

that the tree requires several years to reach maturity and to bear fruit, and few investors can afford to wait the necessary time.

Vanilla.—The vanilla bean grows very luxuriantly on the Gulf coast of Mexico, and it has been for some time a very profitable production, especially in the counties of Papamtlá and Misantla, in the State of Veracruz, on account of the excellent quality of the bean and the high price which it brings. It grows in a region which is subject to intermittent and remittent fevers, and sometimes yellow fever, and where labor is very scarce; for these reasons it has not attained a greater development. I hardly think there is any locality where the vanilla vine grows better than in Mexico.

Vanilla requires a hot, moist climate, and, therefore, the lowlands are best suited for its culture. Very little of the vanilla produced in Mexico is at present grown at an elevation exceeding 1000 feet. At the same time it is claimed that in some places it thrives up to 3000 feet.

The vines will usually produce considerable vanilla in the third year, and they will yield considerably more during the fourth, fifth, sixth, and seventh years, and the production then begins to decrease. But before this time new rootlets have been dropped from the old plants, which form new vines that take the place of the old ones; thus the plantation is kept in a state of continued production. The central portion of the Isthmus of Tehuantepec is one of the most suitable regions for its cultivation, as much wild vanilla is found growing in the forests there.

The Mexican vanilla dealers have established five grades, namely: First, vanilla "fina," or legal, the beans and pods of six and a half inches long, or upwards, short in the neck, sound and black, and the beans which become split or open, provided they have the foregoing qualities and the split does not extend more than a third of the pod. This class is again divided into "terciada," which is composed of the shortest pods; "primera chica," "primera grande," "marca menor," and "marca mayor," the largest of all. Second, "vanilla chica," those pods which differ from the "terciada" only in being shorter, two of them counting as one of the first class. Third, vanilla "zacate," the pods of all sizes, which are off color through being gathered before becoming properly ripe, or being over-cured; "pescozuda," "vana," "cueruda," and "apocoyonada," names for pods in a more or less damaged condition. Fourth, vanilla "cimarrona," the wild vanilla in good or fair condition, three pods counting as one of the first class. Fifth, the "rezacate," composed of the very short pods; of those split all the way up to the stalk, of the badly damaged, of the very immature, and of the greatly over-cured; of this, six pods count as one of the first class.

After the sizing and classification are finished, the pods are tied up in bunches of 100-150, so as to weigh one pound, and wrapped in filtering paper and tin foil.

Silk Culture.—The mulberry-tree and silkworm industries have a very great future in Mexico, and are destined to produce a veritable revolution in the industries of the central plateau of that country. The mulberry tree can be grown in Mexico almost to an unlimited extent, especially in the central plateau, and, as wages are low, the raw silk can be manufactured at a great profit. Several experiments have been made on a small scale, more particularly in the Valley of Mexico, by Mr. Hipolito Chabon, a gentleman of French descent, and he has obtained most satisfactory results. I have no doubt that the time is not far distant when the silk industry will assume great proportions in Mexico, and we will be able to stand among the foremost silk-producing countries of the world.

Cochineal.—The cochineal is a bug which feeds on the cactus; and which, when fully developed, is brushed off the cactus leaves and roasted to prevent decomposition, being then ready for market. It is raised to great advantage in Mexico, and especially in the valleys of the State of Oaxaca. When it was the only article used to dye red it was very valuable, commanding sometimes between four and five dollars per pound, and it made the wealth of that State. But recent discoveries in chemistry have supplied other substances for dyeing which are very cheap, especially aniline, and the price of cochineal has fallen considerably, so that now it is hardly raised at all. When it had a high price, it was raised in Guatemala, and it was the beginning of the wealth of that State. It is now raised, I understand, in several other countries.

Rice.—Rice grows very well in Mexico, and I have not seen any district where it is necessary to inundate the fields to favor its production, although I understand it is also raised in that way in some localities. It is generally planted just as wheat and barley are in the United States, needing no irrigation and depending entirely on the rainfall. I imagine that raising rice by inundation would be more expensive, and also be dangerous, because it could not fail to affect the salubrity of the country.

Chicle, or Chewing-Gum.—This article, like many others, grows wild in Mexico, where the demand that has arisen for it in the United States has begun to develop its production. For some time past the shipments from Mexico have been on an increasing scale, owing, no doubt, to the comparatively high prices which ruled early in 1896.

