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**AGRICULTURAL  
IMPLEMENT MARKET OF FRANCE  
AND THE FRENCH COLONIES**



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## FOREWORD

This report on the market for agricultural implements and machinery in France and French colonies should be of value to the American implement manufacturer for two reasons—first, because of the large amount of farm equipment purchased by France and its colonies direct from the United States, which in the past three years alone reached a total of more than \$18,000,000; and secondly, because a large part of the French implement production consists of machines manufactured by American branch plants located in France, which find their way to all the French colonies, mandates, and protectorates.

While the market for American implements in France proper is not expanding, as is shown by the imports from the United States in the past decade, the colonial market has been growing rapidly in recent years. Some colonies have adopted methods of farming closely patterned after those prevailing in the United States, with the result that considerable amounts of American power farming implements are being purchased each year. This is particularly true of the French colonies in North Africa, which have been important markets for American equipment for the past several years, and which have taken large quantities of American tractors, combines, threshers, and harvesters.

Should the reader desire further information concerning the marketing of farm equipment in France, its colonies, or any other locality or country, specific inquiries should be addressed to the Agricultural Implements Division of the Bureau of Foreign and Domestic Commerce at Washington.

FREDERICK M. FEIKER, *Director,*  
*Bureau of Foreign and Domestic Commerce.*

APRIL, 1932.

There has been a decrease in the production of beet and other roots in comparison with the pre-war period, especially in the production of sugar beet. Before the war France exported sugar but has not done so since.

Viticulture has also suffered a decline, chiefly because since the war the exportation of wine has greatly diminished. Former large markets such as Russia and the United States are closed. Great efforts have been made to open up new markets, but as yet without any appreciable results.

#### AREA UNDER CULTIVATION

The census of 1926 disclosed that out of a total working population of 22,000,000, more than 9,000,000 (over 40 per cent) are farmers, with a total working capital of 70,000,000,000 to 80,000,000,000 francs.

In 1927, the last year for which these figures are available, rural France was divided up as follows:

	Acres
Arable land.....	136,000,000
Natural meadows and pasture land.....	70,000,000
Orchards and vineyards.....	14,500,000
Woods and forests.....	64,500,000
Heath and waste land.....	28,000,000

French agriculture is characterized by small farm units. Its crop acreage is farmed by 5,702,000 proprietors, making an average farm area of 24 acres. The number of agricultural laborers employed in 1927 was 4,850,000. The number of farms and their acreage were as follows:

	Number
Less than 25 acres.....	4,852,000
25 to 100 acres.....	711,000
100 to 250 acres.....	105,000
250 to 750 acres.....	29,000
750 acres and over.....	4,280

Twenty-three per cent of the total farm area was made up of farms of 24 acres and less, 74 per cent of 25 to 100 acres, and only 3 per cent of more than 750 acres.

#### SELLING AMERICAN AGRICULTURAL IMPLEMENTS IN FRANCE

Fifteen or twenty years ago 80 per cent of the farm implements used in France were of American manufacture. It is estimated by reliable authorities that at the present time not more than 2 or 3 per cent of the implements bought each year are made in America. It is not known what per cent of all implements now in use is of American manufacture.

During the past few years purchases from the United States have been confined mostly to tractors, tractor plows, tractor disk harrows, and some few binders, mowers, rakes, and tedders. The big drop in the volume of American exports to France is, however, more relative than absolute. That is to say, 20 years ago farm implements were not so generally used as now, and although there has been some real drop in the volume of imports, brought about mostly as a result of the high French tariff, the range of French imports has been compressed from implements of all kinds to those specialties mentioned above.

The import duties now in effect on agricultural implements are:

	Francs per 100 kilos
Agricultural and other tractors, including motors, imported complete and weighing—	
More than 3,000 kilos (gross)-----	85
From 2,000 to 3,000 kilos (net)-----	175
From 1,250 to 2,000 kilos (net)-----	225
Less than 1,250 kilos (net)-----	250
Cultivators, single plows, harrows, hayrakes-----	70
Cream separators, weighing—	
More than 35 kilos-----	260
35 kilos or less-----	320
Double plows-----	90
Wine and oil presses, weighing 400 kilos and over-----	75
Harvesters, reapers, thrashers, and mowers-----	60
Other equipment, weighing—	
400 kilos and over-----	80
Less than 400 kilos-----	100

American manufacturers have taken to manufacturing in France on a big scale in order to meet the competition encouraged by the high-tariff rates. That policy has enabled them to hold their own in the general implement field. Competition or the tariff has not yet forced them to manufacture tractors, tractor plows, and tractor harrows in France, since there is sufficient spread between the selling prices of the locally made and the United States products to yield a satisfactory profit in spite of the fact that the American-made tractor and tractor plow carry the additional burden of export packing, handling and transportation charges, as well as the import duty of 70 francs per 100 kilos.

UNITED STATES EXPORTS OF FARM EQUIPMENT TO FRANCE AND ITS COLONIES,  
MANDATES, AND PROTECTORATES

Country	1922	1926	1927	1928	1929	1930	1931 <sup>1</sup>
France-----	\$3,729,755	\$7,076,084	\$2,949,134	\$1,922,540	\$2,427,270	\$2,541,470	\$2,105,608
French West Indies-----	3,803	1,607	3,737	20,432	18,091	22,109	7,380
French Guiana-----	772				340	9	517
French Indo-China-----	1,058	61,604	119,084	144,579	222,954	170,401	10,817
Syria-----		7,898	18,804	14,744	42,680	18,798	18,641
French Oceania-----	495	1,390	2,405	523	6,521	698	1,873
Algeria and Tunisia-----	151,570	1,186,091	1,916,841	2,985,535	4,654,665	2,507,711	1,182,434
Madagascar-----		3,073	1,458	6,197	102	1,041	1,488
Other French Africa-----	20,382	2,242	28,333	31,559	124,841	113,361	21,162
Morocco-----	33,949	450,982	722,924	775,418	785,112	575,495	513,641

<sup>1</sup> Preliminary.

CHANGE IN SELLING PRACTICE

Particular attention is called to the fact that there has been a fundamental change in the selling practice of implement manufacturers. Where formerly they granted the sales rights of large territories to some few dealers, they now sell directly to thousands of local dealers, some of whom are no more than village blacksmiths. The reason and advantage of this practice is, of course, that by coming into direct contact with the same small dealers to whom the general agents formerly granted subagencies, commissions are considerably reduced. Competition became so keen and sales profits so compressed that dealing through general agents was no longer possible. This is, con-

sequently, an exceedingly important consideration for manufacturers of agricultural implements intending to enter this market.

For a long time the French farmer remained hostile to the use of modern agricultural machinery owing to the small size of the farms and to the great diversity in the character of the soil and, hence, of the yield. French soil presents no homogeneity, either in aspect or in composition. In some cases moderate-sized farms contain two or three different kinds of soil.

Before the war agricultural labor was plentiful and cheap, and the general use of agricultural implements was therefore not essential. Since the war conditions have changed. There is a decided labor shortage and the farming districts have been particularly hard hit, because of the migration to the cities, coincidental with and as a result of the great industrial development of the country. Even the smallest farmers now use modern implements of one sort or another, and their use is becoming more general every year. Those small farmers who can not buy even general-purpose machines on their own account band together in cooperatives, pooling their resources to buy modern equipment.

#### INCREASED DOMESTIC PRODUCTION

The move toward mechanization of French farms prior to the war brought with it the maximum of imports from the United States. During the year 1913 the total imports of agricultural machinery amounted to 35,000 tons, of which the greatest proportion came from America. Since then the imports have declined, attaining only 16,240 tons in 1930.

Meanwhile, French manufacturers of agricultural implements and machinery, who in 1913 were able to export 12,500 tons, mainly in the form of plows, have made considerable progress; in 1930 they exported 26,200 tons of agricultural equipment of all kinds, including a large number of harvesting machines. Thus, in 17 years, while the imports decreased by 53.6 per cent, the exports increased by 109 per cent.

It is generally recognized to-day that the French machine competes on an equal footing with all foreign makes. For this reason, American manufacturers have been forced to extend their manufacturing activities to this field in order to hold the business they formerly enjoyed through imports.

There are some fundamental reasons why the French farmer prefers the locally made products. In the first place the French machines are designed for the peculiar conditions under which the farmer has to work in this country—small farm areas and diversity of soil. The characteristics of the American machines in general are that they are made in large quantities and designed to work with rapidity over wide areas. French land is relatively more expensive, and consequently it must be made to yield as much as possible per acre. When the French farmer cut his grass with a scythe, he got practically all of it, because he clipped close to the ground, whereas with an American mowing machine of the pre-war pattern he was obliged to leave standing several inches of stalk.

In pre-war days, similar criticism could be made of practically all the American mowing and harvesting machines sold in France,

and their sale was due to the simple fact that they had no competition.

The French manufacturers profited greatly by these circumstances. Having in view the needs of the French farmers, they made their machines conform to the characteristics of the French soil. Instead of standardized machines like the Americans, they produced models appropriate to the many varieties of French soil. The success of French-made machines during and immediately after the war was due to this fact and not to superiority of the machines or selling methods.

