GUAYULE RUBBER

Progress of Emergency Production at Salinas (Calif.) Plantation

By J. FRANCIS MACBRIDE
ASSOCIATE CURATOR OF HERBARIUM

Probably no single plant has in recent years so captured the interest and imagination of the general public as guayule. It has become the most talked about and written about emergency source of natural rubber. When Congress last spring authorized the Department of Agriculture to engage in its propagation, the task was turned over to the Forest Service, and the chance to prove the worth of guayule as a rubber plant was at hand.

That no effort is being spared to make this opportunity conclusive must be evident to anyone who visits the fields where the plant is now being grown near Salinas, California, and hears from the several capable men in charge the explanation of the many phases of the work. It was my good fortune recently to be able to spend a day on the Guayule Emergency Rubber Project. Members of the plantation staff gave me data on the progress to date, some of which I am permitted to make public.

With an assistant I saw many of the fields and experimental plots in the Salinas Valley. It was my pleasure to have with us Dr. W. B. McCallum, who may be called the dean of the guayule business, having been in charge of the development and growing of it for a private company since about 1912. This company grew some 8,000 acres of the shrub under cultivation and processed it at Salinas alone, and since the Government has taken over their interests in the United States, Dr. McCallum has continued to give his practical knowledge.

Nowadays the science of botany has so progressed that the domestication, so to speak, of a plant like guayule can proceed definitely and simultaneously along all the lines desired so that the development of its maximum usefulness may be guaranteed. This, however, calls for a staff of men trained in everything that has to do with the living plant—the varieties and their improvements, the foods they need, and the diseases that injure them. Never was there a finer example than in the guayule setup of the usefulness and interdependence of every phase of botanical science, including taxonomy, with practical agriculture. Among those who materially assisted the writer of this article is Dr. E. L. Perry, of the Salinas Project staff.

30,000 ACRES TO BE GROWN

A survey of the southwestern United States has been made by scientifically trained men who know the plant and its habitats. This has to date resulted in the selection of a considerable number of areas in California where the Government has already leased 30,000 acres of land upon which guayule will shortly be growing. A great many more thousands of acres will be acquired as nursery stock is produced to plant them. In addition to these production areas, about 100 small indicator plots have been established in Texas, New Mexico, and Arizona, as a means of testing the adaptability of other areas for guayule culture.

In the United States the shrub grows naturally only in the Big Bend country of southwestern Texas. Its principal development is in north-central Mexico, where it is

"THE PLANT OF THE YEAR"
Guayule (Parthenium argentatum), hopefully being cultivated as a source of rubber. Native to northern central Mexico and Big Bend section of Texas. Larger mature plant is about four years old; other is a one-year seedling.

confined to the tops and slopes of limestone ridges and outwash cones. Like most other plants, however, it responds readily to better growing conditions. Up to the present it has been found to grow best under cultivation in the fertile Salinas Valley. Here, under irrigation, it attains about a foot in two years, and its final height of two and one-half feet, in four or five years. The plant produces rubber as the result of alternate periods of growth and dormancy, and on its natural range where it may rain any time during the year and where growing conditions are poor, it ordinarily requires several years for the plant either to develop much size or accumulate much rubber. Botanists therefore have the problem of producing races that, in spite of forcing in good soils and by irrigation, will yield a maximum of rubber. Dr. McCallum has been remarkably successful along this line during his thirty years of selection and breeding work. The strains now grown commercially produce about twice as much rubber per pound of shrub as the wild plants. A great deal of work, is also being done to develop forms suitable for various soil types and resistant to certain growth hazards which are found in various localities.

It is remarkable that there are now available about 300,000,000 seedlings ready for planting in the field this winter, when it is considered that only some 23,000 pounds of seed of improved varieties were on hand at Salinas when the government took over the work. From the growing fields and from the nurseries more than 150,000 pounds of seed were obtained during the past summer. A machine had been developed by the company for gathering seed, but since it is somewhat wasteful and every possible pound of seed is required, the machine method was abandoned and the harvesting is done by hand. The nursery beds, which are four feet wide and four hundred feet long, look at a little distance like gray-green carpets of some low vegetation—for example, some vegetable—so closely are the seeds sown, and so high is the percentage of germination and growth.

When these seedlings are only a few inches high they are transplanted, one by one, by a four-row machine especially devised for the purpose. The plants are spaced from 20 to 24 inches apart in the rows, and the rows themselves are 28 inches apart. This permits clean cultivation by tools between the rows, but a considerable amount of labor is required, as with sugar beets, for weeding between the plants in each row.

TWO-YEAR HARVEST IN EMERGENCY

When the plants are mature they become bushy. They are then about two or two and one-half feet high, and composed of many more or less ligneous branches that are herbaceous only toward the growing tips where the gray-green, rather slender, leaves are closely crowded together. Above the leaves once a year—or by irrigation sometimes more often—the small greenish yellow flowers are raised on a slender stalk. A rather pleasant resinous fragrance, as of many composites, is everywhere present.

Under cultivation the most economical time to harvest guayule is at the end of the fourth or fifth growing season. However, in view of the pressing need for rubber, the Forest Service plans to grow it only two years, spacing the plants more closely in the field in order to compensate for the reduced volume per shrub.