Every year a larger extent of forests is worked for chicle, resulting in a steady growth of the production since the gum first became an important commercial article, about ten years ago. Prior to that

time 7 or 8 cents a pound was considered a good price, and in 1896 it was sold at 36 cents. The importation into the United States constitutes almost the entire production, and the amounts and values are thus officially reported by the Statistical Bureau of the United States for the fiscal years ending June 30 :

	1894.	1895-96.
Chicle	1,903,655 lbs.	3,618,483 lbs.
Value.....	\$490,438	\$1,167,101
Average.....	25½ cents per lbs.	32 cents per lbs.

The following statement has been compiled from official data collected by the Mexican Government, the value of the chewing-gum being in silver :

Year.	Pounds.	Value.
1885-86.....	929,959	\$ 156,402
1886-87.....	1,254,853	353,641
1887-88.....	1,542,794	371,673
1888-89.....	2,037,783	592,810
1889-90.....	1,827,131	714,242
1890-91.....	2,457,653	1,284,682
1891-92.....	2,494,177	703,572
1892-93.....	1,757,813	705,167
1893-94.....	2,645,722	803,019
1894-95.....	1,668,636	679,367
1895-96.....	3,297,371	1,527,838
Total.....	21,913,932	\$7,892,413

Yuca.—Yuca, or starch-plant, called manioc in South America, is a bush from four to six feet high, having tubers, like horse-radish, six to ten to every plant, and weighing from one to twelve pounds each. It is an important product of Chiapas and may be sown at any time, but it is better to do so from the stems when the rains begin, say in the month of May, by opening ditches five feet apart, and planting the cuttings, eight inches long, in them consecutively, leaving one foot between. Vegetable and sandy soil is best adapted for it, although it can be planted and will thrive in any kind of land. In arid and hard soil it needs plowing. If the land has been thoroughly cleared before planting it requires but little weeding during cultivation. A year after being sown, if the soil is rich, it will begin to yield tubers which must be dug up at the time the tree begins to flower. In replanting after digging the tubers, a slip is left standing and this will bear in twelve months. Besides extracting the starch from the tubers, the leaves are used as fodder for stock.

Sir Henry Dering, the British Minister to Mexico, sent recently to the Foreign Office some practical notes on the cultivation in Mexico of the "Yuca" or cassava plant, pineapple, ginger, "chicle" or chewing-

gum, sarsaparilla, jalap, licorice, canaigre, and ramie, and I shall quote here from his notes on some of those products.

The yuca is to the peon, in the tropical section of the Republic, what potatoes are to the poor and working people of Ireland. Yuca is a native of the country, and its rise dates back before the conquest of Hernan Cortez, and it has always formed a portion of the food of the ancient and present Mexicans, especially those living in Veracruz, Oaxaca, Chiapas, Tabasco, and Yucatan. It has been estimated that the returns of yuca cultivation are immense; the yield of an acre contains more nutritive matter than six times the same area of wheat.

Ginger.—Ginger is found growing wild in various parts of Mexico. The returns from an acre of land vary considerably, but when cultivated under favorable conditions, the crops ought to be 4000 pounds and upward. A ten-acre patch would yield annually from \$5000 to \$7000.

Canaigre.—Though for years canaigre has been used in Mexico, both for medicinal and tanning purposes, it has but recently attracted the attention of the outside commercial world as a valuable source of tannic acid. The result of investigations has been to create a great demand for canaigre in the tanning business of European countries, and more recently in the leather-making centres of the United States. The only supply now to be obtained of this plant is from the wild growth along the rivers and valleys of Western Texas, New Mexico, and Mexico, and a fear has been felt for some time that with the constantly increasing demand the present sources of supply must become exhausted.

Peppermint.—Water mint (*mentha vulgaris*) thrives very well on the central plateau of Mexico and in some sections of the warm zone, especially along the rivulets and small lakes. There is no reason why the peppermint (*mentha piperita*), as well as spearmint and tansy, should not grow in abundance in Mexico, as they belong to the same family and require the same climatic conditions. As the oil of peppermint is very extensively employed in medicines and the arts, the cultivation of this plant will be profitable to Mexico.

Cabinet and Dye Woods.—In the low, hot countries we have all the cabinet woods growing wild and a great many dye woods, some of which are indigenous to Mexico, like the Campechy wood, not being found in other countries. It would take too long to enumerate the different kinds of cabinet woods we have, and I will only say that it happens with them as with our fruits, that only such of them as have been introduced here, like mahogany, cedar, rosewood, ebony, and a few others, are known in this country and in Europe, while hundreds of other kinds as hard as those and of as fine, if not a finer grain, are found in the wild woods of Mexico.