The French farmer is little influenced by nationalistic considerations in buying his machinery. In fact, so far as specialties are concerned, American-made machinery when advertised as such has a decided advantage.

The French agricultural-implement industry is also one of small units. There are approximately 200 companies, employing 25,000 workmen, engaged in the manufacture of implements of one kind or another. However, some of the most important companies are American-controlled, and some of these have retained their original firm names.

It is certain that the locally made implement dominates the market, but American manufacturers are now firmly entrenched in France, and additional factories may soon be in operation.

The mower, the reaper, and the binder, although invented in the United States, are produced extensively in France. Future competition will be keen in this category, but the American products will probably have the greatest demand. For this very reason, the French constructors continue to demand higher and higher tariff rates. They take into account the fact that the American machines are now nearly as well adapted to French agriculture as their own, and that, moreover, the Americans, after having erected big factories in France, are in a position to sell at prices just as low as the French.

A characteristic of French machines, particularly of binders and mowers, is the resemblance to American implements of the same kind. The design of the locally made machines has, in most cases, been inspired by American practice.

#### MARKET CHANGES AFFECTING SALE OF IMPLEMENTS

During the past few years, the French agricultural-machinery market has been profoundly modified through large reductions in importations, especially from the United States and from Germany, and coincidentally, by the greatly increased volume of output of the foreign owned branch plants (chiefly American) established in France.

The three principal factors which have contributed to the development of the local industry at the expense of the import trade are: (1) The depreciation and fluctuation of the franc, which made the importation of agricultural equipment a precarious undertaking. (2) The raising of the import tariffs on all but tractors and power-driven harvesting and plowing equipment in 1928, to a point where foreign manufacturers could no longer compete with domestic producers. The result has been that foreign firms, notably two American concerns, have greatly expanded their French manufacturing

facilities. (3) Although the demand for agricultural machinery was particularly heavy during the years following the war, the normal demand for farm machinery in this essentially agricultural country has continued to increase.

#### GOVERNMENT AID TO AGRICULTURE

Agriculture has received special attention from the Government, as evidenced by the increase in the duties on wheat. Furthermore, according to a decree promulgated in the *Journal Officiel* of July 18, 1931, flax of foreign origin imported into France has been limited to a contingent of 50,000 tons for the period extending from July 18, 1931, to July 18, 1932. This decree was enacted in the attempt to render more effective the law promulgated in the *Journal Officiel* of July 5, 1931, allocating premiums to domestic flax-manufacturing enterprises and is in line with the present Government policy to intervene in the rehabilitation and development of the flax industry.

#### TYPES OF AGRICULTURAL IMPLEMENTS USED IN FRANCE

Cereals, wine, cider, flax, hops, root crops, olives, stock raising, and dairy farming all enter into the occupation of the French farmer. To the machinery required for each of these may be added the equipment for subsidiary industries, such as distilling, sugar refining, malting, etc.

Of course, many machines which are used in France are common to almost all countries, but there are some which are particularly French, such as cider and wine presses, machines for the cultivation of sugar beets and Brabant plows. During the past few years France has gone over almost entirely to this type of 2-way plow, which has displaced the American type of ridge and furrow plows.

Locomotives or stationary engines, with their threshing outfits, used to be imported from England in large quantities, but to-day those used in France are almost exclusively of French manufacture. Trussers, which are widely used in tying up the straw in bundles as it comes from the thresher, are made chiefly in France.

Although many of the smaller machines were successfully manufactured locally quite early, haying and harvesting machinery continued to be imported for a long time. Progress in perfecting this kind of machinery was, however, very closely followed in France, and American manufacturers had for many years a good outlet for their production in this country.

The use of the mechanical mower, reaper, and binder was adopted in France shortly after their introduction on American farms. The first self-binding reaper was brought into France about 50 years ago.

The binder is used universally in France to-day, although, like most labor-saving devices, it did not receive a warm reception from the French peasants when first introduced. The old type of reaper has now almost disappeared, yet about 60,000 mowers and 20,000 to 25,000 binders are purchased annually in France.

Although for many years the bulk of the haying and harvesting machinery business was in the hands of American, Canadian, and English concerns, French plants have gradually grown up and have been able to obtain considerable protection from the Government

in developing their trade. To-day the burden of customs duties and other charges is so heavy that importation has been largely eliminated and the foreign manufacturers who had previously been importing this type of machinery have had either to withdraw or to establish plants in France which are operated by French subsidiaries.

Before the war a certain number of tractors had been introduced into France, but until then this business was inconsiderable. During the war period the tractor trade received a great impetus, owing to the majority of the able-bodied population being under arms. Immediately after the war this business slackened to a very considerable extent, owing to dissatisfaction on the part of the farmers. This may be explained by the fact that the machines were handled by inexperienced people, prejudiced in advance against mechanization and also by the fact that the early imported tractors and those manufactured locally on similar models were not adapted to local conditions—the small area of the farm and the diversity of soil and crops. To-day, however, the tractor has taken its place in the general line of machinery used by the French farmer, partly owing to the labor shortage in 1930 and before, partly to the greater mechanical knowledge of the younger generation, and partly to the adaptation of the machines to the needs of the country.

The small type of tractor is sold in France for general service in the fields and also to replace the locomobile for driving threshing outfits. The majority of the tractors sold up to the present are equipped only for burning gasoline or kerosene, but in the past two or three years German Diesel and semi-Diesel tractors burning crude oil have made their appearance and have met with considerable success. The reason for this is that in France the price of fuel is an important item.

With the tractors have come also power lift plows, cultivators, and just lately power-driven binders. The latter have made rapid strides, altogether the sale will always be limited owing to the small area of the farms. The tendency for farms is still to decrease in area rather than increase, owing to the Napoleonic succession laws, which are still in force and which give equal rights to all the children when the father dies.

The reaper-thresher has also been introduced into France in recent years, but sales have so far been restricted. American importers, however, believe that this machine has come to stay, although it is probable that sales will never be very large, since only a small number of the farms in France have fields where such machines can be used. The type which will eventually be used will probably be a smaller model than that employed in the great wheat fields of the United States, Canada, Argentina, and Australia. It will probably be the pick-up type, by which the crop is first cut and allowed to remain on the fields while it matures, then picked up and carried into the reaper-thresher for threshing, instead of the work being carried out in a single operation.

Power cultivation and harvesting is making rapid progress in France, for which the lack of farm labor was largely responsible. There is yet ample room for development. It is still a common sight, even around Paris, to see plows drawn by a team of four or six horses or oxen.



**SALES CHANNELS**

The agricultural-machinery business in France is done through local agents. These agents or jobbers were often originally important firms with selling rights over a very big territory. Owing to the great diffusion of agricultural machines, the business has gradually drifted into the hands of smaller agents, with small territories. Almost all blacksmiths, wheelwrights, etc., in the rural districts either sell or repair agricultural implements.

These agents buy for their own account, and although conditions and terms of payment vary according to the category of implement sold, haying and harvesting equipment is paid for at the end of the season of the year of sale. The risk run by the agent is, however, largely covered by special conditions granted by all the manufacturers under which unsold machinery not exceeding 25 per cent of the total purchases by the agent is carried forward for payment to the end of the following season.

These local agents sell to the farmer direct, and they are given the sales rights over a given territory according to the number of machines they stock at the beginning of the season. The agent is provided by the manufacturer with all the necessary advertising matter, such as calendars, posters, prospectuses, etc. It is the manufacturer who publishes prices, there being two lists—one, the prices the agent is to pay to the manufacturer, and the other, the prices at which the agent sells to the farmer. The agent's remuneration consists of the difference between the two lists, as well as certain special rebates, which vary according to the quantity of machines he purchases. The principal manufacturers have warehouses in the most important centers.

Repairs of machines in use are carried out by the local agents, and in order to induce them to keep a stock of the most needed repair parts on hand, special terms are granted for such orders. On the other hand, the manufacturers keep heavy supplies of spare parts in their stocking centers, to insure that the agent or farmer has the repair parts he needs at an urgent moment with the minimum delay.

The credit of the French farmer and agent is exceedingly good, and the percentage of bad debts is very small. In both cases they generally come of families which have been known in the same place for a great number of years, and though in many cases they are not in a particularly affluent position, they are fundamentally honest and will do everything possible to meet their obligations as a matter of family honor. So far as the agricultural-implement industry is concerned, bad debts are more likely to be the result of misfortune than dishonesty.

**DISTRIBUTING CENTERS**

Along with most other lines of French business, the agricultural-implement trade centers in Paris, because that city is the commercial center of the country and the hub of the French railway and communication systems. The large houses, both native and foreign, have their offices there. Only one large importing house has its

main office and warehouse outside Paris, this one being established at Lyon. It deals almost entirely in English and Canadian machinery. So that, with this one exception, an exporter from the United States who is going to France to establish connections in the implement trade will find in Paris the responsible members of all the more important firms—those firms which cover the entire country or any considerable part of it with their sales organizations. Here, too, are the offices of the two agricultural-implement syndicates or associations, one being a combination of the leading French manufacturers of implements and the other the leading importers. The former, the *Chambre Syndicale des Constructeurs de Machines Agricoles de France*, has its office at No. 10 rue de Lancry; the latter, the *Chambre Syndicale du Commerce des Machines Agricoles*, has offices at No. 43 rue Beaubourg. Neither organization attempts to fix prices. Their purpose is to present a united front in matters, legislative and otherwise, which affect their membership as a whole.

