

by the development of fungi or the growth of other microorganisms. This is certainly an advantage that the practical pharmacist can appreciate as well as the fact that his medicated waters are always clear and sightly.

The saturation of these waters can easily be determined. If to an equal amount of water a 50 percent solution of magnesium sulphate is added, there is at once developed a distinct cloudiness.

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THE CULTIVATION OF CASTOR OIL PLANT AS A COMMERCIAL POSSIBILITY: RICINUS COMMUNIS, PALMA CHRISTI.*

BY JOSEPH L. LEMBERGER.

Always an admirer of the beautiful palma christi, a thought possessed the writer to plant some of the seed of the variety known as *Ricinus sanguineus*, a beautiful, stately and highly colored plant, and note results as to its commercial value. My experience was satisfactory beyond expectation, having no previous thought beyond that of an ornamental bush, and when the fact has materialized, that the castor bean can be cultivated as a commercial product a large agricultural asset will be attained.

After the season had closed correspondence with seed crushers and vegetable oil producers has convinced me that the subject is entirely feasible and deserves more than passing attention—weather conditions appearing as the only doubtful factor. This also applies to other crops as well.

The cultivation is very simple. The seed will generate almost anywhere, provided the soil is good. Experiment is being made this summer by planting the seed along the fences where the plow and harrow cannot be used, and only when the commercial fact is proven or established, need we think of field culture.

I am interesting farmers in my county and experiment will be made on a much larger scale—will try some waste places on the farm, and, if successful, may publish the results, if spared, some future time.

It will be interesting to know that there is not at this time any attention paid to cultivation of castor oil beans for commercial purposes in this country. After the writer began formulating this paper, searching for data, etc., reference was made to Professor Wm. Procter's article along similar lines in 1855, giving a particular account of the mode of cultivation in western states (*American Journal of Pharmacy*, vol. xxviii, p. 99). At that period we remember the *St. Louis Brand Castor Oil* stenciled on the boxed containers and barrels of castor oil. The present generation of pressers of the castor oil seed know nothing of the industry of that period and it is evident that there is no longer any attention given to the cultivation of the castor oil bean as an industry. The journal quoted from has the following, which I prefer to make part of this paper as a pleasant memory of our departed friend:

Southern Illinois is the source from whence all the beans are brought that are sold or manufactured in St. Louis. The ground is prepared as for other crops, and when there is no longer any danger from the spring frosts, the seeds are planted in hills and rows, much in the manner of planting Indian corn, with the

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exception that there is but one seed put into each hill, and that at every fourth row a space is left sufficiently wide to admit of the passage of a team for the purposes of gathering the crop. Unlike the cereal grains the ricinus bears at the same time flowers and fruit, and the severity of our climate, which renders it in this latitude an annual plant, destroys its vitality whilst yet decked with bloom. The ripening commences in August, and the crop is gathered at intervals from this date till the plants are destroyed by the frost.

The yield, of course, varies with the quality of the soil, and the care of the culture. Twenty-five bushels from an acre of ground is considered a very large crop, and is but seldom obtained. From sixteen to twenty bushels per acre is a very fair yield in a season not marked by drought or other unfavorable feature.

| Year. | Crop in bushels. | Factories in Illinois. | Factories in St. Louis. | Barrels of oil made. | Equivalent in gallons. |
|------------|------------------|------------------------|-------------------------|----------------------|------------------------|
| 1850 | 250,000 | 18 | 2 | 9900 | 350,000 |
| 1851 | 160,000 | 7 | 2 | 7000 | 255,000 |
| 1852 | 90,000 | 5 | 2 | 5500 | 192,500 |
| 1853 | 65,000 | 3 | 3 | 4200 | 147,000 |

The estimated crop of beans for 1854 is but 10,000 bushels, being almost a total failure, arising from the excessive drought that prevailed during the past summer over that part of the country. The number of mills in operation in 1854 was but five, and they only employed part of the time.

As indicated, I planted the bean of *Ricinus sanguineus*—I knew no other variety at that time. There are other varieties, and I have obtained and planted this year *Ricinus Gibsonii*, *Ricinus macrocarpus* and *Ricinus Phillippiensis*. The mature plant in my yard attained the height of about fifteen feet. The foot stalk of one of the plants, as well as some specimens of the fruit, are herewith exhibited (at Association meeting).

