

THE PHOSPHATE ROCK INDUSTRY OF MOROCCO.

FRED S. MOHME, UNIVERSITY OF ILLINOIS.

Phosphatic material, such as animal refuse, bones, fish, and guano have been used for fertilizer for such a long time that it is nearly impossible to state when its application as such was first discovered. However, it was not until the discovery of the mineral phosphates that the artificial fertilizer industry rose to such magnitude that today abundant supplies of this mineral have become indispensable. Fortunately the beneficence of nature insures us vast deposits of mineral phosphates.

One of the richest phosphate fields, probably only surpassed by that of the United States, is the Moroccan. It is found in three fairly large areas, all on the Tertiary and Quaternary tableland nearly 100 miles broad, bordering the Atlantic Ocean.¹ Of these regions the northernmost one, about 80 miles southeast of Casablanca and including Oued-Zem, El Boroudj, Guisser, and Kasba Tadla on the north,

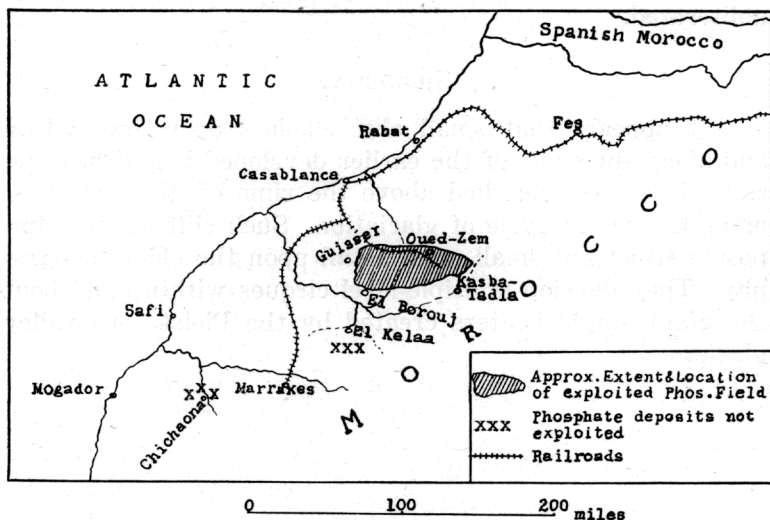


FIG. 1.

south, east, and west sides respectively, is the only one that has been explored in any detail, and at present the only one

¹Stone, R. W. *Phosphate Rock*, U.S.G.S. Min. Res. of the U. S. 1919, Pt. II, p. 222.

mined.² (Fig. 1). This field covers an area some 75 kilometers in length and from 5-35 kilometers in breadth. The phosphate found here is in the form of fine grayish sand, friable, and with a high percentage of phosphate of lime (73-78%). As regards its quantity the estimates vary from "many millions" to "hundreds of millions" of tons. G. R. Mansfield of the United States Geological Survey places the reserves for this northern area at 1,000,000,000 metric tons.³

The phosphate beds, separated by calcareous beds, clay, and a low percentage of phosphatic marls, consist of horizontal layers varying in thickness from a maximum of 65 feet in the north at Oued-Zem to 98 feet at the south in El Boroudj.⁴ From a topographical point of view they present the appearance of a plateau rising gradually from the north to the south, and since this plateau is criss-crossed by a number of intermittent streams the erosion caused thereby has made prospecting for the phosphate a comparatively simple matter. It has likewise made both surface mining and horizontal tunneling possible. The deposits, however, are not continuous throughout the district above described, and their value fluctuates with the variation in the grade. In many places the grade is too poor to be commercially recovered, and unfortunately this is often true of the thickest beds.

At El Boroudj cliff, which is the southern boundary of this exploited field, erosion has caused the phosphate to disappear, but it reappears further south in the region of El Kelaa. About 60 miles to the southwest of this field another layer of phosphate makes its appearance, which is known as the Chichaona-Imintannt field. Both of these beds, said to be as much as 200-275 feet thick in places, form parts of the same sedimentary series that is present in the Algerian and Tunisian deposits. However, no attempt at exploitation in these regions has as yet taken place.

Production.

The development of the phosphate rock deposits of Morocco has proceeded with almost unprecedented vigor.

²Mansfield, G. R. *Phosphate Reserves Ample for 2000 Years*, Engineering and Mining Journal, vol. 122, No. 21, p. 812.

³Mansfield, G. R. *Phosphate Reserves Ample for 2000 Years*, Engineering and Mining Journal, vol. 122, No. 21, p. 812.

⁴Loyd, S. L. *Moroccan Phosphate Deposits*, Engineering and Mining Journal, vol. 113, April 8, 1922, p. 565.

From an output of 6,981 tons in 1921, the production has increased to 720,680 tons in 1925⁵ (Fig. 2). When the Protectorate (the French) realized that the phosphate deposits were of such enormous extent and value they made the entire exploitation a matter of State monopoly, which greatly facilitated the construction of railroads, port equipment, and mines. To this can be attributed largely the phenomenal increase in production. However, the scarcity of labor limits the output. It has been said that in order to bring the production up to 1,000,000 tons per annum 20,000 miners will have to be employed, which is more than the total population of the region under development.⁶ Furthermore, the labor supply, being largely recruited from the country-side, is curtailed during the ploughing and harvesting seasons. As yet wages are not high enough to induce foreign labor to come to Morocco. The extent of the deposits being practically unlimited, it would seem that production is entirely dependent on the demand and the availability of labor.

Exportation.