Lyon, Amiens, Toulouse, Marseille, Bordeaux, Tours, and Clermont-Ferrand are inland distributing centers for prosperous agricultural areas. Lyon, third city of France in point of size, with a population of about a half million, is situated in the valley of the Rhone in the southeastern part of the country, 220 miles north of Marseille. It is on the main line of the Paris, Lyon & Mediterranean Railway, the largest of the French systems, and branches of this road radiate in every direction. One large importing house has its main office and warehouse at Lyon, and most of the important Paris houses maintain branch offices there. The territory served by Lyon as a distributing center is devoted to general agriculture. Much wheat is grown in the central district to the west and north, a great deal of hay in the mountain regions to the east and north, and there are extensive vineyards to the south.

Amiens, in the Department of the Somme, is 82 miles directly north of Paris. It is a railroad center of importance on the Nord system, and serves what was formerly one of the important agricultural districts of France, namely, the northern Provinces which suffered great destruction during the World War. Cereal crops were grown throughout this entire district, but the most important product was the sugar beet, two-thirds of the entire French output coming from this invaded area. With the rehabilitation of the devastated districts, and particularly the revival of agriculture, Amiens will again become an important distributing center for the large importing houses.

The important wheat-growing and general agricultural district in the southwest of France is served largely by Toulouse, in the Department of Haute-Garonne and near the foothills of the Pyrenees Mountains. It is the most important point on the Midi Railroad between Bordeaux and Marseille, about 160 miles from the former and 265 miles from the latter. On account of the elevation the surrounding territory is not well adapted to vineyards, which thrive especially in the lower territory to the east and north; but some of the best cereal crops of the country are grown there, as well as much hay and general produce. Tractor farming has been particularly popular in this district. Most of the important native importing firms maintain branch offices at Toulouse.

Marseille, capital of the Department of the Bouches-du-Rhone, is the first port in France and the second city in point of size, with a population of 652,196 inhabitants. Situated at the mouth of the Rhone River, on the Mediterranean, it is the railroad terminal of the P. L. M. Railway (Paris-Lyon-Méditerranée), the largest of the French systems. Marseille is the most important distributing center for Algeria and the French colonies.

Bordeaux, capital of the Department of the Gironde, is the fourth city of France, with a population of 270,000 (including suburbs, about 400,000), situated on the left bank of the Garonne River, about 60 miles southeast of its mouth. It is a transit port for merchandise consigned to French colonial and other African ports. The region is renowned for its vineyards and wines, about a fifth of the total French output being produced there. About two-thirds of entire French production of prunes is obtained from the Department of Lot-et-Garonne, in the Bordeaux region.

Tours, capital of the Department of Indre et Loire, 233 kilometers from Paris, is a railroad center of importance on the Orleans and States railways. Its population is 77,192. The region served by Tours is devoted to general agriculture and vineyards.

Clermont-Ferrand, capital of the Puy-de-Dome, in the Massif Central, is a railroad center of importance on the P. L. M. Railway. Its population is 111,721 inhabitants. The region served by Clermont-Ferrand is the very fertile valley of the Allier River, known as La Limagne, producing cereals, wine, and fruits.

#### FAIRS AND EXPOSITIONS

Exhibiting at fairs is a generally used and very effective means of selling agricultural machinery in France. The principal exposition is the annual "salon" in Paris, followed closely by the annual Paris fair.

Two marked tendencies were apparent at a recent salon: First, the tendency to manufacture agricultural machinery of a more durable character than in the past, and then the effort to exploit every means of economizing labor. In addition, a great effort has been made to develop all kinds of equipment to meet the peculiar needs of the small farmers. In fact, the number of different models of machines answering to more or less the same purpose was striking; it was generally felt that one of the chief lessons taught by the exposition was the need of greater standardization.

The annual Paris agricultural implement show is particularly important, as it is there where the small dealers come yearly to study new developments and place their orders for the new season.

The following paragraphs concerning the most recent show, held in January, 1932, were prepared by H. C. Schuette, assistant trade commissioner at Paris.

About 600 firms exhibited at the show, displaying implements and machinery for all branches of agriculture, together with parts, accessories, and allied products. Last year about 700 concerns had stands at the show. Most of the firms that stayed out this year were small manufacturers of implements and accessories, the decrease in the accessory groups being especially noticeable.

By far the largest majority of the exhibits was French. The most important American companies were represented either directly by their French branches or through dealers. Machinery from Germany, England, Switzerland, and a few other European countries was also shown. The number of exhibits from foreign countries was practically the same as in former years, with the exception of the German, which increased considerably since last year. German manufacturers are making a determined bid for an appreciable portion of the French agricultural-implement market, and a number of German makes have recently been successfully introduced in this country. Competition in the trade is keener now than it has ever been, not only between French and foreign manufacturers, but among the French manufacturers themselves.

There are now about 800 manufacturers of all kinds of agricultural implements in France, as against 400 before the World War. Of the 800 firms, about 15 employ from 500 to 1,000 workmen each, 25 employ from 200 to 500, and 125 employ from 50 to 200 each. The total number of workmen employed in the industry is about 40,000.

As a whole, the machines displayed showed little change from last year, although a continued perfection of mechanical details was noticeable. Major improvements in design and manner of operation were almost wholly lacking from the exhibits at the show. The "new machine" section this year held only 18 stands, none of which showed any outstanding innovations.

While it is difficult to make an exact count of the number of exhibits of each kind of implement shown because of a certain amount of vagueness and duplication in the classification, the following approximate list, taken from the official catalogue of the salon, shows the wide variety of the farm implements on display:

	Exhibitors		Exhibitors
Automatic troughs .....	7	Binders for threshers .....	6
Hay blowers .....	4	Oil-cake crushers .....	6
Cider or wine distillers .....	5	Wheelbarrows .....	6
Crushing mills .....	18	Crushers (meat, potatoes, etc.) ..	25
Hayrakes (for loaders) .....	3	Cider presses .....	7
Tree pullers .....	1	Crushers .....	12
Beet and other root diggers .....	8	Root cutters .....	38
Potato diggers .....	18	Incubators .....	4
Watering equipment .....	2	Sifters .....	4
Saw outfits .....	5	Jacks .....	4
Butter churns .....	24	Cultivators .....	30
Scales .....	3	Beet scrapers .....	9
Electric threshers .....	2	Fertilizer distributors .....	29
Threshers .....	73	Dynamos .....	2
Hydraulic rams .....	6	Cream separators .....	24
Narrow cultivators .....	28	Electric pumps .....	7
Two-furrow plows .....	8	Feed elevators .....	20
Reversible single-furrow plows ..	11	Boggers .....	9
Reversible 2-furrow plows .....	12	Weeders .....	9
Reversible multifurrow plows .....	5	Tedders .....	12
Plows for earthing up potatoes ..	6	Mowers .....	24
Subsoil plows .....	4	Binder twines .....	10
Tractor plows .....	23	Electro-generating plants .....	19
Plows for vineyards .....	19	Straw choppers .....	11
Other plows .....	35	Harrows .....	34
Flour mills (hand) .....	2	Hoes .....	37
Trussers .....	11	Steam engines .....	11

Exhibitors		Exhibitors	
Harvesters.....	17	Straw presses.....	16
Milking machines.....	10	Wine presses.....	10
Horse mills.....	3	Plant sprayers (all kinds).....	56
Sickle sharpeners.....	18	Hayrakes.....	5
Combines.....	3	Log saws.....	20
Electric engines.....	8	Circular saws.....	9
Stationary steam engines.....	6	Sowing machines (grain).....	25
Gasoline engines.....	29	Sowing machines (beet).....	14
Gasogene engines.....	7	Sowing machines (miscellaneous).....	10
Heavy-oil engines.....	15	Silos.....	8
Kerosene engines.....	5	Tractors, caterpillar type.....	12
Motor-driven pumps.....	25	Tractors, Diesel.....	4
Motor-driven saws.....	11	Tractors, for vegetables.....	7
Flour mills.....	24	Tractors, wheel.....	12
Windmills.....	3	Tractors, for vineyards.....	15
Pasteurizers.....	3	Grain separators.....	7
Centrifugal pumps.....	7	Potato-separators.....	5
Hydraulic pumps.....	2	Separators (other).....	6
Deep-well pumps.....	12	Disks.....	6
Hydraulic presses.....	7		

The following partial list of agricultural-implement shows held regularly in France will indicate to American exporters and manufacturers the various centers where exhibits of their products can be made.

