):77-87.

THE PRESENCE OF LEVULINS IN GUAYULE TISSUES WAS ESTABLISHED AND THEY WERE FRACTIONATED INTO TWO MAJOR PORTIONS BY EXTRACTION WITH 89 PERCENT ETHANOL. A METHOD, WHICH SHOULD BE USEFUL IN SEASONAL PHYSIOLOGICAL STUDIES, WAS DEVISED TO DETERMINE RELATIVE AND ABSOLUTE PROPORTIONS OF THE TWO FRACTIONS IN RESPONSE TO ENVIRONMENTAL FACTORS.
SEE: BA(21)12621. CA (41)1868.

PLANT PHYSIOLOGY/CHEMISTRY

794

TRAUB, H.P./SLATTERY, M.C./MCRARY, W.L.
1946
EFFECT OF MOISTURE STRESS ON NURSERY-GROWN GUAYULE WITH REFERENCE TO CHANGES IN RESERVE CARBOHYDRATES.

AMERICAN JOURNAL OF BOTANY 33(9):699-705.

GUAYULE PLANTS GROWN UNDER HIGH MOISTURE STRESS CONTAINED RELATIVELY HIGH PERCENTAGES OF WATER-SOLUBLE CARBOHDRATES IN OCTOBER. THESE RESERVES WERE UTILIZED FOR EARLY AND VIGOROUS RESUMPTION OF GROWTH IN THE SPRING WHICH WAS NEARLY 3 TIMES GREATER THAN THAT OF ANY OTHER TREATMENT. UNDER LOW MOISTURE STRESS PLANTS APPARENTLY LOST THE ABILITY TO ACCUMULATE INULIN AT LOW TEMPERATURES, BUT COULD STILL ACCUMULATE SMALL AMOUNTS OF WATER-SOLUBLE CARBOHYDRATES.
SEE: BA(21)10180. CA (41)1282. HA (17)845.

MOISTURE STRESS/PLANT GROWTH/PLANT PHYSIOLOGY/PLANTING MANAGEMENT

795

TRAUB, H.P./SLATTERY, M.C./WALTER, E.D.

1946

FRUCTOSE AND OTHER MONOSACCHARIDES IN GUAYULE.

AMERICAN SOCIETY OF HORTICULTURAL SCIENCE, PROCEEDINGS 48:358-360.

CHEMICAL ANALYSES INDICATE THAT FRUCTOSE CONSTITUTES ABOUT 10 PERCENT OF THE REDUCING SUGARS FOUND IN GUAYULE STEMS AND ROOTS AND 25 PERCENT IN INFLORESCENCES. KETOSES OTHER THAN FRUCTOSE MAY ALSO BE PRESENT.
SEE: CA (41)7453.

CHEMISTRY

796

TREADWELL, J.C.

1926

GUAYULE RUBBER FROM TEXAS: FACTORY AT MARATHON HAS TAKEN FULL ADVANTAGE OF ONLY GUAYULE DISTRICT ON AMERICAN SIDE OF THE RIO GRANDE.

RUBBER AGE 20:139-140.

TEXAS/PLANT DISTRIBUTION/ECONOMICS

797

TRUMBULL, H.L.

1942

GROWING RUBBER IN NORTH AMERICA.

INDUSTRIAL AND ENGINEERING CHEMISTRY, INDUSTRIAL EDITION 34:1328-1335.

THE POTENTIAL FOR RUBBER PRODUCTION FROM PLANTS GROWN IN THE UNITED STATES IS EXAMINED. TECHNIQUES EMPLOYED IN GROWING AND PROCESSING GUAYULE ARE DESCRIBED.
SEE: BA(18)22763. CA (37)767.

UNITED STATES/CULTIVATION/RUBBER EXTRACTION

798

TURNER, C.

1944

NOTES ON AMERICAN RUBBER PRODUCTION.

ROYAL HORTICULTURAL SOCIETY, JOURNAL 69:228-230.

MECHANICAL PROCESSES ARE DESCRIBED FOR GUAYULE SEED COLLECTION, SEED BED PREPARATION, SOWING, WEEDING, TRANSPLANTING, AND HARVESTING. IN THE TRANSPLANTING PROCESS, 4 ROWS ARE PLANTED SIMULTANEOUSLY AT THE RATE OF 10,000 PLANTS PER HOUR OR 10 ACRES IN A 10-HOUR DAY.
SEE: BA(20)18439. HA (14)1721.

SEEDS/PLANTING MANAGEMENT/CULTIVATION

799

TYSDAL, H.M.

1950

APOMICTIC INTERSPECIFIC HYBRIDS ARE PROMISING FOR RUBBER PRODUCTION FROM GUAYULE.

AGRONOMY JOURNAL 42(7):351-355.

HYBRIDS BETWEEN GUAYULE AND THE CLOSELY RELATED PARTHENIUM STROMONIUM BREED TRUE, HAVE ABOUT TWICE THE GROWTH AND ABOUT TWO-THIRDS THE RUBBER CONTENT OF THE GUAYULE PARENTS, THUS PRODUCING ABOUT 40 PERCENT MORE RUBBER. OTHER CLOSELY RELATED SPECIES ALSO HAVE DESIRABLE CHARACTERISTICS THAT MIGHT BE UTILIZED IN A PLANT BREEDING PROGRAM.
SEE: BA(24)32677. HA (20)3048.

GENETICS/PLANT BREEDING/PLANT GROWTH/RUBBER YIELD

800

TYSDAL, H.M.

1953

REPORT OF THE GUAYULE SEED STOCKPILE AND ITS POSSIBLE USE.

(UNPUBLISHED). 15 P.

SEEDS/PLANTING MANAGEMENT

801

TYSDAL, H.M./RANDS, R.D.

1953

BREEDING FOR DISEASE RESISTANCE AND HIGHER RUBBER YIELD IN HEAVEA, GUAYULE, AND KOK-SAGHYZ.

AGRONOMY JOURNAL 5:234-243.

PLANT BREEDING/RUBBER YIELD

802

TYSDAL, H.M./RANDS, R.D.

1953

NATURAL RUBBER: U.S. FARMERS CAN GROW IT.

CROPS AND SOILS 6(3):16-17.

THE POTENTIAL FOR PLANTATION GROWTH OF GUAYULE IN THE AMERICAN SOUTHWEST IS DISCUSSED. RECENT IMPROVEMENTS ARE MENTIONED IN GUAYULE VARIETIES THROUGH PLANT BREEDING, IN METHODS OF CULTURE, SEED HARVESTING, AND METHODS OF PROCESSING.

UNITED STATES/CULTIVATION/PLANT BREEDING/HARVESTING/SEEDS/RUBBER EXTRACTION

803

U.S. AGRICULTURAL RESEARCH ADMINISTRATION, WASHINGTON, D.C.

1947

PROGRESS REPORT OF RESEARCH ON STRATEGIC AND CRITICAL AGRICULTURAL MATERIALS (AUG. 1 - NOV. 30, 1947).

SAME AS AUTHOR. 6 P.

ECONOMICS

804

U.S. AGRICULTURAL RESEARCH ADMINISTRATION, WASHINGTON, D.C.

1949

RESEARCH ON STRATEGIC AND CRITICAL AGRICULTURAL MATERIALS: RUBBER (DECEMBER 1, 1949 - MAY 31, 1949).