Grasses.—In the lower regions of Mexico, especially at the sea-level, we have various grasses which can be grown at very little expense and which make very good food for cattle, fattening them very much, and in comparatively short time. While I lived in Soconusco, I used to buy lean cattle, three years old, at \$10 per head; and letting them pasture on the grass, the expense being little more than that of a few men to take care of the cattle, without providing them with any shelter, pens, or anything of that kind, only giving them about once a month some salt, at the end of four or five months they became very fat and could be sold on the spot at \$25 a head. The fattening grasses can be very easily cultivated, because they are of such rank growth that they do not allow any other vegetation to spring up on the same spot, and so save the expense of cleaning the ground of weeds; which, in the hot regions is very great, as vegetation is there very rank.

Alfalfa.—The alfalfa grows very luxuriantly in almost every place in Mexico, and it is so abundant there, that it has very little commercial value. It is nowhere dried and kept for fodder, but of course such use can be made of it. Land good for alfalfa has a very low price, and we are greatly surprised when we hear that in California the alfalfa land is worth \$100 an acre.

Cattle Raising.—Mexico has special advantages for the raising of cattle, not only because of its mild climate, which renders unnecessary the many expenses required in the northern section of this continent, but also on account of the grasses that grow in several localities and that constitute very good food for cattle, as I have just stated.

Mexico will be, before long, a very large producer of cattle and other animals, and they will form a large share of her exports. Mexico has sent within two years about 400,000 small undeveloped cattle to the United States at about \$15, Mexican silver, per head, and has also sent nearly her entire output of cotton-seed meal to the United States and Europe at about \$16, silver, per ton. The meal sent to the United States is fed to cattle. The Mexican cattle sent there take the place of the better stock which is sent to Europe, causing virtually a five-thousand-kilometre railway haul against the short haul in Mexico to reach the coast. In addition we have to pay import duties in the United States. This is a sufficient evidence that a large profit could be made by fattening cattle with the cotton-seed meal in Mexico, and shipping the fattened cattle direct to Europe, even using the best cattle of the country. But rapid improvement should be made in the class of cattle for beef purposes. Cotton-seed meal is the feed to be relied on chiefly. The quantity of it produced already is sufficient to fatten a large number of stock. The cattle should also be fed with a small amount of corn along with the meal during the last month of feeding to harden and whiten the meat, as feeding only with cotton-seed meal makes the

meat dark, and militates against its selling value to some extent, and the corn can be easily and profitably supplied. The total cost of fattening a steer should not reach \$15 silver. There is an unlimited demand in Europe for choice meats at about 12c., gold, per pound, and no import duties have to be paid. Poor classes of meat are a drug in all markets of the world. With these great advantages placed within easy reach, the producers in Mexico of grain and stock have a guarantee of ready sale at good prices for all they can produce.

Inquiry was made in Liverpool about the possibilities of the Mexican live-animal trade with England, and it was found that the initial difficulty is the small size of the Mexican cattle, as cattle weighing 1200 pounds are considered small by the trade there, and from 900 to 1000 pounds is therefore extremely small. The smallest Texan cattle ever imported in Liverpool averaged 1226 pounds.

The best Mexican steers can be made to weigh 1200 pounds if well fattened. The difference in cost of transportation on account of lighter weight is but small in proportion to the cheapness of Mexican cattle. Cattle breeders in Mexico, on the whole, have not advanced much in developing good breeds of cattle. They do not appreciate their value, nor would they pay one-half their actual cost, though they can be had from the United States at half of what they would cost from Europe. Herefords are the best breed. I am sure that the railroads will do all they can to encourage that industry by charging as low rates as possible, as they would thus develop an industry which in the course of time would become very profitable to them.

A great need of Mexico is a reliable supply of good and healthy water through artificial means, well distributed over the stock ranges to prevent the great loss by death through lack of water, as well as the heavy shrinkage of meat and tallow, by so much unnecessary travelling of stock to water. They cannot grow fairly, much less fatten, and over one-half the annual increase die of exhaustion, while the value of the stock lost in one year would supply permanent water at convenient distances and prevent three-fourths of the loss and shrinkage now sustained. It has been amply proved that stock water can be secured under the most unfavorable conditions.

It would be to the advantage of the breeder to import some English short-horn bulls, with the object of breeding larger cattle, so as to make profitable the export of cattle to England, as animals should weigh from 1200 to 1300 pounds. This has been done in Texas and in the Argentine with beneficial results, and the improvement in the cattle from the latter place has been most marked during the last five years. With the proper attention, the same good results could be achieved in Mexico.