Through correspondence with one of the largest seed crushers and oil-producing firms in this country, much valuable information was obtained, and the following excerpts from several letters will, I feel sure, interest you :

March 23, 1916.

We have the pleasure to acknowledge receipt of your valued favor of March 22nd and are very pleased that you are interested in raising Castor Beans as a commercial crop.

If you can raise these in sufficient quantities, or if by combining with your neighbors you are able to do so, we think the experiment might be profitable.

The value of castorseed, or *castor beans*, fluctuates very much, according to the size of the crop in India, the demand for consumption in the United States, and the fluctuation in freights from India to the United States; which, in the latter case, have risen from about 20 cents per bushel of 50 pounds to \$1.40 per bushel of 50 pounds, due to war conditions and the requisitioning of so many ships by the English Government.

At the present time the value of castor beans in not less than carload lots delivered to New York City points, in bags and without charge for bags, is from \$2.25 to \$3.15 per bushel. It has been higher and it has been within the last two years as low as \$1.22 per bushel. However, we think the normal price is about \$1.30 per bushel, 50 pounds being considered a bushel.

We can give you no information whatever regarding planting of these seeds, as derived from those who have planted them for commercial crops; and inquiry at the Department of Agriculture at Washington fails to elicit any information in this direction. The superintendent of a large country place, near Buffalo, has advised us that he would expect success in planting one bean to a hill and placing the hills three feet apart in rows four feet apart. We think, however, he had in mind the raising of beans for the beauty of the plant and

blossom rather than for commercial purposes; and in planting for a commercial crop it would be better to plant three beans in a hill, lest one bean might possibly not germinate. On the above basis, it would require 726 beans to plant one acre, one bean to a hill, or, say $1\frac{1}{2}$ quarts or about $2\frac{1}{4}$ pounds; and to plant three beans in a hill, 2178 beans, or, say $4\frac{1}{2}$ quarts or about $6\frac{3}{4}$ pounds.

We would be interested to know how this compares with your experience and to see a sample of the beans raised by you.

March 27, 1916.

We beg to thank you for your letter of March 24th, which contained very interesting information regarding the cultivation of Castorseed, with some of which we were not familiar.

We also thank you very much for the sample of the seeds you have raised and have sent them to our Laboratory for analysis as to percentage of oil contained therein. On receipt of our chemist's report, which, however, may not be for two or three weeks, as the Laboratory is very busy just now with very important matters, we shall be very glad indeed to give you our opinion of the value of the seed as compared with that shipped from Bombay, India.

April 1, 1916.

Referring to the sample of castor beans you were kind enough to send us, we beg to report that an analysis indicates them to contain about the same percentage of oil as the Bombay beans.

The foot stalk or trunk of the plant you will observe is full of pithy cellulose-membranous substance, very suggestive for wood paper pulp. Trying to determine uses for the woody portions of the plant, the writer incinerated the *burr* envelope of the seed and all other portions of the plant, and by the old process of making lye by lixiviation and evaporation obtained a fair percentage of potash, and have for your inspection a presentable sample of potassium nitrate. The experience we are passing through at this time naturally leads one to believe that we might economize, incinerating much of the refuse of saw mills—and forestry—with a view to utilizing the alkali.

In concluding this examination as to the possibilities, would define:

1. Enlarged castor oil industry in the United States.
2. As by-product, paper pulp or the conservation of alkali contents from *burr* to root.

As a last word, all portions of this country may not be available on account of climatic conditions, but the writer believes, from his experience, that the moist, warm regions of the southern part of this country should take advantage of the possibility. We may not be able to raise the African *Ricinus* as a perennial tree, as is stated by a writer, but realize the practical possibility of having annual crops of *castor oil beans* as is done with any of the familiar farm products.

The most natural privilege of man, next to the right of acting for himself, is that of combining his exertions with those of his fellow-creatures, and of acting in common with them. The right of association, therefore, appears to me almost as inalienable in its nature as the right of personal liberty.—DE TOCQUEVILLE.