SAME AS AUTHOR. PROGRESS REPORT 4. 16 P.

PLANTING MANAGEMENT

805

U.S. AGRICULTURAL RESEARCH ADMINISTRATION, WASHINGTON, D.C.

1949

RESEARCH ON STRATEGIC AND CRITICAL AGRICULTURAL MATERIALS: RUBBER (JUNE 1, 1949 - NOVEMBER 30, 1949).

SAME AS AUTHOR. PROGRESS REPORT 5. 11 P.

806

U.S. AGRICULTURAL RESEARCH ADMINISTRATION, WASHINGTON, D.C.

1950

RESEARCH ON STRATEGIC AND CRITICAL AGRICULTURAL MATERIALS: RUBBER (DECEMBER 1, 1948 - MAY 31, 1949).

SAME AS AUTHOR. PROGRESS REPORT 6. 11 P.

PLANTING MANAGEMENT/RUBBER YIELD

807

U.S. AGRICULTURAL RESEARCH ADMINISTRATION, WASHINGTON, D.C.

1950

RESEARCH ON STRATEGIC AND CRITICAL AGRICULTURAL MATERIALS: RUBBER (JUNE 1, 1950 - NOVEMBER 30, 1950).

SAME AS AUTHOR. PROGRESS REPORT 7. 10 P.

808

U.S. AGRICULTURAL RESEARCH ADMINISTRATION, WASHINGTON, D.C.

1951

RESEARCH ON STRATEGIC AND CRITICAL AGRICULTURAL MATERIALS: RUBBER (JUNE 1, 1951 - NOVEMBER 30, 1951).

SAME AS AUTHOR. PROGRESS REPORT 9. 11 P.

809

U.S. AGRICULTURAL RESEARCH ADMINISTRATION, WASHINGTON, D.C.

1951

RESEARCH ON STRATEGIC AND CRITICAL AGRICULTURAL MATERIALS: RUBBER (NOVEMBER 1, 1950 - MAY 31, 1951).

SAME AS AUTHOR. PROGRESS REPORT 8. 8 P.

810

U.S. AGRICULTURAL RESEARCH ADMINISTRATION, WASHINGTON, D.C.

1952

RESEARCH ON STRATEGIC AND CRITICAL AGRICULTURAL MATERIALS: RUBBER (DECEMBER 1, 1952 - MAY 31, 1953).

SAME AS AUTHOR. PROGRESS REPORT 12. 13 P.

811

U.S. BUREAU OF AGRICULTURAL AND INDUSTRIAL CHEMISTRY, WASHINGTON, D.C.

1950

LIST OF PUBLICATIONS AND PATENTS WITH ABSTRACTS PERTAINING TO RESEARCH ON NATURAL RUBBER, 1944-1949.

SAME AS AUTHOR. PUBLICATION AIC-276. 8 P.

SEE: HA (21)820.

U.S. PATENTS/BIBLIOGRAPHIES

812

U.S. BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE, WASHINGTON, D.C., DIVISION OF FOREST INSECT INVESTIGATIONS

1942

POTENTIAL INSECT ENEMIES OF GUAYULE.

SAME AS AUTHOR.

INSECTS/PLANT INJURY

813

U.S. BUREAU OF PLANT INDUSTRY, SOILS, AND AGRICULTURAL ENGINEERING, BELTSVILLE, MARYLAND, PATHOLOGY DIVISION

1944

GUAYULE NURSERY DISEASES AND THEIR CONTROL.

SAME AS AUTHOR. 20 P.

PLANT INJURY/MICROORGANISMS

814

U.S. BUREAU OF PLANT INDUSTRY, SOILS, AND AGRICULTURAL ENGINEERING, WASHINGTON, D.C.

1942

GUAYULE AS AN EMERGENCY SOURCE OF CRUDE RUBBER.

SAME AS AUTHOR. 4 P.

USES

815

U.S. BUREAU OF PLANT INDUSTRY, SOILS, AND AGRICULTURAL ENGINEERING, WASHINGTON, D.C.

1943

GUAYULE NURSERY CULTURE IN CHILE (SANTIAGO).

SAME AS AUTHOR.

SOUTH AMERICA/PLANTING MANAGEMENT

816

U.S. BUREAU OF PLANT INDUSTRY, SOILS, AND AGRICULTURAL ENGINEERING, WASHINGTON, D.C.

1944

REPORT ON ACTIVITIES OF THE SPECIAL GUAYULE RESEARCH PROJECT.

SAME AS AUTHOR. 14 P.

CULTIVATION

817

U.S. BUREAU OF PLANT INDUSTRY, SOILS, AND AGRICULTURAL ENGINEERING, WASHINGTON, D.C.

1951

BIWEEKLY REPORT OF STOCKPILING ACTIVITIES IN CALIFORNIA AND TEXAS (MAY 19 - JUNE 1, 1951).

SAME AS AUTHOR. 13 P. (UNPUBLISHED)

CALIFORNIA/TEXAS/SEEDS/PLANTING MANAGEMENT

818

U.S. BUREAU OF PLANT INDUSTRY, SOILS, AND AGRICULTURAL ENGINEERING, WASHINGTON, D.C.

1951

BIWEEKLY REPORT OF STOCKPILING ACTIVITIES IN CALIFORNIA AND TEXAS (OCTOBER 6-19, 1951).

SAME AS AUTHOR. 5 P. (UNPUBLISHED)

PLANTING MANAGEMENT/CALIFORNIA/TEXAS/SEEDS

819

U.S BUREAU OF PLANT INDUSTRY, SOILS, AND AGRICULTURAL ENGINEERING, WASHINGTON, D.C.

1952

GUAYULE SEEDLING STOCKPILING PROJECT IN ZAVALA AND MAVERICK COUNTIES, TEXAS, 1951.

SAME AS AUTHOR. 199 P. (UNPUBLISHED)

TEXAS/SEEDS/PLANTING MANAGEMENT

820

U.S. BUREAU OF PLANT INDUSTRY, SOILS, AND AGRICULTURAL ENGINEERING, WASHINGTON, D.C.

1952

PROPOSED RESEARCH ON GUAYULE IN TEXAS.

SAME AS AUTHOR. 6 P. (UNPUBLISHED)

TEXAS

821

U.S. BUREAU OF PLANT INDUSTRY, SOILS, AND AGRICULTURAL ENGINEERING, WASHINGTON, D.C.

1954

REPORT OF THE CHIEF, 1953.

SAME AS AUTHOR. 128 P.

SEE: HA (24)4490.

RUBBER YIELD/PLANT BREEDING

822

U.S. BUREAU OF RECLAMATION, WASHINGTON, D.C.

1947

CENTRAL VALLEY PROJECT STUDIES: THE WAR PROGRAM, PROBLEMS.

SAME AS AUTHOR. 150 P.

ECONOMICS

823

U.S. DEPARTMENT OF AGRICULTURE, SALINAS, CALIFORNIA, DIVISION OF FARM MECHNICAL EQUIPMENT RESEARCH

1943

ANNUAL REPORT, 1942: GUAYULE EMERGENCY RUBBER PROJECT.

SAME AS AUTHOR.

CALIFORNIA/CULTIVATION

824

U.S. DEPARTMENT OF AGRICULTURE, WASHINGTON, D.C.