Nature of exhibition	Place	Month	Information obtainable from--
International exhibition of aviculture and apiculture.	Lyon.....	January.....	Société d'Aviculture et d'Apiculture de Lyon 1, rue Bellecour, Lyon, Rhone.
Agricultural exhibition.	Nevers.....	do.....	Société départementale d'Agriculture de la Nièvre, Nevers.
Wine fair.....	Tours.....	do.....	Union Vinicole des Propriétaires d'Indre et Loire 7, Place du Palais, Tours.
Seed fair (officially recognized).	Chartres.....	January-February.	Syndicat Agricole d'Eure et Loir, 15, Place des Halles, Chartres.
Wine fair.....	Angers.....	January.....	Fédération des Syndicats Viticoles de l'Anjou 7, rue St. Blaise, Angers (Maine et Loire).
Seed fair.....	Paris.....	do.....	Mr. Garnier, 63, rue de Varenne, Paris, 7e.
International exhibition of agricultural implements.	do.....	do.....	Union des Exposants de Machines et d'Outillage agricoles, 38, rue de Chateaudun, Paris, 9e.
Agricultural show.....	Moulins.....	do.....	Société d'Agriculture de l'Allier, 1 bis, rue des Tanneries, Moulins.
Agricultural implements exhibition (officially recognized).	Brignoles.....	January-February.	Fondation Salgues Station Botanique Brignoles, Var.
Wine fair.....	Saumur.....	February.....	Mr. G. Gigault, 26, rue Dacier, Saumur (Maine et Loire).
International exhibition of aviculture and cereals.	Paris.....	do.....	Société Centrale d'Aviculture de France 34, rue de Lille, Paris.
Agricultural show.....	do.....	March.....	Ministère de l'Agriculture 78, rue de Varenne, Paris.
Exhibition of aviculture.....	Le Mans.....	do.....	Société d'Aviculture de la Sarthe, Le Mans.
Agricultural show.....	Vimoutiers.....	April.....	Hôtel de Ville, Vimoutiers (Orne).
Wine fair.....	Sancerre.....	do.....	Union Agricole et Viticole Hotel de Ville, Sancerre, Cher.
Cattle show.....	Haze brouck.....	do.....	Mr. Hacille Hadou, 38, rue de l'Eglise, Haze brouck, Nord.
Agricultural, commercial, and industrial show.	La Roche-sur-Foron.....	do.....	Hôtel de Ville, La Roche-sur-Foron, Haute Savoie.
Wine fair.....	Epernay.....	May.....	Office Agricole départemental de la Marne, Epernay.
Agricultural show (officially recognized).	Rouen.....	do.....	Société Centrale d'Agriculture de la Seine-Inférieure 40 bis, rue Saint-Lo, Rouen.
Agricultural and wine exhibition.	Puligny-Montrachet.....	do.....	Mr. Marcel Peres, Villa Von Accueil, Puligny-Montrachet (Cote d'Or).
Agricultural and horticultural exhibition.	Compiegne.....	June.....	Services Agricoles de l'Oise 7, rue du Palais de Justice Beauvais.
Agricultural show.....	Chalon-sur-Saone.....	do.....	Société des Foires 6, rue St. Georges Chalon-sur-Saone, Saône et Loire.

Nature of exhibition	Place	Month	Information obtainable from—
Exhibition of agricultural machinery.	Angers.....	June.....	Mr. Langlois, 71, rue Plantagenet, Angers, M. et L.
Agricultural, commercial, and industrial exhibition.	Charleville.....	.....do.....	Hôtel de Ville, Charleville (Ardennes).
Exhibition of agricultural implements.	Bordeaux.....	.....do.....	Comité de La Foire de Bordeaux.
Exhibition of aviculture.....	Bourges.....	June-July.....	Société d'Aviculture du Cher Bourges.
Agricultural, commercial, and industrial exhibition.	Etampes.....	July.....	Hôtel de Ville Etampes, Seine et Oise.
Exhibition of medicinal herbs and tobacco.	Milly-en-Gâtinais.....	August.....	Mairie, Milly-en-Gâtinais (Seine et Oise).
Agricultural and Industrial exhibition.	Beaune.....	September.....	Comité d'Agriculture et de Viticulture de la Côte d'Or 9, Place Monge, Beaune.
Wine fair.....	Grenoble.....	.....do.....	Société des Cuisiniers du Sud-Est, 22 Place Grenette Grenoble, Isère.
Seed fair.....	Chartres.....	.....do.....	Syndicat Agricole d'Eure et Loir 15, Place des Halles, Chartres.
Hop fair.....	Hazebrouck.....	September-October.....	Syndicat des Planteurs de Houblon des Flandres 38, rue de l'Eglise Hazebrouck, Nord.
Agricultural exhibition.....	Le Mans.....	September.....	Société des Agriculteurs de la Sarthe 30, rue Paul Ligneul, Le Mans.
Horticultural exhibition.....	Paris.....	October - November.....	Société Nationale d'Horticulture de France 84, rue de Grenelle, Paris.
Agricultural implements show.....	Versailles.....	October.....	Chambre Syndicale de la Motoculture de France 30, ave. de Messine, Paris.
Cattle show.....	Hazebrouck.....	.....do.....	Mr. Achille Hadou 38, rue de l'Eglise Hazebrouck, Nord.
Agricultural and horticultural exhibition.	Lyon.....	November.....	Hôtel de Ville, Lyon.
Cattle show.....	Pau.....	.....do.....	Préposé en chef de l'Octroi Pau, Basses Pyrénées.
Wine fair.....	Carpentras.....	.....do.....	Mr. Marius Nichel, Carpentras Vaucluse.
Agricultural implements (especially for vineyards).	Beaune.....	.....do.....	Comité de Viticulture de la Côte d'Or 9, Place Monge, Beaune.

### FRENCH MARKET FOR PARTICULAR IMPLEMENTS

Particular attention has been paid in the subsequent paragraphs to those machines which appear to have a good prospective market and which at present are little used, together with those machines furnished largely by competitors of United States manufacturers. In one or the other of these categories it seems proper to place plows, both horse and tractor drawn, tractors, manure spreaders, cream separators, small stationary and portable engines, grain seeders, threshers, and certain kinds of haying and tillage machines.

#### MANURE SPREADERS

Little progress has been made in introducing manure spreaders in France. Local manufacturers do not make them, and only a few of the American manufacturers doing business in France have made any effort to put them on the market. What success determined efforts in this direction would bring is therefore largely a matter of conjecture. The consensus among implement-importing houses and agents seems to be that a fair demand can be created, especially in the central and northern portions of the country, which are devoted largely to the various grain crops.

The French farmer is accustomed to utilize every particle of manure for fertilizing purposes. The common practice is to haul the manure to the fields during the winter and in idle times and place it about in small piles, later scattering it by hand. In introducing the use of spreaders, the saving in time and labor and the better distribution of manure over the land would have to be demonstrated. French farmers are very much averse to changing old practices, and

they would have to be shown the clear superiority of the new method over the old.

Owing to the small size of the average farm, a spreader intended for the French market must necessarily be small in size and as compact as possible. Wide tires would be essential, and provision should be made for the use of oxen as well as horses.

Practical demonstrations in various parts of the country would have to be made to arouse interest. This method has been used with remarkable success in the introduction of tractors, and the exploitation of spreaders might well accompany the many tractor and plowing demonstrations which are held yearly. The most important of these is the annual tractor and power implement competitive tests held at Buc, near Versailles, usually in October.

The assistance of the Government might also be obtained in carrying on educational campaigns among the numerous farmers' cooperatives and syndicates.

#### HORSE AND TRACTOR PLOWS

The most serious competition an American manufacturer would meet in attempting to introduce any one class of farm machinery in the French market would be in the sale of plows. Numerous French and other European manufacturers are engaged in their production, and they turn out remarkably good plows. Practically all of the many varieties are radically different from the plows most common in the United States. It is said that there are 40 different kinds of soil in France and that each kind requires an especially adapted plow. However well founded this statement may be, the fact remains that the village blacksmith in almost every locality is a plow manufacturer in a small way, turning out a plow that seems particularly well adapted to local needs as the farmer conceives them.

Perhaps the plow in most general use is the "double Brabant." This type has one plow inverted above the other. This avoids the necessity of creating dead furrows and back furrows. This plow has the disadvantage in heavy soil of not permitting the rain water to drain. Many of the plows are equipped with movable points consisting simply of a piece of sharpened bar steel, which can be adjusted as the point wears; the point can also be readily sharpened by the farmer himself. The shares are commonly of soft center steel, with the chilled or cast share used to some extent in the more sandy soils. Practically all types are furnished with steel beams, although there is some demand for wooden beams for use in the vineyards.

The most popular size plow cuts a furrow 10 to 12 inches in width, but there is some demand for still smaller sizes and also for a 14-inch bottom. Riding plows are not in general use, although sulky plows were sold to some extent by the Germans prior to the war. Plows are sold in France by weight rather than by size, but there seems to be no good reason why the latter method could not be used with the successful introduction of American-made plows.

#### SEEDERS AND DRILLS

The sowing of grain is most commonly done with the ordinary drill. Some of it is still done by hand. Very few disk drills are in use. Broadcast seeders, with the spring-tooth harrow attachment

for covering the seed, have only a small market in many parts of the country. Where such machines are used, they should be furnished with a grass seed box as an attachment.