The English steamers that bring a large quantity of merchandise

to Mexican ports have trouble in even securing ballast to get out of those ports, and have to traverse the Gulf and United States coasts to secure loads for the return trip. Their owners are willing and ready to supply facilities for the exportation of live stock and frozen meats if assured of a sufficient traffic to justify them in the expense, for they prefer reloading direct for Europe to going elsewhere for freight. The time required to return direct from Mexican ports is but little more than from New York and Baltimore, and is sufficiently short to warrant good service in transportation of live stock, and the cost would practically be the same as from United States ports. The United States is beginning to export beef and stock from Galveston to Europe, which is practically the same distance as from the Gulf ports of Mexico.

Mexico could export annually and easily after the next ten years 400,000 of fattened cattle, which would increase considerably the amount of our exports, and this trade would greatly assist the development of many other industries.

The desired result in question could be hastened by mixing good foreign labor with the native labor. The latter would be better fed, clothed, and educated, as well as encouraged, taught, and compelled to do better work, and thus the country's physical and mental welfare would be greatly promoted.

Sheep.—The same conditions apply to the sheep and wool industry. It is a great mistake for the Mexican sheep-owners to raise a class of sheep that yield each only from one to two and one-half pounds of very coarse and inferior wool, annually, while they themselves wear goods manufactured from foreign wools, and the domestic-cloth manufacturers are also under the necessity of importing largely of fine wools. Mexico possesses natural resources for producing all the wools of every grade that she needs, with a large quantity over for export, not to speak of choice grain-fed mutton for domestic and foreign consumption.

The custom of killing so much poor stock is a terrible waste of resources, as one well-fattened animal will render twice as much as a thin or poor one.

Products of Cold and Temperate Regions.—I will not speak of the products of the cold and temperate regions of Mexico, such as Indian corn, wheat, oats, barley, and others, because their cultivation is well understood in the United States, and I could say here nothing new to the American reader, but will only state that they all grow very well in the proper regions of Mexico.

FRUITS.

We produce in Mexico a great many tropical fruits that are not sent to the United States because there is no market for them for the reason that they are not known here. Some of them are delicious,

and with the facilities of communication, I have no doubt that they will become known and a taste will be developed for them in this country. I will speak here only of such of our tropical fruits as come to the United States.

The advantage of tropical fruits growing in their proper zone and climate is immense, as the expense of planting and cultivating them outside of their proper limits is very great and there is always danger of their destruction.

Oranges.—Orange trees, like any other fruit trees, depend in Mexico on the rain, and, except in a private garden or private grounds, are not irrigated. While the orange tree is a hardy plant, it thrives best and yields the most luscious fruit in the tropics. Elevation exceeding 2500 feet is not, as a rule, desirable for orange culture.

The advantages of irrigation in orange culture are great in the subtropical regions of Mexico. The fruit of the irrigated orange tree is of a very superior quality, while the tree itself has a longer lease of life and is less subject to attacks from insects and diseases of a fungoid nature. One of the conditions primarily requisite to the growing of a marketable orange is that the trees be watered at judiciously regulated intervals during and for a short time after the blossoming season. Attacks from insect and fungoid pests, which are most disastrous, and to which the trees are peculiarly subject during the blossoming period, are rendered even more dangerous by the prevalence of a considerable amount of humidity in the atmosphere which is always conducive to the development of parasitic germs or fungoid spores. An abundance of moisture in the ground but a comparatively small amount in the air is the condition most to be desired during and just after the blossoming season. This is to be had by irrigation, but, generally speaking, not without it. Under irrigation, the soil is also much less subject to deterioration, owing to the superior fertilizing properties of water taken from wells and streams. Rain water, aside from containing a small percentage of ammonia, which it receives from the air, only acts as a medium to transmit the nutriment from the soil to the tree, while water taken from wells or streams holds in solution the renewing materials which are directly communicated to the plant proper.

In the more elevated orange districts of Mexico, the trees should be watered about once every twenty days during the dry season.

In some places our oranges are as sweet as if they had been preserved in sugar, and this, notwithstanding the fact that no attention is paid to their cultivation, that they grow almost wild, and without irrigation.

I think that the distillation of orange blossoms would prove very profitable. The production of flowers per tree is given at from 22 to 55 pounds in the case of sweet oranges, and from 60 to 100 pounds per tree from the bitter variety.