1934

FEDERAL SCIENTISTS SPEED RUBBER PLANT EXPERIMENTS (PRESS RELEASE).

SAME AS AUTHOR. 5 P.

825

U.S. DEPARTMENT OF AGRICULTURE, WASHINGTON, D.C.

1942

GUAYULE RUBBER PRODUCTION LAUNCHED BY U.S.D.A. (PRESS RELEASE).

SAME AS AUTHOR. 4 P.

826

U.S. DEPARTMENT OF AGRICULTURE, WASHINGTON, D.C.

1942

NURSERY PLANTING COMPLETED IN GUAYULE RUBBER PROJECT (PRESS RELEASE).

SAME AS AUTHOR. 3 P.

PLANTING MANAGEMENT

827

U.S. DEPARTMENT OF AGRICULTURE, WASHINGTON, D.C.

1942

RAPID PROGRESS REPORTED ON GUAYULE RUBBER PROJECT (PRESS RELEASE).

SAME AS AUTHOR. 2 P.

828

U.S. DEPARTMENT OF AGRICULTURE, WASHINGTON, D.C.

1943

GUAYULE EMERGENCY RUBBER PROGRAM IS BEING CURTAILED (PRESS RELEASE).

SAME AS AUTHOR. 2 P.

829

U.S. DEPARTMENT OF AGRICULTURE, WASHINGTON, D.C.

1943

GUAYULE RUBBER NOW BEING EXTRACTED FOR WAR NEEDS (PRESS RELEASE).

SAME AS AUTHOR. 2 P.

USES/RUBBER EXTRACTION

830

U.S. DEPARTMENT OF AGRICULTURE, WASHINGTON, D.C.

1943

PROGRESS REPORTED IN GUAYULE RUBBER PROJECT (PRESS RELEASE).

SAME AS AUTHOR. 4 P.

831

U.S. DEPARTMENT OF AGRICULTURE, WASHINGTON, D.C.

1943

TEXAS' WILD GUAYULE AIDS RUBBER SUPPLY (PRESS RELEASE).

SAME AS AUTHOR. 2 P.

TEXAS/PLANT DISTRIBUTION

832

U.S. DEPARTMENT OF AGRICULTURE, WASHINGTON, D.C., OFFICE OF THE SECRETARY

1942

DESIGNATION OF RESPONSIBILITY TO FOREST SERVICE FOR GUAYULE RUBBER.

SAME AS AUTHOR. MEMO 991. 1 P.

LEGISLATION

833

U.S. DEPARTMENT OF AGRICULTURE, WYNDMOOR, PENNSYLVANIA, EASTERN RESEARCH LABORATORY

1943

NOTES ON GUAYULE RUBBER PROCESSING FROM SECTIONS 208, 209, AND 210 OF DATA IN THE SALINAS FILES OF THE INTERCONTINENTAL RUBBER COMPANY, SALINAS, CALIFORNIA.

SAME AS AUTHOR. 8 P.

CALIFORNIA/RUBBER EXTRACTION

834

U.S. EMPLOYMENT SERVICE, SACRAMENTO, CALIFORNIA

1942

GUAYULE: ESTIMATED LABOR REQUIREMENTS FOR PLANTING AND WEEDING 50,000 ACRES IN CALIFORNIA, 1942-1943.

SAME AS AUTHOR. 2 P.

CULTIVATION/ECONOMICS/PLANTING MANAGEMENT/CALIFORNIA

835

U.S. FOREST SERVICE, SALINAS, CALIFORNIA, EMERGENCY RUBBER PROJECT

1942

QUESTIONS AND ANSWERS.

SAME AS AUTHOR. 6 P.

836

U.S. FOREST SERVICE, SALINAS, CALIFORNIA, EMERGENCY RUBBER PROJECT

1942

SOME FACTS ABOUT GUAYULE CULTURE.

SAME AS AUTHOR. 5 P.

CULTIVATION/PLANTING MANAGEMENT

837

U.S. FOREST SERVICE, SALINAS, CALIFORNIA, EMERGENCY RUBBER PROJECT.

1943

RUBBER FROM GUAYULE.

SAME AS AUTHOR. 8 P.

838

U.S. FOREST SERVICE, WASHINGTON, D.C.

1944

A REPORT ON THE GUAYULE PROJECT OF THE UNITED STATES DEPARTMENT OF AGRICULTURE UNDERTAKEN PURSUANT TO THE ACT OF MARCH 5, 1942 AS AMENDED.

SAME AS AUTHOR. 43 P.

LEGISLATION

839

U.S. FOREST SERVICE, WASHINGTON, D.C., DIVISION OF SURVEYS AND OPERATIONAL INVESTIGATIONS, EMERGENCY RUBBER PROJECT

1945

GUAYULE; A SURVEY OF POSSIBLE PRODUCTION AREAS IN THE UNITED STATES: ARIZONA - NEW MEXICO.

SAME AS AUTHOR. 167 P.

ARIZONA/NEW MEXICO/PLANTING MANAGEMENT

840

U.S. FOREST SERVICE, WASHINGTON, D.C., DIVISION OF SURVEYS AND OPERATIONAL INVESTIGATIONS, EMERGENCY RUBBER PROJECT

1945

GUAYULE; A SURVEY OF POSSIBLE PRODUCTION AREAS IN THE UNITED STATES: CALIFORNIA.

SAME AS AUTHOR. 259 P.

CALIFORNIA/PLANTING MANAGEMENT

841

U.S. FOREST SERVICE, WASHINGTON, D.C., DIVISION OF SURVEYS AND OPERATIONAL INVESTIGATIONS, EMERGENCY RUBBER PROJECT

1945

GUAYULE; A SURVEY OF POSSIBLE PRODUCTION AREAS IN THE UNITED STATES: TEXAS.

SAME AS AUTHOR. 221 P.

TEXAS/PLANTING MANAGEMENT

842

U.S. FOREST SERVICE, WASHINGTON, D.C., EMERGENCY RUBBER PROJECT

1942

GUAYULE CULTURE.

SAME AS AUTHOR. 14 P.

CULTIVATION/PLANTING MANAGEMENT

843

U.S. FOREST SERVICE, WASHINGTON, D.C., EMERGENCY RUBBER PROJECT

1942

REPORT ON THE POSSIBILITIES OF GUAYULE IN THE SOUTHWESTERN UNITED STATES FROM THE STANDPOINT OF CLIMATE.

SAME AS AUTHOR.

UNITED STATES/PLANTING MANAGEMENT

844

U.S. FOREST SERVICE, WASHINGTON, D.C., EMERGENCY RUBBER PROJECT

1944

GUAYULE RUBBER PRODUCTION BY THE EMERGENCY RUBBER PROJECT.

INDIA RUBBER WORLD 109:363-366.

CULTIVATION

845

U.S. FOREST SERVICE, WASHINGTON, D.C., EMERGENCY RUBBER PROJECT

1946

CLIMATE AND GUAYULE CULTURE.

SAME AS AUTHOR. 17 P.

PLANTING MANAGEMENT

846

U.S. FOREST SERVICE, WASHINGTON, D.C., EMERGENCY RUBBER PROJECT

1946

THE PROCESSING OF GUAYULE RUBBER.

SAME AS AUTHOR. 59 P.

RUBBER EXTRACTION

847

U.S. HOUSE OF REPRESENTATIVES

1942

GUAYULE RUBBER.