#### HAY-BALING PRESSES

The demand for hay balers is still small, although these machines are becoming more popular. Baling presses of the type common in the United States are in evidence in various parts of the country, some with engines mounted on the press, others with press and engine separate. However, the demand for balers does not seem great enough to warrant any large expenditure of money on the part of American manufacturers in an attempt to push the sale of the machine. A straw-baling device little known in the United States is commonly used in France for baling the straw as it comes from the thresher, the baler being attached to the rear end of the threshing machine. These machines are of simple construction and are plentifully supplied by domestic manufacturers.

#### SMALL ENGINES

In the small-engine trade American exporters to France meet with local competition, for excellent engines of various types are built in a number of the European countries, including France. The Europeans in general make no better engines than the manufacturers of the United States, but their superiority is in the fact that they finish their products in a neater and more attractive manner. This applies in some degree to all classes of machinery, but in particular to engines. The French buyer is greatly influenced by the general finish and appearance of a machine, and the majority of American manufacturers now selling engines in the French market have been influenced accordingly. A poorly finished machine, unattractively painted, with rough unpolished surfaces, even though it be of the highest quality, will not bring the price that a much poorer machine will command if it is nicely painted and polished.

There is a large sale in France of stationary engines of 2 to 8 horsepower, both vertical and horizontal. Two and three horsepower engines are especially in demand for operating bread mixers, particularly in the smaller villages and towns; those of greater power are also in demand for pumping, grinding, and wood sawing. There is a moderate demand for portable wood-sawing outfits, of which French manufacturers make a number of types.

Feed grinders of different types are produced by domestic manufacturers in sufficient quantities to meet the home demands.

#### THRESHERS

English-made threshers and steam engines long commanded the French trade on account of their excellent quality and special adaptation to the French needs, but they can not compete now with the French-made machines which can be manufactured at a lower cost. The threshers used in France have a drum with angle bars that beat out the grain, but at the same time preserve the straw, which is later baled or tied in bundles. Because they consider the straw of greater value than do American farmers, French farmers object to the American style of thresher, which breaks the straw and leaves it unsuitable for binding.



### TILLAGE TOOLS

Harrows of the spring and peg tooth varieties and small 1-horse cultivators are made in quantities by French and other continental manufacturers. American exporters, however, are enjoying a small trade, especially in spring-tooth harrows and small cultivators. The former are commonly demanded with lever adjustment for raising and lowering the teeth and are furnished for use in one or two sections, the sizes ranging from 9 teeth in single sections to 13, 15, and 17 teeth for two sections. Small cultivators are extensively used in vineyards and truck gardening. These should be equipped with ordinary tools for cultivating and weeding, with a lever device for widening or narrowing the teeth.

The locally made cultivators are so strongly entrenched in the market that the American-made machine has little or no chance. Peg-tooth harrows are commonly known, but the demand for them is somewhat limited. Like the spring-tooth harrow they should be furnished for use in one or two sections, and in both cases a hitch should be made available for the use of oxen instead of horses.

Disk harrows are being introduced with some success by three or four of the American exporting houses, although they are not in general use throughout the country. A small disk with reversible gangs adapted for use in vineyards is meeting with considerable favor in the large wine-growing sections. The heavy disk harrow requires more horsepower than the ordinary French farmer can provide and is an essentially tractor implement.

### HAYING AND GRAIN-HARVESTING MACHINERY

Mowers and binders were chief among the early machines shipped by United States manufacturers to France nearly a half century ago, and from that early date they have continued to form the bulk of shipments of farm implements to that country. To the manufacturers of this machinery the demands of the French market are as well known as the demands of the home trade and, in general, as well cared for. Because of the small farms, the French demand is for the 5 and 6 foot binders rather than the 7 and 8 foot, and for mowers with a cut from 3½ to 5 feet. The farmer often avoids the necessity of buying a binder for a small patch of grain by getting a reaping attachment with his mower, perhaps 45 per cent of all mowers being sold with this device. French and European manufacturers in general offer practically no competition in the production of binders, nearly all of them coming from Canada and the United States. French and German manufacturers are making bids, but only the Germans are making headway.

Excellent rakes are made in France, and the American trade in this machine has never reached large proportions. In recent years it has been declining rather than increasing. The French demand is for a heavy, durable rake with heavy flat-pointed teeth. The teeth are shaped somewhat differently than in the American rake, in order to avoid digging into the ground when the stubble is very short. In the more mountainous districts lighter rakes have necessarily been called for, and the American machine has found some favor because of price. The size ordinarily runs from 5 to 8 feet, with 24 to 30 teeth.

Side-delivery rakes of both domestic and foreign make are in the market and somewhat commonly used. Owing to the general practice of tedding the hay during the drying process on account of its heaviness, the combination side-delivery rake and tedder is more often called for, and the machine intended for this market should be thus designed.

Hay loaders are little known in France, and it seems doubtful if they will ever attain any marked degree of popularity. The reason for this is to be found both in the small size of the average farm and the universal use of the 2-wheeled wagon, to which it would be difficult to attach the loader. Also the use of the loader would require another draft animal, which would be a problem with many farmers. The machine is not made in France, and its introduction has not been seriously pushed by American firms.

#### HARVESTER-THRESHERS

The harvester-thresher was introduced in France only in 1921, and a few have been sold each year since then. These machines are employed chiefly in the southern districts, where wheat matures more evenly on the stalk. In the northern districts, as well as in districts where landed property is cut up into small areas, such, for instance, as the western sections and more especially Brittany, the "combine" method of harvesting has, needless to say, not been introduced at all.

The machines that have been sold and used lately have elicited widespread comment, both in the rural communities and in the agricultural press. Practically all important farmers in France have some idea of the operation of the harvester-thresher; but it is equally true that the majority of them are still a long way from being ready to adopt this new method of harvesting on their own farms. This is due to the rather limited size of farms and the natural conservatism of the farmers.

It is hardly possible to formulate any definite forecast as to the future of the harvester-thresher in France. It is still in an experimental stage. On the other hand, as regards North Africa (Algeria, Morocco, and Tunisia), it can be said that the harvester-thresher method of harvesting is now an accepted fact. Many machines are sold every year in this region, and the economic, climatic, and labor conditions are well suited to this modern method of harvesting and threshing grain in one operation.

#### DAIRY AND BARN EQUIPMENT

As a direct result of the war-time regulation of prices of necessities—restrictions which, in the case of milk, are still in force—the French dairy industry is in a very poor condition. The wholesale price of bulk milk, in Paris, is 1 franc a liter (about 4 cents a quart). The retail price, in Paris, is 1.50 francs a liter (about 6 cents a quart). In the provincial towns the retail price is generally 1.25 francs per liter (5 cents a quart). The limitations imposed upon the producers do not make it profitable for them to invest money in equipment. In fact, the attempt is made to produce the milk as cheaply as possible, with the consequent result that the quality is exceedingly poor.

No French housewife would ever use milk which she, herself, has not boiled. The bacteria content sometimes reaches between 400,000 and 500,000 per cubic centimeter.

There has been little modernization of equipment since 1914, and so long as the price is strictly limited, as at present, but little progress can be anticipated in the improvement, either on the farm or in the distribution methods. Some years ago Maggi, the principal Parisian milk distributor, attempted to introduce modern milk sanitation in bottling and distribution methods, but had to revert to the old practice, because of the losses sustained in attempting to educate the public. The Rothschild Foundation, as public philanthropy, then attempted to bring about the same end, and, even though no profit was expected from the venture it also gave up the effort.

There are only four or five exceptions (all small companies) which produce high-grade milk, with a bacteria content equivalent to the best American standards. Their cost of production is so great that they are forced to sell their milk at a price of about 24 cents a quart, a figure which is prohibitive to the majority of the consuming public. As a result, their clientele is confined to the hospitals, to those of the big hotels which cater to American trade, and to well-to-do families for the use of small children.

French methods of milk production are so antiquated that no fresh cream can be obtained in the cities, except in Paris, as above noted. Refrigeration is rarely used.

#### MODERN EQUIPMENT IN DAIRY FARMING

Competent authorities estimate that not more than 60 per cent of the farms have cream separators, and of those perhaps 3 to 4 per cent have power-driven separators. The others are hand-operated. Although pasteurizing is generally practiced, but not required, the effect of it is doubtful, because the milk is never cooled after pasteurizing. The milking is all done by hand, and universally wet. For that reason, and because of the nearly total absence of mechanical equipment, the milk produced is of the very poorest quality. As explained above, it is not likely that that situation will change so long as dairying is unprofitable to the peasants.

The above remarks can be modified to a slight extent, so far as the important Normandy dairy industry is concerned. In that region cows are left in the fields for 9 to 10 months a year, and, as considerable quantities of milk and butter are exported to England—at higher prices than those obtained in the domestic market—milk-handling equipment is somewhat more extensively used.

As Normandy would be the first region to develop a dairy industry sufficiently profitable to warrant the installation of modern equipment, it is only there where American manufacturers, in the immediate future, can look for any prospects for selling their equipment. Milking machines are hardly known, anywhere in the country. Cheap farm labor—it can be had at \$240 per year, with board and room—lack of sanitary requirements, and price limitations militate against a market for modern equipment at this time.