There are no statistics concerning the domestic consumption of phosphate fertilizer, but it is understood that prior to 1925 the amount was negligible. Consequently, practically the entire output is exported. It appears, however, that the producers are either not attempting or have been unable to place their products extensively in other markets than those of Europe. The only exceptions are small amounts that are sent to the Union of South Africa and to Australia (Fig. 3). The European market is canvassed thoroughly, a policy which apparently seeks to establish a well-rounded demand that will give greater stability to the industry. The expansion of the European buying market will admit the ready disposal of increased output. Morocco exports only the high grade phosphate, which since the war has been especially demanded by the trade. It is the high-grade Moroccan rock that competes so strenuously with the high-grade Florida phosphate, for in 1925 Europe consumed 721,227 tons of Moroccan phosphate as compared with 614,571 tons of high-grade Florida phosphate (Fig. 2).

⁵Waggaman, W. H. *Phosphate Rock*. The Mineral Industry, vol. 34, p. 552.

⁶*Ibid.*, p. 553.

Although no figures as to the cost of extraction and carriage of the phosphate to the port of Casablanca has been announced, the price of phosphate at English and French ports amounted in 1924 to only \$5.25 per ton.⁷ This amount appears exceedingly low, when it is considered that the mineral must be extracted, sorted, crushed, loaded on cars and carried 80 miles to Casablanca, loaded on ships and transported to the various foreign markets. No doubt, in order to permit a greater profit, the producers are endeavoring to reduce transportation and handling costs by manufacturing super-phosphate (which is the concentrated form of phosphate fertilizer) in Morocco. This high-grade product can more readily than the raw product support the freight rates. The preparation of super-phosphates has already been started in a small way at Casablanca.

Morocco's Future in Phosphate Production.

Although active propaganda to increase the sales of Moroccan phosphate is being carried on by the French, several economical and geographical conditions greatly facilitate the exploitation of this field. These are:

1. Moroccan ports are exceedingly well-placed geographically to secure favorable freight rates to the European markets.
2. Phosphate deposits can be mined more cheaply than any other known deposits because of (a) horizontal beds, (b) high percentage of phosphate of lime, (c) proximity to the coast, (d) soft texture of the rock which is highly desired in the manufacture of super-phosphates.
3. Morocco can furnish, if necessary, all the standard grades of phosphate from high to low.
4. Facilities for railroad construction from the coast to the mines are excellent.
5. Low wages and assistance from the French Government stimulate sales.

The Moroccan enterprise has been in existence only since the war, but already it is third in world production. As time goes on it is highly probable that Europe will secure the bulk of its supply from the North African phosphate fields (the high grades from Morocco and the lower grades

⁷Mansfield, G. R. *Phosphate Rock in 1924*, U.S.G.S. Min. Res. of the U. S. 1924, Pt. II, p. 102.

from Algeria and Tunisia). The physical characteristics of the phosphate, its accessibility from the mining standpoint, and its transportation facilities are the chief factors governing price, which in turn determines sales. Since Morocco is especially favored in these respects, she should be able to maintain a commanding hold upon the European market.

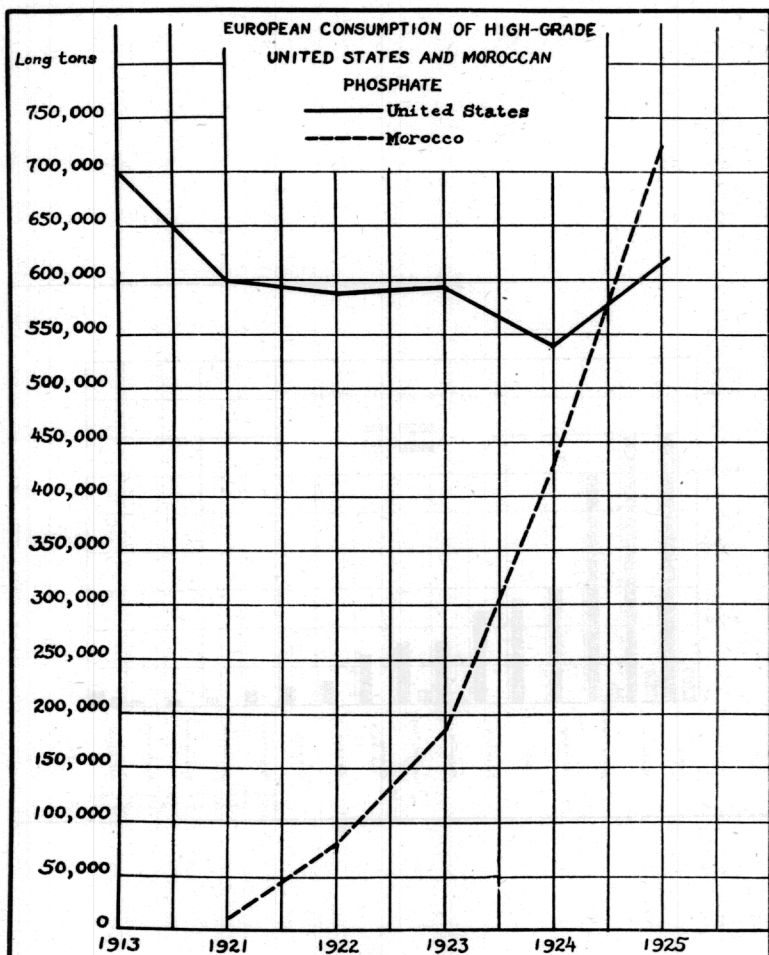


Fig. 2

The exports of Moroccan Phosphate rock to Europe approximately equals the total production since domestic sales and the deliveries to other countries than Europe are almost negligible.

Note: Data for U.S. from Min. Res. of U.S. Pt. II, 1925, p. 161,
for Morocco from letter to writer from
A.D. Cameron, U.S. Consul, Paris, France, Mar. 1927.