CONGRESSIONAL RECORD 88:1091-1120, 1827-1828.

LEGISLATION

848

U.S. HOUSE OF REPRESENTATIVES

1943

GUAYULE RUBBER PROGRAM.

CONGRESSIONAL RECORD 89:10324-10327.

LEGISLATION

849

U.S. HOUSE OF REPRESENTATIVES

1945

COMPLETE LIQUIDATION OF EMERGENCY RUBBER PROJECT EXTENDED TO DECEMBER 31, 1946.

CONGRESSIONAL RECORD 91:11,458-11,460.

LEGISLATION

850

U.S. HOUSE OF REPRESENTATIVES

1945

COMPLETE LIQUIDATION OF EMERGENCY RUBBER PROJECT REQUIRED BY JUNE 30, 1946.

CONGRESSIONAL RECORD 91:9981-10,010.

LEGISLATION

851

U.S. HOUSE OF REPRESENTATIVES, COMMITTEE ON AGRICULTURE, 77TH CONGRESS, 2D SESSION

1942

GUAYULE AND OTHER RUBBER-BEARING PLANTS.

U.S. GOVERNMENT PRINTING OFFICE, WASHINGTON, D.C. 5 P.

LEGISLATION

852

U.S. HOUSE OF REPRESENTATIVES, COMMITTEE ON AGRICULTURE, 77TH CONGRESS, 2D SESSION

1942

GUAYULE RUBBER.

U.S. GOVERNMENT PRINTING OFFICE, WASHINGTON, D.C. 8 P.

LEGISLATION

853

U.S. HOUSE OF REPRESENTATIVES, COMMITTEE ON AGRICULTURE, 77TH CONGRESS, 2D SESSION

1942

GUAYULE RUBBER HEARING.

U.S. GOVERNMENT PRINTING OFFICE, WASHINGTON, D.C., 113 P.

LEGISLATION

854

U.S. HOUSE OF REPRESENTATIVES, COMMITTEE ON AGRICULTURE, 78TH CONGRESS, 2D SESSION

1945

A REPORT ON A STUDY OF RUBBER IN THE UNITED STATES, MEXICO AND HAITI.

U.S. GOVERNMENT PRINTING OFFICE, WASHINGTON, D.C. 22 P.

LEGISLATION/UNITED STATES/MEXICO/ECONOMICS

855

U.S. HOUSE OF REPRESENTATIVES, COMMITTEE ON AGRICULTURE, 78TH CONGRESS, 2D SESSION

1945

STUDY OF RUBBER IN THE UNITED STATES, MEXICO, AND HAITI.

U.S. GOVERNMENT PRINTING OFFICE, WASHINGTON, D.C. 22 P.

UNITED STATES/MEXICO/LEGISLATION

856

U.S. HOUSE OF REPRESENTATIVES, COMMITTEE ON AGRICULTURE, 79TH CONGRESS, 1ST SESSION

1945

PROVIDING AND INSURING A SUPPLY OF DOMESTIC AND NATURAL RUBBER.

U.S. GOVERNMENT PRINTING OFFICE, WASHINGTON, D.C. 4 P.

LEGISLATION

857

U.S. HOUSE OF REPRESENTATIVES, COMMITTEE ON APPROPRIATIONS, 78TH CONGRESS, 1ST SESSION

1943

FIRST SUPPLEMENTAL NATIONAL DEFENSE APPROPRIATION BILL FOR 1944: HEARINGS.

U.S. GOVERNMENT PRINTING OFFICE, WASHINGTON, D.C. 1638 P.

LEGISLATION

858

U.S. HOUSE OF REPRESENTATIVES, COMMITTEE ON APPROPRIATIONS, 78TH CONGRESS, 2D SESSION

1942

SECOND DEFICIENCY APPROPRIATION BILL FOR 1942: HEARINGS.

U.S. GOVERNMENT PRINTING OFFICE, WASHINGTON, D.C. 105 P.

LEGISLATION

859

U.S. HOUSE OF REPRESENTATIVES, COMMITTEE ON APPROPRIATIONS, 79TH CONGRESS, 1ST SESSION

1945

A REPORT ON RESTORING FUNDS TO MAINTAIN 10,000 ACRES OF PLANTATIONS WHICH THE BUDGET BUREAU RECOMMENDED BE PLOWED UP.

U.S. GOVERNMENT PRINTING OFFICE, WASHINGTON, D.C.

LEGISLATION/ECONOMICS

860

U.S. HOUSE OF REPRESENTATIVES, 77TH CONGRESS, 1ST SESSION

1941

A BILL TO PROVIDE FOR THE PLANTING OF 45,000 ACRES OF GUAYULE IN ORDER TO MAKE AVAILABLE A DOMESTIC SOURCE OF CRUDE RUBBER FOR EMERGENCY AND DEFENSE USES.

U.S. GOVERNMENT PRINTING OFFICE, WASHINGTON, D.C. 6 P.

LEGISLATION/USES

861

U.S. HOUSE OF REPRESENTATIVES, 77TH CONGRESS, 2D SESSION

1942

A BILL TO PROVIDE FOR THE PLANTING OF GUAYULE AND OTHER RUBBER-BEARING PLANTS AND TO MAKE AVAILABLE A SOURCE OF CRUDE RUBBER FOR EMERGENCY AND DEFENSE USES.

U.S. GOVERNMENT PRINTING OFFICE, WASHINGTON, D.C. 5 P.

LEGISLATION/USES

862

U.S. HOUSE OF REPRESENTATIVES, 77TH CONGRESS, 2D SESSION

1942

A BILL TO PROVIDE FOR THE PLANTING OF 75,000 ACRES OF GUAYULE OR OTHER RUBBER-BEARING PLANTS IN ORDER TO MAKE AVAILABLE A DOMESTIC SOURCE OF CRUDE RUBBER FOR EMERGENCY AND DEFENSE USES.

U.S. GOVERNMENT PRINTING OFFICE, WASHINGTON, D.C. 5 P.

LEGISLATION/USES

863

U.S. HOUSE OF REPRESENTATIVES, 78TH CONGRESS, 1ST SESSION

1943

RESOLUTION PROVIDING FOR AN INVESTIGATION OF THE PROGRAM FOR THE PLANTING OF GUAYULE TO SERVE AS A DOMESTIC SOURCE OF CRUDE RUBBER.

U.S. GOVERNMENT PRINTING OFFICE, WASHINGTON, D.C. 2 P.

LEGISLATION/ECONOMICS

864

U.S. HOUSE OF REPRESENTATIVES, 79TH CONGRESS, 1ST SESSION

1945

A BILL TO PROVIDE AND INSURE A DEPENDABLE SUPPLY OF DOMESTIC NATURAL RUBBER.

U.S. GOVERNMENT PRINTING OFFICE, WASHINGTON, D.C.

LEGISLATION/ECONOMICS

865

U.S. PRESIDENT, 77TH CONGRESS, 2D SESSION

1942

PLANTING OF GUAYULE AND OTHER RUBBER-BEARING PLANTS: VETO MESSAGE.

U.S. GOVERNMENT PRINTING OFFICE, WASHINGTON, D.C. 3 P.