## EQUIPMENT IN CITY OR MUNICIPAL DAIRIES

Beyond pasteurizers as on the farms, there is very little equipment used in the urban dairies. Although milk is delivered to consumers in bottles, many of the bottles are not even sterilized, and no sealing device is ever used. Mixers are not employed, and coolers are used indifferently. There is no icing.

Butter and cheese making is confined to the farms where, for the reasons noted above, no equipment is used. That applies particularly to French cheese, which, of course, is universally known for its excellency. There are many varieties, and all are produced with what Americans would consider primitive means. That, incidentally, is one reason for its excellency.

## ORIGIN OF EQUIPMENT USED

The equipment in use is made locally. Imports of dairy machinery are negligible. There is one local manufacturer, Alfa-Laval, who makes sterilizers and sterilizing equipment, pasteurizers and pasteurizing equipment, coolers, and milk-bottling equipment very similar to that used in modern American dairies; but, of course, that company's market is limited. American manufacturers' competition with that company and with several lesser ones would undoubtedly meet with but very moderate success. The burden of export packing, transportation, and handling charges imposed upon the American manufacturer—charges which are spared the local manufacturer—would undoubtedly make it very difficult, if not impossible, to develop a lucrative French market.

## EXTENT OF USE OF MODERN BARN EQUIPMENT

Stanchions, steel cow stalls, litter carriers, and stock-watering bowls are practically unknown in all parts of the country. Barn-door hangers are not used. It is a French practice, generally, to use swinging doors. Hay-unloading tools and equipment are only now beginning to be used. Hay hooks, suspended on rollers and mounted on overhead tracks are known, but because of the low wages paid farm hands only the more modern and progressive farmers have installed such equipment. One local manufacturer, Garnier, has started the making of such equipment.

The above comment as to the possibilities of selling American-made dairy equipment applies as well to the prospects of selling American barn equipment.

## FRENCH MARKET FOR SILOS

Silos are only beginning to be used. Some few have been sold in Normandy, Brittany, in the Aisne, and in the Paris region. They are generally of metal, and all of local manufacture. It is safe to say that there is no prospect of selling American-made silos in France. The same applies to silo fillers, which are now made locally and sold at prices far below what would have to be the laid-down cost in France of the American machines.

Ensilage cutters are used to a small extent in the same regions mentioned above. There is very little present prospect of their being sold here. Louden, a French manufacturer, has been getting all the business to date. Harrison-McGregor, an English manufacturer, as well as one of the largest American agricultural implements manufacturers, has attempted to obtain a share of that trade, but with only moderate success.

#### TRACTORS

The introduction of tractors and power-farming methods in France has been greatly hastened by the conditions prevailing a few years ago, when labor was scarce, prices of farm products were high, and the Government was urging the farmers to increase production. Under these forced circumstances results were accomplished which would have required many years and the expenditure of large sums of money by private concerns. The French farmer now is keenly interested in the use of tractors. Most of them now in use have come from the United States, but the unusual interest displayed has aroused French manufacturers to attempt their construction on a large scale. It seems likely, however, that the French farmers will continue to look to American manufacturers for a considerable proportion of their tractors.

The demand thus far appears to favor a small tractor designed to pull two or three plows. The wheel type of machine rather than the crawler seems to be preferred, but there are a number of designs of the latter type in the market that are meeting with success. Tractor work has been confined almost entirely to plowing, although in the numerous demonstrations that are being held each year throughout the country the feasibility of the tractor for preparing the ground for seeding has also been demonstrated. Owing to the small size of a great majority of French farms and the presence of hedges or stone fences around many fields, a tractor for general use must be able to turn very sharply. Where the plow or other implement is attached, the hitch should be made as close as possible to the tractor. Whether the tractor has one or two wheels running in the furrow, or whether all wheels run on the land, does not seem to be a matter of great importance, one design being popular in one locality, while near by another local dealer will have popularized the other type.

For road work it is essential that the tractor wheels be flat or that a heavy band be provided to slip over the lugs. Practically all French roads are macadam and the laws governing their use are stringent.

#### TRACTORS FOR VITICULTURISTS

There has been much talk among viticulturists and tractor makers about designing a tractor for use in the extensive vineyards of France. The difficulty of designing such a tractor is greatly aggravated by the lack of standard methods in planting vineyards. For example, in one district the rows of vines may be little more than 1 yard apart, while in other districts they may be from 2 to 3 yards.

In the most important vine-growing sections through the southern part of the country the vines are planted on an average about 5 feet apart. A tractor designed for use in such vineyards could be hardly more than 40 inches in width, thus allowing about 10 inches between the wheels and the vines on either side. A machine developing 5 or 6 horsepower at the drawbar would be strong enough to perform the work required, namely, cultivating to a depth of about 2 inches and plowing to a depth of 3 or 4 inches.

A tractor designed for work in vineyards would hardly be practicable, on account of its size, for any sort of general work; but a tractor that was successful in meeting the requirements of the viti-culturists alone would undoubtedly meet with an excellent demand. About 4 per cent of the total area of France is devoted to vineyards, and about one-third of the world's supply of wine is produced within the country. Little success has been attained thus far in the use of tractors in vineyards. One important French concern has designed and placed on the market a small machine especially for this purpose, but the field is largely unexploited.

#### WHEEL TRACTORS AND TRACK-LAYING TRACTORS

Wheel tractors are not manufactured by American companies having branch factories in France. Only two foreign companies have local plants sufficiently large and equipped to make tractors, but both of them devote their manufacturing facilities solely to turning out a nearly complete line of tillage and harvesting implements.

As regards track-laying tractors, the situation is somewhat different. One make of tractor is manufactured in France under license; it is the 20-horse-power tractor, which is an exact copy of an American-made machine. That size of tractor was selected because it is perhaps the best adapted for all-around work on small farms and because it is the best size suitable for drawing the French 75 mm gun. The French Government, in its desire to have sufficient tractors of that type and power available for an emergency, contributes toward the purchase of such a machine a sum of 6,100 francs, provided it is equipped with certain minor parts which will make it suitable for war use. It is believed the most essential part required, if advantage is to be taken of the Government's subsidy, is the standard 75 mm gun-carriage traction hook.

#### SELLING METHODS FOR TRACTORS

Competition in the sale of tractors is severe. Between 15 and 20 French concerns are manufacturing tractors, and about an equal number of foreign makes is being offered in the French market. The cost of manufacturing the French-made machines at the present time, as judged by the retail selling price, is obviously higher than the cost of manufacturing in the United States, as judged by the retail price of these machines in the French market.

A number of English concerns are also making a strong bid for tractor business. It seems likely, however, that the cost of construction will place them in a position somewhat similar to the French

manufacturers, with the added burden of the tariff against them.

American manufacturers offering strong and durable tractors of neat appearance, with the production cost in their favor, should continue to get the bulk of the French tractor business for some years to come.

### FRENCH FOREIGN TRADE IN AGRICULTURAL IMPLEMENTS

The following data on the French imports and exports of the various types of farming equipment were provided by H. C. Schuette, assistant trade commissioner at Paris.

The United States supplied France with more than \$2,385,000 worth of agricultural machinery in 1931, or 42 per cent of the total French imports of farm implements. This represents a slight increase over the year 1930. Fully half of the total value of imports from America consisted of tractors.

Total imports of agricultural implements into France from all countries amounted to 144,111,000 francs, a decrease of 9.5 per cent from the 159,265,000 francs worth imported in 1930. The American share of the total increased, however, from 38 per cent in 1930 to 42 per cent in 1931, or from 60,008,000 to 60,732,000 francs.

French exports of farm machinery, on the other hand, decreased from a value of 142,660,000 francs in 1930 to 81,338,000 in 1931, a drop of 43 per cent.

Tractors constituted the most important item in both the import and export trade in the past year, imports amounting to a value of 56,640,000 francs, and exports 13,375,000 francs. French foreign-trade figures show a total of 23,294,000 francs worth of "other agricultural machinery" exported, but this is made up of numerous implements not tabulated separately.

The following table shows the value of imports into France in 1930 and 1931 of the main classifications of agricultural machinery, as well as imports from the United States during the two years under review.

TOTAL FRENCH IMPORTS, AND IMPORTS FROM THE UNITED STATES OF AGRICULTURAL IMPLEMENTS, BY CATEGORIES, 1930 AND 1931

Item	Total imports, in thousands of francs		Imports from the United States, in thousands of francs	
	1930	1931	1930	1931
Tractors.....	53,579	56,640	30,552	30,758
Cultivators, harrows, rakes, tedders, single plows.....	1,424	1,640	344	339
Cream separators and other centrifugal machines.....	22,684	19,791	308	466
Mowers.....	8,378	7,791	980	1,304
Reapers, combines.....	24,824	16,296	14,243	11,143
Double "Brabant" plows.....	3,262	2,927	410	166
Wine and fruit presses, weighing 400 kilos or more.....	773	632	-----	-----
Other agricultural machinery.....	24,735	21,194	4,726	7,060
Spare parts.....	19,606	17,200	8,445	9,496
Total.....	159,265	144,111	60,008	60,732

Of the 56,640,000 francs worth of tractors imported into France from all countries in the past year, 55 per cent, valued at 30,758,000

frances, came from the United States. Of the latter amount, tractors weighing from 2,000 to 3,000 kilos accounted for 14,579,000 francs of the total and tractors weighing more than 3,000 kilos made up 11,764,000 francs of the total. Great Britain was the second most important supplier and Ireland third. Tractors from Ireland are the product of the Cork plant of a well-known American manufacturer.