Guayule plantations will always have to have a nursery of seedlings to perpetuate them, for in harvesting the entire plant is used. An efficient method of extracting rubber from guayule has been in use for many years, and briefly it is as follows: The plants, roots and all, are chopped up rather finely and run between rollers to crush the woody portions. This material, with a carefully controlled addition of water, is then fed into a cylinder lined with very hard silicon bricks and partly filled with a special kind of smooth pebbles. The tube rotates and the material is thus ground between the pebbles and the lining, separating the rubber particles from the plant fibers. Emerging from this tube, the mass

goes into a settling tank where the water-logged woody material sinks and the rubber floats to the surface, its particles agglomerated in the form of "worms." These worms are then spread out in pans and dried, after which they are pressed into slabs weighing 100 pounds each.

REGARDED AS PERMANENT SOURCE

The question that is uppermost in the minds of every one is, of course, whether guayule will pay. There is no reasonable question that it will not be an important help in supplementing other sources of rubber because guayule rubber, however expensive, is of high quality and under present conditions will have its special place. This importance lies in its ability to fill those purposes in rubber manufactures for which the synthetics are not well adapted.

One man's guess seems to be as good as another's as to its value as a crop in normal times, but at least one man I talked to in Salinas has complete faith in it, and that man is the one who has known it longest, Dr. McCallum. He points out that had our government protected it and subsidized its cultivation in the 1930's, as some thoughtful and informed men desired, there would be no acute rubber shortage today. Hereafter, Dr. McCallum avers, it will remain permanently a supplementary source, at least, because of its particular merit in conjunction with other rubbers. There are a large number of rubber-bearing plants in the United States, both native and imported, only a few of which, however, have any apparent commercial possibilities. Among the best of these is an African vine, Cryptostegia, but so far a thoroughly satisfactory means of collecting the rubber from it has not been devised.

Boys and Girls of the 4-H Clubs Make Annual Museum Visits

In accordance with their custom, established for many years, the cream of America's farm youth—the boys and girls of the Four-H Clubs selected for the annual pilgrimage to Chicago—included Field Museum during their recent visits. The Museum was host to some 450 of the girls on November 30, 384 boys on December 1, and a smaller group which made a special tour on December 5. Each of the two large groups were assembled in the James Simpson Theatre to hear a preliminary lecture by Miss Miriam Wood, Chief of the James Nelson and Anna Louise Raymond Foundation staff. After the lecture they were supplied with pictorial maps indicating the outstanding exhibits which would be likely to interest them, and sent forth on their own in the Museum halls. All members of the Raymond staff were stationed at strategic points to give them information and otherwise assist them. The special group was taken on a conducted tour of the Hall of the Stone Age of the Old World.

THINGS YOU MAY HAVE MISSED

Museum Displays "Noah's Ark"—But it's a Seashell

A recent visitor to the Museum asked to see Noah's Ark. Although he had to be told Noah's Ark was not in the Museum he was shown a fragment of Mt. Ararat upon which the Ark landed, according to the Bible. After he left it was found that although the Museum did not have the Ark, it did have *a* Noah's ark—that is, a salt water shell which Linnaeus named Noah's Ark (*Arca noae*) because he noted in it a resemblance to some crude types of early ships. On several occasions visitors have brought to the Museum alleged relics of the Ark in the shape of pieces of wood which they insisted were parts of the Ark, although naturally they were unable to prove it. Many years ago a woman claimed she knew exactly where Noah's Ark was, and asked the Museum to finance an expedition that she had planned in great detail to excavate it.

Illustration on right courtesy of Lester Bridaham, Art Institute of Chicago

TWO VIEWS OF NOAH'S ARK SHELL, AND ARTIST'S CONCEPTION OF BIBLICAL ARK
(Photographs of shell one-half natural size)

A Huichol Indian Legend About Rock Crystal

The Huichol Indians of Mexico have a legend of the origin of rock crystal fully as weird as the most absurd of the numerous superstitions concerning gems prevalent before and during the Middle Ages. According to a note left by the late Dr. Oliver C. Farrington, former Curator of Geology, these Indians believe that rock crystals are mysterious people, dead or alive, who at the shaman's bidding come flying through the air as tiny white birds which afterwards crystallize. They are called grandfathers and they bring special luck in hunting deer. Some hunters keep as many as ten carefully put away in baskets. The condition necessary for living people to become rock crystal is that they must be true husbands and wives—hence, such crystals are rare, the Indians explain. Deer hunters after death become crystals and accompany the sun on its travels.

BOOKS WITH WAR INTEREST AVAILABLE IN LIBRARY

The Librarian, Mrs. Emily M. Wilcoxson, calls attention to the fact that many books with special interest due to the war are available to Members of the Museum and other readers. The public is invited to use the Library whenever special geographic, economic and scientific information is desired concerning regions involved in the conflict. Among a few recently added books are the following:

China After Five Years of War. Published by the Chinese Ministry of Information.

Lengyel: *Dakar* (reputed to be the only extensive description of that strategic African locality).

Milinkov, P.: *Outlines of Russian Culture.*

Haynes, W.: *This Chemical Age.*

Blair, T. A.: *Climatology* (general and regional).

Thompson, V.: *Thailand, the New Siam.*

The Library is open to the public on weekdays from 9 A.M. to 4 P.M., except Saturdays, when it closes at 12 noon; it is closed on Sundays. As it is purely a reference library, there are no circulating books, but the reading room has been especially equipped for comfort and convenience, and has the best type of modern lighting.

Demons Feared in Africa

Many Bedouin Arabs of north Africa believe in the existence of demons (*affrits*) who carry out their evil designs under the direction of a chief of the demons. Primitive rock engravings, and even the desert itself are attributed to these demons. Divination and omens are seriously regarded, and the evil eye is greatly feared. Amulets, and sometimes tattooing, are regarded as a protection against an evil glance or curse. An *affrit* is said to have red eyes and long talons.