LEGISLATION/CULTIVATION

866

U.S. PRESIDENT, 77TH CONGRESS, 2D SESSION

1943

SUPPLEMENTAL ESTIMATE OF APPROPRIATION FOR EMERGENCY RUBBER PROJECT, DEPARTMENT OF AGRICULTURE, COMMUNICATION FROM THE PRESIDENT.

U.S. GOVERNMENT PRINTING OFFICE, WASHINGTON, D.C. 3 P.

LEGISLATION/ECONOMICS

867

U.S. PRESIDENT, 77TH CONGRESS, 2D SESSION

1943

THE RUBBER SITUATION, MESSAGE TRANSMITTING DIGEST AND REPORT OF THE SPECIAL (BARUCH) COMMITTEE TO STUDY THE RUBBER SITUATION AND RECOMMEND ACTION.

U.S. GOVERNMENT PRINTING OFFICE, WASHINGTON, D.C. 46 P.

LEGISLATION/ECONOMICS

868

U.S. PRESIDENT, 78TH CONGRESS, 1ST SESSION

1943

SUPPLEMENTAL ESTIMATE OF APPROPRIATION FOR EMERGENCY RUBBER PROJECT, DEPARTMENT OF AGRICULTURE, COMMUNICATION FROM THE PRESIDENT.

U.S. GOVERNMENT PRINTING OFFICE, WASHINGTON, D.C. 2 P.

LEGISLATION/ECONOMICS

869

U.S. SENATE

1941

PRODUCTION OF RUBBER FROM GUAYULE.

CONGRESSIONAL RECORD 87(24):10361-10363.

LEGISLATION

870

U.S. SENATE

1942

INVESTIGATION OF RUBBER SUPPLIES AND PRODUCTION.

CONGRESSIONAL RECORD 88(2):506-508.

LEGISLATION

871

U.S. SENATE

1942

PRODUCTION OF RUBBER FROM GUAYULE.

CONGRESSIONAL RECORD 88:389-392, 1159-1160, 1366-1367.

LEGISLATION

872

U.S. SENATE, COMMITTEE ON AGRICULTURE AND FORESTRY, 78TH CONGRESS, 1ST SESSION

1943

A RESOLUTION FOR AN INVESTIGATION RELATIVE TO THE PRODUCTION OF INDUSTRIAL ALCOHOL, SYNTHETIC ALCOHOL, AND SYNTHETIC RUBBER FROM FARM CROPS: HEARINGS. PT. 6.

U.S. GOVERNMENT PRINTING OFFICE, WASHINGTON, D.C. P. 1659-1702.

LEGISLATION/CHEMISTRY

873

U.S. SENATE, COMMITTEE ON APPROPRIATIONS, 78TH CONGRESS, 1ST SESSION

1943

FIRST SUPPLEMENTAL NATIONAL DEFENSE APPROPRIATION BILL FOR 1944: HEARINGS.

U.S. GOVERNMENT PRINTING OFFICE, WASHINGTON, D.C. 764 P.

LEGISLATION

874

U.S. SENATE, COMMITTEE ON MILITARY AFFAIRS, 77TH CONGRESS, 1ST AND 2D SESSIONS

1941 - 1942

GUAYULE RUBBER AS A STRATEGIC AND CRITICAL MATERIAL: HEARINGS. 2 PTS.

U.S. GOVERNMENT PRINTING OFFICE, WASHINGTON, D.C.

LEGISLATION/USES

875

U.S. SENATE, COMMITTEE ON MILITARY AFFAIRS, 77TH CONGRESS, 1ST SESSION

1941

GUAYULE RUBBER.

U.S. GOVERNMENT PRINTING OFFICE, WASHINGTON, D.C. 3 P.

LEGISLATION

876

U.S. SENATE, COMMITTEE ON MILITARY AFFAIRS, 77TH CONGRESS, 2D SESSION

1942

A BILL RELATING TO THE PLANTING OF GUAYULE AND OTHER RUBBER-BEARING PLANTS: HEARINGS.

U.S. GOVERNMENT PRINTING OFFICE, WASHINGTON, D.C. 20 P.

LEGISLATION/CULTIVATION

877

U.S. SENATE, COMMITTEE ON MILITARY AFFAIRS, 77TH CONGRESS, 2D SESSION

1942

EXPANSION OF PROGRAM RELATING TO PLANTING OF GUAYULE AND OTHER RUBBER-BEARING PLANTS.

U.S. GOVERNMENT PRINTING OFFICE, WASHINGTON, D.C. 2 P.

LEGISLATION/CULTIVATION

878

U.S. SENATE, COMMITTEE ON MILITARY AFFAIRS, 77TH CONGRESS, 2D SESSION

1942

GUAYULE RUBBER.

U.S. GOVERNMENT PRINTING OFFICE, WASHINGTON, D.C. 12 P.

LEGISLATION

879

U.S. SENATE, 77TH CONGRESS, 1ST SESSION

1942

A BILL TO PROVIDE FOR THE PLANTING OF 45,000 ACRES OF GUAYULE IN ORDER TO MAKE AVAILABLE A DOMESTIC SOURCE OF CRUDE RUBBER FOR EMERGENCY AND DEFENSE USES.

U.S. GOVERNMENT PRINTING OFFICE, WASHINGTON, D.C. 5 P.

LEGISLATION/USES

880

U.S. SENATE, 77TH CONGRESS, 2D SESSION

1942

A BILL RELATING TO THE PLANTING OF GUAYULE AND OTHER RUBBER-BEARING PLANTS.

U.S. GOVERNMENT PRINTING OFFICE, WASHINGTON, D.C. 2 P.

LEGISLATION/CULTIVATION

881

U.S. SENATE, 77TH CONGRESS, 2D SESSION

1942

A BILL TO PROVIDE FOR THE PLANTING OF GUAYULE AND OTHER RUBBER-BEARING PLANTS AND TO MAKE AVAILABLE A SOURCE OF CRUDE RUBBER FOR EMERGENCY AND DEFENSE USES.

U.S. GOVERNMENT PRINTING OFFICE, WASHINGTON, D.C. 5 P.

USES/LEGISLATION

882

U.S. SOIL CONSERVATION SERVICE, LOS ANGELES, DIVISION OF IRRIGATION

1943

PROGRESS REPORT OF ACTIVITIES OF THE IRRIGATION STAFF FOR THE EMERGENCY RUBBER PROJECT.

SAME AS AUTHOR.

CALIFORNIA/IRRIGATION EFFECTS

883

U.S. TARIFF COMMISSION, WASHINGTON, D.C.

1941

RUBBER: POSSIBILITIES OF PRODUCING RUBBER IN THE UNITED STATES AND RUBBER CONSERVATION.

SAME AS AUTHOR. 14 P.

USES

884

U.S. WAR DEPARTMENT, WASHINGTON, D.C.

1930

REPORT OF INSPECTION OF GUAYULE RUBBER INDUSTRY.

(UNPUBLISHED). 24 P.

ECONOMICS

885

U.S. WEATHER BUREAU, WASHINGTON, D.C.

1942

SOUTH AMERICAN AREAS CLIMATICALLY SUITED TO GUAYULE: SPECIAL REPORT.

SAME AS AUTHOR.

SOUTH AMERICA/PLANTING MANAGEMENT

886

VAL'DMAN, G.

1933

GUAYULÉ KPKH NO. 4 AND MARGUSHEVAN (TRANSLATED TITLE).