The United States supplies the preponderant share of the imports of harvesters—11,143,000 francs out of a total of 16,296,000 francs. While direct imports from the United States in cultivators, mowers, plows, and other machinery do not bulk large, it must be remembered that these figures do not take into account any of the implements manufactured in France by the branch plants of two American companies.

Taking all categories of implements into consideration, Germany was the second most important foreign supplier, followed by Belgium and Great Britain.

The following table indicates the total weight and value of French agricultural-implement exports and lists the quantities in each category which went to the leading French colonial markets.

AGRICULTURAL-IMPLEMENT EXPORTS OF FRANCE TO ITS LEADING COLONIES, MANDATES, AND PROTECTORATES, IN 1931, BY WEIGHT AND VALUE<sup>1</sup>

Item	Weight, in metric quintals	Value, in thousands of francs	Item	Weight, in metric quintals	Value, in thousands of francs
Tractors:			Double "Brabant" plows—		
Algeria.....	3,776	5,059	Continued.		
All countries.....	9,154	13,375	Madagascar.....	956	357
Cultivators, harrows, rakes, tedders, single plows:			All countries.....	6,150	3,099
French West Africa.....	4,866	1,729	Wine and fruit presses weighing 400 kilos or more:		
Algeria.....	1,369	810	Algeria.....	6,114	3,576
All countries.....	21,796	7,777	Syria.....	332	103
Cream separators and other centrifugal machines:			Tunisia.....	1,201	417
All countries.....	122	180	All countries.....	9,612	5,312
Mowers:			Other agricultural machinery:		
Tunisia.....	154	55	Algeria.....	12,535	8,080
All countries.....	13,030	5,170	Morocco.....	1,650	1,026
Reapers, combines:			Tunisia.....	2,868	1,550
Algeria.....	1,430	673	All countries.....	35,232	23,294
Tunisia.....	440	214	Spare parts:		
All countries.....	6,723	2,988	Algeria.....	14,058	8,016
Double "Brabant" plows:			Tunisia.....	3,097	1,504
Algeria.....	1,988	1,379	Morocco.....	1,179	634
French West Africa.....	2,076	745	All countries.....	39,506	20,143
			Grand total.....	141,325	81,338

<sup>1</sup> Insignificant items to colonies not listed separately.

### THE FRENCH COLONIAL MARKETS

France is the second greatest colonial power in the world. Its territory, 12,000,000 square kilometers (4,633,000 square miles) in area, with 59,000,000 inhabitants, is scattered over the world, but the largest portion, which owes its importance to its proximity to France, is in North Africa.

The number of French colonists is spread in a fairly equal proportion over all the colonies.



## AREA AND POPULATION OF FRENCH COLONIES, PROTECTORATES, AND MANDATES

Colony	Area (thousands of square kilo- meter )	Total population	French population	Other Europeans and as- similated inhabi- tants
Algeria.....	2, 195	6, 066, 000	694, 865	175, 718
Tunisia <sup>1</sup> .....	125	2, 159, 000	71, 020	102, 261
Morocco <sup>2</sup> .....	420	4, 229, 000	74, 558	30, 154
French West Africa.....	3, 749	13, 542, 000	11, 099	4, 300
Other African colonies.....	3, 442	8, 903, 000	202, 372	12, 303
Syria <sup>3</sup> .....	200	2, 191, 000	15, 744	20, 620
French India.....	513	273, 000	1, 034	282
Indo-China.....	737	20, 697, 000	23, 164	1, 118
Oceania.....	34	148, 000	17, 516	5, 050
American areas.....	93	522, 000	501, 600	1, 055
<b>Total.....</b>	<b>11, 049</b>	<b>59, 474, 000</b>	<b>1, 613, 256</b>	<b>352, 952</b>

<sup>1</sup> Civilians.<sup>2</sup> Protectorate.<sup>3</sup> Mandate.<sup>4</sup> Including 10,574 European soldiers.

Until comparatively recent times, anything approaching modern equipment and agricultural methods were unknown in the French colonies; the natives used only the most rudimentary instruments: Plows made of branches of olive or oak, with an iron share and wooden handles, which only scratch the soil; primitive harrows: scythes which served to cut the crops and shear the sheep; ropes made of native fibers to harness pairs of oxen, horses, donkeys, or camels to the plow; big jars for keeping the stock of grain, etc. The crops are sown even to-day in many places before the soil is plowed and the plowing is done in such a way that the seeds are scarcely covered. Hoeing and fertilization were unthought of until recent years.

The first colonists had agricultural equipment sent to them from France and gradually overcame ancestral traditions and accustomed the natives to its use. Until quite recent years, the agricultural implements differed little from those used in continental France. Lately, however, English and American equipment has been imported to a large extent, and even equipment well suited to the peculiar local conditions has been manufactured in Algeria. The European colonists there in some cases are now better equipped than agriculturalists in France. The natives themselves, impressed by the results obtained with modern equipment, are gradually abandoning their primitive methods.

The total value of modern equipment purchased by the natives in the various colonies was estimated at 45,000,000 francs in 1929, compared with 191,000,000 francs, the value of the equipment belonging to colonists.

Every effort is being made to educate the natives in modern agricultural methods, not only through the example of the European colonists, but also by the establishment of laboratories, special schools, research stations, and special classes in the native schools. Two large schools of agriculture exist in Algiers and in Philippeville; another is under construction in the Department of Oran. Important work is being done by the Pasteur Institute in studying methods of

combating plant diseases, locusts, orange flies, etc. Finally, various departments in the colonial governments are exclusively devoted to the encouragement of agriculture and agricultural research.

This development was not equal in all the colonies. Even in 1900 the North African colonies were considerably more developed than the others. During the war the difficulty of procuring merchandise from abroad was the cause of internal development in the colonies. As a result, agriculture was neglected, the exports of foodstuffs decreased, and the need of fabricated products from abroad diminished. Since the war, there has been a general, progressive development of commerce between France and its colonies, between the French colonies and other countries. This tendency is especially marked in the colonies other than Algeria and North Africa.

Algeria imported from France during the first nine months of 1931—

102 tons of cultivators, spring harrows, horserakes, hayrakes, single plows, valued at 654,000 francs.

5 tons of mowers, valued at 21,000 francs.

143 tons of reapers, reaper-binders and harvesters, valued at 673,000 francs.

157 tons of double plows, valued at 1,025,000 francs.

1,097 tons of separate parts, valued at 6,624,000 francs.

Tunisia imported from France during the same period—

44 tons of cultivators, spring harrows, horserakes, hayrakes, single plows, valued at 242,000 francs.

41 tons of reapers, reaper-binders, and harvesters, valued at 200,000 francs.

19 tons of double plows, valued at 95,000 francs.

274 tons of separate parts, valued at 1,346,000 francs.

Morocco imported from France during the same period—

28 tons of cultivators, spring harrows, horserakes, hayrakes, single plows, valued at 138,000 francs.

5 tons of mowers, valued at 19,000 francs.

13 tons of double plows, valued at 100,000 francs.

86 tons of separate parts, valued at 489,000 francs.

French West Africa imported from France during the same period—

490 tons of cultivators, spring harrows, horserakes, hayrakes, single plows, valued at 1,729,000 francs.

1 ton of mowers, valued at 7,000 francs.

1 ton of reapers, reaper-binders, and harvesters, valued at 6,000 francs.

143 tons of double plows, valued at 505,000 francs.

12 tons of separate parts, valued at 87,000 francs.

Madagascar imported from France during the same period—

1 ton of cultivators, etc., valued at 11,000 francs.

4 tons of mowers, valued at 24,000 francs.

95 tons of double plows, valued at 357,000 francs.

11 tons of separate parts, valued at 94,000 francs.

Other French colonies imported from France during the same period—

3 tons of cultivators, etc., valued at 27,000 francs.

6 tons of double plows, valued at 42,000 francs.

6 tons of separate parts, valued at 66,000 francs.

Exports from the French colonies into France are negligible.

## ALGERIA

Herewith is a table showing the acreage of cultivated land in the various districts of Algeria, together with the number of European and native farmers.