SOVETSKII KAUCHUK 4:26-29.

U.S.S.R.

887

VAN DER LINDE, H.

1910

GUAYULE RUBBER.

SOCIETY OF CHEMICAL INDUSTRY, JOURNAL 29:1283-1284.

SEE: CA (5)3346.

PLANT DISTRIBUTION/ECONOMICS

888

VAN DER LINDE, H.

1910

SEPARATION OF RUBBER FROM MIXTURES BY INCREASING BOUYANCY OF RUBBER PARTICLES WITH SOME SUBSTANCE.

U.S. PATENT 979,902.

U.S. PATENTS/RUBBER EXTRACTION

889

VASQUEZ, E.R.

1938

THE ECONOMIC SITUATION OF GUAYULE PRODUCTION IN MEXICO (TRANSLATED TITLE).

MEXICO, ECONOMICS LICENTIATE THESIS. 42 P.

MEXICO/ECONOMICS

890

VASQUEZ VALERO, M./ROYO MARTINEZ, J.

1962

UTILIZATION OF RUBBER FROM PARTHENIUM ARGENTATUM. I: PREPARATION OF CHLORINATED RUBBER (TRANSLATED TITLE).

REAL SOCIEDAD ESPANOLA DE FISICA Y QUIMICA, ANALES, SER. B 58:197-201.

CURED NATURAL RUBBER FROM GUAYULE IS EITHER INFERIOR OR MORE EXPENSIVE THAN HEVEA VULCANIZATES BECAUSE OF THE HIGH RESIN CONTENT OF ABOUT 30 PERCENT. CHLORINATED GUAYULE RUBBERS WERE FOUND USEFUL FOR PAINT BASES.
SEE: CA(57)10005.

USES/CHEMISTRY/RUBBER QUALITY/RESINS

891

VAVILOV, N.I.

1931

PROBLEM OF RUBBER PLANTS IN NORTH AMERICA: THE CONTEMPORARY CONDITION OF UTILIZATION OF WILD RUBBER PLANTS ANDCULTIVATION IN NORTH AMERICA, FROM THE STANDPOINT OF SOLVING THE PROBLEM IN U.S.S.R. (TRANSLATED TITLE).

TRUDY PO PRIKLADNOI, BOTANIKE, GENETIKE I SELEKTSII 26(3):201-267,

UNITED STATES/U.S.S.R./CULTIVATION/PLANTING MANAGEMENT

892

VEIHMEYER, F.J./HENDRICKSON, A.H.

1961

RESPONSES OF A PLANT TO SOIL-MOISTURE CHANGES AS SHOWN BY GUAYULE.

HILGARDIA 30(20):621-637.

EXPERIMENTS WITH GUAYULE OVER A 3-YEAR PERIOD INDICATE THAT SOIL MOISTURE IS EQUALLY AVAILABLE FOR TRANSPIRATION BETWEEN FIELD CAPACITY AND PERMANENT WILTING POINT. IRRIGATED PLANTS PRODUCED LESS RUBBER THAN UNIRRIGATED PLANTS THAT ONLY RECEIVED MOISTURE FROM WINTER RAINS.
SEE: HA (31)6637.

SOIL-WATER-PLANT RELATIONSHIPS/IRRIGATION EFFECTS/RUBBER YIELD/ MOISTURE STRESS

893

VEL'TISHCHEV, P.A.

1937

PESTS OF GUAYULE IN THE U.S.S.R. (TRANSLATED TITLE).

SOVIET SUBTROPICS 9:72-76.

INSECTS/PLANT INJURY/U.S.S.R.

894

VEL'TISHCHEV, P.A.

1939

POLLINATORS OF PARTHENIUM ARGENTATUM IN U.S.S.R. (TRANSLATED TITLE).

PRIRODA 4:52-53.

POLLINATION/U.S.S.R.

895

VESSEL, A.J.

1943

CLASSIFICATION OF SOILS AND TRACTS FOR GUAYUULE: TRACY-NEWMAN-LOS BANOS-MENDOTA AREA, CALIFORNIA.

(UNPUBLISHED). 114 P.

CALIFORNIA/SOIL-WATER-PLANT RELATIONSHIPS/PLANTING MANAGEMENT

896

VON POLETIKA, W.

1937

RUSSIAN PLANTS WHICH YIELD RUBBER (TRANSLATED TITLE).

FORSCHUNGSDIENST 3:200-207.

SEE:CA (32)5657.

U.S.S.R.

897

VORONOV, I.N.

1928

MEXICAN RUBBER BUSH GUAYULE (TRANSLATED TITLE).

IZVESTIIA VAESOIUZNYI INSTITUT PRIKLADNOI BOTANIKI NOVYKH KUL'TUR, LENINGRAD. 58 P.

U.S.S.R.

898

WADLEIGH, C.H./GAUCH, H.G.

1944

THE INFLUENCE OF HIGH CONCENTRATIONS OF SODIUM SULFATE, SODIUM CHLORIDE, CALCIUM CHLORIDE, AND MAGNESIUM CHLORIDE ON THE GROWTH OF GUAYULE IN SAND CULTURE.

SOIL SCIENCE 58:399-403.

EXPERIMENTAL DATA INDICATE THAT GUAYULE IS NOT SALT-TOLERANT. SAND CULTURE PLANTS WERE VERY SENSITIVE TO MAGNESIUM CHLORIDE, MODERATELY SENSITIVE TO SODIUM CHLORIDE AND SODIUM SULFATE, AND WERE TOLERANT OF CALCIUM CHLORIDE. SEE: CA (39)1720. HA (15)666.

CHEMISTRY/SALT TOLERANCE/PLANT GROWTH/PLANT PHYSIOLOGY

899

WADLEIGH, C.H./GAUCH, H.G./MAGISTAD, O.C.

1946

GROWTH AND RUBBER ACCUMULATION IN GUAYULE AS CONDITIONED BY SOIL SALINITY AND IRRIGATION REGIME.

U.S. DEPARTMENT OF AGRICULTURE, TECHNICAL BULLETIN 925:1-34.

THERE WAS GENERALLY A MARKED DECREASE IN RUBBER YIELD PER PLANT WITH INCREASING SALINITY AND MOISTURE TENSION. GROWTH INHIBITION WAS CLOSELY RELATED TO TOTAL MOISTURE STRESS DUE EITHER TO MOISTURE TENSION OR OSMOTIC POTENTIAL OF THE SOIL SOLUTION AND THE PERCENTAGE OF RUBBER IN GUAYULE WAS CLOSELY RELATED TO THE AVERAGE MOISTURE STRESS OVER AN IRRIGATION INTERVAL.
SEE: BA(21)10092. CA (42)6976.

RUBBER YIELD/SALT TOLERANCE/MOISTURE STRESS/SOIL-WATER-PLANT RELATIONSHIPS/ IRRIGATION EFFECTS

900

WAITE AGRICULTURAL RESEARCH INSTITUTE, ADELAIDE, SOUTH AUSTRALIA

1943

REPORT FOR 1941-1942.

SAME AS AUTHOR. 84 P.

A GUAYULE RESEARCH PROGRAM BEGINNING IN JULY 1942 IS DESCRIBED, INCLUDING PROCEDURES USED TO OVERCOME DIFFICULTIES IN SEED GERMINATION. PLANT DEVELOPMENT WAS BEST ON IRRIGATED LIGHT AND MEDIUM TEXTURED SOILS, BUT HEAVY SOILS WERE UNSUITABLE.
SEE: HA (14)1452.

AUSTRALIA/PLANTING MANAGEMENT/IRRIGATION EFFECTS/SEEDLINGS/SEEDS/ SOIL-WATER-PLANT RELATIONSHIPS

901

WAITE AGRICULTURAL RESEARCH INSTITUTE, ADELAIDE, SOUTH AUSTRALIA

1950

REPORT, 1943-1947.

SAME AS AUTHOR. 109 P.

PROCEDURES FOR SUCCESSFUL ESTABLISHMENT OF GUAYULE IN THE FIELD WERE DETERMINED, INCLUDING SEED GERMINATION AND NURSERY PRODUCTION. TOPPING TO THE STEM COLLAR BEFORE TRANSPLANTING RESULTED IN ALMOST 100 PERCENT ESTABLISHMENT WHILE RETENTION OF MATURE LEAVES REDUCED THE PERCENTAGE CONSIDERABLY.
SEE: HA (20)2173.

AUSTRALIA/PLANTING MANAGEMENT/DEFOLIATION

902

WAITE AGRICULTURAL RESEARCH INSTITUTE, ADELAIDE, SOUTH AUSTRALIA

1951

REPORT, 1948-1949.

SAME AS AUTHOR. 68 P.

THE GUAYULE INVESTIGATIONS BEGUN IN 1942 WERE TERMINATED IN 1949. MAXIMUM RUBBER CONTENTS FOR TEST PLOTS ARE GIVEN.
SEE: HA (22)2026.

AUSTRALIA/RUBBER YIELD

903

WALTER, E.D.

1944

NATURAL RUBBER FROM DOMESTIC SOURCES. I: ISOLATION OF PARTHENIOL, PARTHENYL CINNAMATE AND OTHER CONSTITUENTS FROM GUAYULE RESIN.

AMERICAN CHEMICAL SOCIETY, JOURNAL 66(3):419-421.

METHODS FOR ISOLATION AND SOME PROPERTIES OF PARTHENYL CINNAMATE AND PARTHENIOL ARE DESCRIBED ALONG WITH A CRYSTALLINE WAX-LIKE SUBSTANCE AND SEVERAL FRACTIONS OF VOLATILE OILS. RETTING OF THE SHRUB DOES NOT APPEAR TO ALTER RELATIVE PROPORTIONS OF COMPONENTS ISOLATED FROM THE RESIN.
SEE: BA(19)5336. CA (38)2521.

CHEMISTRY/RETTING/RESINS

904

WEBER, C.O.

1903

GUAYULE RUBBER IN REGENERATED RUBBER (TRANSLATED TITLE).

GUMMI-ZEITUNG 18(5):83.

USES

905

WEEKS, G.F.

1928

A MEXICAN INDUSTRIAL ROMANCE: THE REMARKABLE STORY OF GUAYULE, A DESERT SHRUB WITH A HIGH RUBBER CONTENT.

AMERICAN FORESTS AND FOREST LIFE 34(415):411-413.

ECONOMICS/MEXICO/RUBBER YIELD

906

WEEKS, G.F.

1928

EXPLORING FOR RUBBER IN MEXICO.

RUBBER AGE 22:479-481.

MEXICO/PLANT DISTRIBUTION

907

WERKENTHIN, T.A. ET AL

1941

EQUIPMENT FOR ACCELERATED LIGHT AGING OF RUBBER AND METHODS OF EVALUATION OF ULTRA-VIOLET LIGHT AND SUNLIGHT.

INDIA RUBBER WORLD 105:143-146, 264-268.

RUBBER QUALITY

908

WERKENTHIN, T.A. ET AL

1941

LIGHT AND ACCELERATED LIGHT AGING OF RUBBER, SYNTHETIC RUBBER, AND RUBBER SUBSTITUTES.

RUBBER AGE 50:103-108.

RUBBER QUALITY

909

WEST, A.B.

1942

RUBBER FROM THE DESERT.

RECLAMATION ERA 32:64-65.

DISTRIBUTION

910

WHALEY, W.G.

1944

WESTERN HEMISPHERE NATURAL RUBBER.

TORREYA 44(2):17-29.

SELECTED STRAINS OF GUAYULE HAVE RUBBER CONTENTS AS HIGH AS 22 PERCENT AND MAY YIELD A TON OF RUBBER PER ACRE AFTER SEVERAL YEARS GROWTH.
SEE: BA(18)22765.

RUBBER YIELD/CULTIVATION

911

WHALEY, W.G.

1948

RUBBER: THE PRIMARY SOURCES FOR AMERICAN PRODUCTION.

ECONOMIC BOTANY 2(2):198-216.

AMONG SEVERAL PLANTS DESCRIBED, GUAYULE IS THE ONLY ONE CURRENTLY USABLE AS A RUBBER SOURCE IN THE UNITED STATES.
SEE: BA(23)8757. CA (42)6147.

UNITED STATES/RUBBER YIELD

912

WHITE, J.W., JR. ET AL

1945

IMPROVING GUAYULE RUBBER BY SHRUB RETTING.

INDIA RUBBER WORLD 111(5):570-573.

IMPROVEMENTS IN GUAYULE SHRUB RETTING WITH FORCED AERATION ARE DESCRIBED. THE RECOVERED RUBBER HAD A TENSILE STRENGTH OF 3330 POUNDS PER SQUARE INCH AND THE RESIN CONTENT WAS REDUCED FROM ABOUT 22 TO 13 PERCENT AFTER RETTING.
SEE: BA(19)14310. CA (39)2217.

RETTING/RUBBER YIELD/DERESINATION

913

WHITE, N.H./DICKSON, B.T.

1943

A SPOT DISEASE OF GUAYULE (PARTHENIUM ARGENTATUM GRAY).

COUNCIL FOR SCIENTIFIC AND INDUSTRIAL RESEARCH, AUSTRALIA, JOURNAL 16:258-260.

A LEAF SPOT FUNGUS ON GUAYULE, APPARENTLY A SEED-BORNE SPECIES OF RAMULARIS, WAS FOUND TO CAUSE DEFOLIATION IN AUSTRALIAN PLANTS. DISEASE CONTROL WAS OBTAINED BY TREATING SEED WITH A 5 PERCENT SOLUTION OF CALCIUM HYPOCHLORITE.
SEE: BA(18)11947. CA (39)1724. HA (14)1244.

PLANT INJURY/DEFOLIATION/CHEMISTRY/MICROORGANISMS/AUSTRALIA

914

WHITEHEAD, M.R./MITCHELL, J.W.

1943

EFFECTS OF NUTRIENT, PHOTOPERIOD, AND NIGHT TEMPERATURE ON THE DEVELOPMENT OF GUAYULE SEEDS.

BOTANICAL GAZETTE 105(1):14-24.

A NUTRIENT SOLUTION NITROGEN LEVEL OF 192 PARTS PER MILLION PRODUCED A GREATER PERCENTAGE OF GUAYULE SEEDS WITH MATURE EMBRYOS AND A HIGHER PERCENT GERMINATION THAN AT LOWER NITROGEN LEVELS. FLOWER AND SEED PRODUCTION WERE FAVORED BY A 13-14 HOUR PHOTOPERIOD, WARM DAYS (80-90 DEGREES F.), AND COOL NIGHTS (45-55 DEGREES F.).
SEE: BA(18)3464. HA (14)229.

SEEDS/TEMPERATURE EFFECTS/PLANT PHYSIOLOGY

915

WHITTENBERGER, R.T.

1944

OIL BLUE NA AS A STAIN FOR RUBBER IN SECTIONED OR GROUND PLANT TISSUES.

STAIN TECHNOLOGY 19(3):93-96.

CHEMISTRY/PLANT ANATOMY

916

WHITTENBERGER, R.T./BRICE, B.A.

1946

RAPID ESTIMATION OF RUBBER IN GUAYULE LATEX DISPERSIONS.

INDUSTRIAL AND ENGINEERING CHEMISTRY (ANALYTICAL EDITION) 18:209-210.

RUBBER YIELD/CHEMISTRY

917

WHITTLESEY, T.

1909

GUAYULE RUBBER.

JOURNAL OF INDUSTRIAL AND ENGINEERING CHEMISTRY 1:245-249.

GUAYULE PLANT MATERIALS WERE DRIED AND ANALYZED FOR PERCENTAGES OF RUBBER AS FOLLOWS: TRUNK WOOD 0.0 PERCENT; ROOT WOOD 1.7 PERCENT; TRUNK BARK 25.7 PERCENT; ROOT BARK 8.5 PERCENT; BRANCHES WITH VERY FEW LEAVES 64.0 PERCENT. BARK MADE UP ABOUT 56 PERCENT OF THE PLANTS THAT WERE ANALYZED. SEE: CA (3)1471.

RUBBER YIELD/ROOTS/LEAVES/STEMS

918

WILLCOX, U.V.

1927

GUAYULE RUBBER AND ITS PRODUCTION ON A LARGE SCALE.

DUN'S INTERNATIONAL REVIEW 49:40-42.

CULTIVATION

919

WILLIAMS, M.

1911

WEALTH IN DESERT GUAYULE.

SUNSET 27:202-205.

ECONOMICS

920

WILLITS, C.O./SWAIN, M.L./OGG, C.L.

1946

DETERMINATION OF RUBBER HYDROCARBON BY A GRAVIMETRIC RUBBER BROMIDE METHOD.

INDUSTRIAL AND ENGINEERING CHEMISTRY, ANALYTICAL EDITION 18:439.

A DIRECT METHOD IS PRESENTED FOR THE DETERMINATION OF RUBBER HYDROCARBON IN PLANT TISSUE EXTRACTS BASED UPON THE FORMATION OF AN ALCOHOL-INSOLUBLE RUBBER BROMIDE. GRAVIMETRIC FACTORS ARE ESTABLISHED FOR CONVERTING THE WEIGHTS OF RUBBER BROMIDE TO WEIGHT OF RUBBER FOR GUAYULE, CRYPTOSTEGIA OR KOK-SAGHYZ.

RUBBER YIELD/CHEMISTRY/RUBBER EXTRACTION

921

WILLITS, C.O. ET AL

1946

DETERMINATION OF RUBBER IN FLESHY AND WOODY TISSUE PLANTS.

ASSOCIATION OF OFFICIAL AGRICULTURAL CHEMISTS, JOURNAL 29(4):370-387.

A MODIFICATION OF THE SPENCE-CALDWELL METHOD FOR ANALYSIS OF RUBBER IN GUAYULE AND OTHER WOODY PLANTS IS DESCRIBED. PROCEDURES INCLUDE PLANT GRINDING, SAMPLING, AND MOISTURE DETERMINATION.
SEE: BA(21)15456. CA (41)3313.

RUBBER YIELD/RUBBER EXTRACTION

922

WOOD, J.W./FANNING, R.J.

1950

RAPID EXTRACTION OF RESINS FROM CHILTE AND GUAYULE RUBBERS.

RUBBER AGE 68:195-197.

DERESINATION

923

WOODWARD, C.H.

1942

GUAYULE: NEW SOURCE OF RUBBER.

RURAL NEW YORKER 101:572.

924

WOODWARD, C.H./MACDOUGAL, D.T.

1942

WHAT IS GUAYULE?

NEW YORK BOTANICAL GARDEN, JOURNAL 43:168-170.

925

YEANDLE, W.H.

1928

RECOVERY OF RUBBER FROM PLANTS BY COMPRESSED GASEOUS COMPOUNDS AND INSTANTANEOUS EXPANSION WHERE RUBBER COMPOUNDS ARE ENCLOSED IN PLANT CELLS.

U.S. PATENT 1,695,676.

RUBBER EXTRACTION/U.S. PATENTS

926

YOUNGS, F.O.

1942

THE CONTRIBUTION OF THE SOIL SURVEY TO THE GUAYULE EMERGENCY RUBBER PROJECT.

SOIL SCIENCE SOCIETY OF AMERICA, PROCEEDINGS 7:412-415.

THE WORK OF THE DIVISION OF SOIL SURVEY IN THE BUREAU OF PLANT INDUSTRY FOR THE EMERGENCY RUBBER PROJECT IS DISCUSSED. IT INCLUDES THE LOCATION OF BROAD SOIL AREAS FAVORABLE TO GUAYULE PRODUCTION, SELECTION OF TRACTS FOR NURSERIES AND FIELD PLANTINGS, AND SELECTION OF TRACTS FOR ESTABLISHMENT OF EXPERIMENTAL PLOTS.

SOIL-WATER-PLANT RELATIONSHIPS/PLANTING MANAGEMENT

927

YOUNGS, F.O./RETZER, J.L./MOGEN, C.A.

1942

PRELIMINARY REPORT ON THE SOILS OF THE GUAYULE NURSERY AND FIELD-PLANTING TRACTS, GUAYULE EMERGENCY RUBBER PROJECT, SALINAS, CALIFORNIA.

U.S. BUREAU OF PLANT INDUSTRY, BERKELEY, CALIFORNIA. 3 P.

SOIL-WATER-PLANT RELATIONSHIPS/PLANTING MANAGEMENT/CALIFORNIA

928

ZELNICEK, A./GRUNFELD, O.

1934

THE RUBBER-BEARING PLANT GUAYULE (TRANSLATED TITLE).

CESKOSLOVENSKE ZEMEDELEC 16:189-190, 202.

929

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333 352 363 364 405 424 438 458
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451 456 555 566 568 599 613 628
657 731 737 738 756 759 917

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436 437 444 445 448 466 467 468
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747 748 752 755 761 768 770 771
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10 32 35 36 68 192 269 272
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4	68	74	183	184	185	186	187
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292	293	294	295	299	303	305	325
333	361	363	364	412	420	421	438
445	453	458	464	465	476	499	505
531	532	549	556	563	584	585	586
616	617	626	631	632	661	662	665
673	694	705	712	718	728	730	741
743	749	752	766	767	769	771	781
782	783	785	790	791	799	801	806
821	892	899	902	905	910	911	912
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576	671	672	681	898	899

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686	696	697	702	711	733	734	763
765	778	779	780	798	800	802	817
818	819	900	914				

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548	577	582	584	588	599	612	624
625	626	627	636	671	672	673	674
675	725	759	763	779	780	892	895
899	900	926	927				

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625	626	627	628	722	725	914	

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