DISTRIBUTION OF CULTIVATED LAND IN ALGERIA, BY DISTRICTS AND TYPES OF FARMERS

Districts	Owners possessing less than 10 hectares <sup>1</sup>		Owners possessing from 10 to 50 hectares		Owners possessing from 50 to 100 hectares		Owners possessing more than 100 hectares	
	Number	Hectares	Number	Hectares	Number	Hectares	Number	Hectares
Algiers:								
Europeans.....	5,425	21,488	2,832	75,770	1,364	104,531	1,090	298,013
Native.....	149,309	378,619	34,356	707,860	4,821	340,996	1,601	362,066
Total.....	154,734	400,108	37,188	783,630	6,185	445,527	2,691	660,079
Oran:								
Europeans.....	1,943	11,566	3,055	95,287	2,374	184,378	2,522	678,071
Native.....	57,362	347,354	19,879	514,411	6,506	438,429	2,549	616,492
Total.....	59,305	358,920	22,934	639,697	8,880	622,806	5,071	1,294,563
Constantine:								
Europeans.....	1,275	8,515	1,178	44,860	962	63,575	1,75	739,03
Native.....	156,944	864,320	84,710	1,360,177	25,508	807,243	3,851	606,390
Total.....	158,219	872,835	85,888	1,405,037	26,470	870,818	5,608	1,345,424
Southern Territory:								
Europeans.....	234	965	45	870	25	1,882	42	6,860
Native.....	70,922	148,513	1,065	22,827	127	8,730	34	8,550
Total.....	71,156	149,478	1,110	23,697	152	10,612	76	15,410

<sup>1</sup> 1 hectare equals 2.471 acres.

The total amount of land cultivated in Algeria comes to 9,908,644 hectares, of which 2,345,667 are owned by European farmers and 7,562,977 hectares by native farmers.

There is still much room for development in both agriculture and viticulture. There seem to be great opportunities in Algeria for manufacturers of agricultural machinery, tracklaying tractors, and irrigation equipment. However, a very careful study of the conditions under which the machines will have to work is necessary before an attempt can be made to export agricultural machinery to Algeria. Difficult soil, destructive climate, and native labor are among the drawbacks; and machinery to be advantageously used must be strong, simple in construction, and heat-resistant.

A recent agricultural implement census in Algeria showed the following equipment in use:

Plows.....	Number	544,573	Reapers.....	Number	15,433
Harrows.....	56,436	Carts.....	53,006		
Disk pulverizers.....	8,967	Locomotives.....	1,524		
Cultivators.....	14,835	Threshers.....	1,565		
Rollers.....	10,257	Reaper threshers.....	440		
Sowing machines.....	4,891	Tractor plows.....	577		
Mowers.....	6,596	Tractors.....	5,344		

<sup>1</sup> Of this number, 344,061 are native-made plows.

The import duties payable on agricultural machinery entering Algeria are the same as those payable on entry into continental France.

#### SPRAYERS AND DUSTERS FOR VINEYARDS

American Consul Oscar S. Heizer, at Algiers, has made the following report regarding the equipment used in the vineyards:

A good market exists in Algeria for mechanical spraying and dusting equipment. This region is rapidly growing in importance as a grape and wine producer. During 1928, 548,000 acres were devoted to grapes, while in 1929 the acreage rose to 560,000.

Wine production in 1929 amounted to 339,995,000 gallons, an average of 605 gallons per acre, as compared with the 1923-1927 average of 246,313,000 gallons produced and an average per acre yield of 502 gallons. This increase in the average yield per acre is very likely due in no small measure to the increased use of mechanical equipment for the better care of the vines as regards insect pests and other plant destroyers.

In former days the spraying and dusting was all done by hand, great numbers of natives being employed, each man carrying a copper cylinder on his back. To-day horses and mules carrying the apparatus have superseded the men to a large extent and motor power is being used wherever the character of the ground is sufficiently favorable. There is therefore a good opening for sales of equipment of this kind. The field covers not only Algeria, but all of north Africa and southern France, since conditions are alike in all these areas.

A great deal of the equipment used consists simply of sheet metal easily put together by the local industry. Machinery offered in this market must be of excellent quality, yet simple and foolproof, so that it can be intrusted to the ordinary native without risk of damage and subsequent pecuniary loss. A large French concern has made practical application of compressed air to agricultural industry, particularly grape growing. Large owners have their own installations of the necessary machinery. Smaller estates are supplied with the cylinders of compressed air which are distributed among the vineyards and used by the carload.

Frequent spraying and dusting is necessary in the vineyards of Algeria, the number of sprayings depending on the character of the season and the nature of the diseases or pests in evidence. There are seasons in which spraying is necessary every few days either with the sulphate of copper mixtures against mildew, or against eudemis, which is a caterpillar which attacks the grape itself. There is also the black rot which ravages the clusters in some seasons. In these cases, spraying and dusting should be almost continuous during the growing season. Thus the equipment is in constant use and frequent replacements are necessary.

At present, the trade is in the hands of French firms. It is believed that French manufacturers sell annually at least five or six million dollars worth of spraying and dusting equipment. During 1929, American export statistics show that 47 sprayers and dusters valued at \$8,466 were purchased by Algeria and Tunisia, while during 1930 none was purchased by this market.

#### TUNISIA

The agricultural-implement situation in Tunisia in 1930 and 1931 was not altogether favorable, according to American Consul Leland L. Smith, at Tunis.

The situation of the farmers continues difficult despite the increased credit facilities extended by the Government. One relief measure affects all classes of farmers. By special arrangement between the administration and a local bank, all local farmers who store their grain in a warehouse approved by the Government, pending the sale of the grain, are entitled to cash advances reaching 90 per cent of the value of the wheat, barley, or oats thus stored. The Government guarantees the bank 2 per cent on these advances in

the event of devalorization and also assumes for a period of six months any part of the interest on these advances which shall exceed 3 per cent. These conditions apply to grain stored before September 1, 1930, for maximum quantities of 1,000 quintals of grain per producer.

The second measure affects only those farmers who were installed on land after 1926 in accordance with a French scheme of colonization. This class of farmer acquired land grants at an inopportune time and has proved to be the chief suffered from the present difficult situation. They bought the land at from 1,000 to 3,000 francs per hectare and were given 20 years in which to reimburse the Government. In addition, average and short-term obligations were assumed to pay for stocking the farm, for immediate requirements such as fuel and seed, and for the purchase of agricultural implements.

To help this class of farmers, the administration arranged with the banks for a sum of 25,000,000 francs to be loaned at 5.5 per cent, of which 2 per cent is to be assumed by the administration. It is estimated that 40 per cent of this sum will be diverted to the implement trade with the remainder going to the farm organization supplying the livestock and seed.

There are conflicting opinions regarding these measures. Implement dealers, who did an excellent business in 1929, are finding collections slow, with numerous requests for extensions, and complain that only 10,000,000 francs have been allotted by the Government to help the farmer pay the implement trade.

In 1929, 770 wheel tractors and 325 tracklaying tractors were sold in Tunisia, with 95.5 per cent of the former and 91.5 per cent of the latter being of American manufacture.

An estimate for 1930 places combine sales at 205 units, as compared with 198 in 1929. One American combine with a new hillside model adaptable to work on the plains, increased its sales to more than three times the 1929 amount, while all other makes show considerable losses. Binder sales in 1929 reached a total of 568 units, whereas it is estimated that about 340 were sold in 1930. An increasing number of binders, at present about 10 per cent, are equipped with power take-off. In such equipment as disk harrows, disk plows, and moldboard plows, sales are stated to be reduced one-fourth of what they were in 1929.

It may be said that a very difficult situation for both farmers and dealers exists, although slightly improved by Government attitude and credit assistance. A long period of calm is expected in the implement trade.

Official statistics regarding imports of agricultural implements indicate that 5,803 tons of heavy agricultural implements were imported during 1928, 1929, and 1930. These include (1) mowers, harvesters, harvester-binders, harvester-threshers, tractor plows (with the exception of tractors), weighing approximately 3,000 tons; (2) others weighing 400 kilos and more (sorters, wine presses, hay presses, heavy plows, windmills and accessories, pulverizers, crushers, sowing machines, manure spreaders, etc., weighing 2,000 tons; and (3) implements weighing less than 400 kilos (rakes, vineyard implements, etc.), weighing 800 tons.

Agricultural tools imported, including shovels, picks, axes, spades, wheelbarrows, carts, scythes, rakes, tool handles, shears, and pruning knives, weighed approximately 329 tons.

Imports of power equipment are classified in the official customs returns under the general title "Locomotives and road-making equipment." It is therefore difficult, if not impossible, to determine the amount of machinery imported. However, from information gathered in the trade, it would appear that approximately 1,200 tractors are in use among the European and native farmers in Tunisia. One-third of these are tracklaying tractors. Two-thirds of the tractors in use in the Regence district are made in America, the remainder being imported from England, Germany, and Czechoslovakia.

#### MOROCCO

The French Protectorate of Morocco is primarily an agricultural country. The climate, though generally favorable to a wide variety of crops, is too dry in summer and too cold in winter for the successful cultivation of purely tropical plants. Only western Morocco is susceptible to agricultural development; this section embraces approximately 27,000,000 acres. In 1929 the land under cultivation covered 8,920,000 acres, including 272,000 acres of orchards, vineyards, and gardens.

Barley is the most extensively cultivated cereal, in 1929 covering 3,247,000 acres and yielding 10,302,000 metric quintals (40,557,000 bushels). This yield was inferior to that of 1928 and prices dropped considerably. Exports also declined, although large quantities are usually shipped to France, England, and Belgium for use in brewing.

Both hard and soft wheat are raised, the former in 1929 covering 2,350,000 acres, and the latter 462,000 acres. Although the yields of 6,801,000 and 1,843,000 quintals (24,823,000 and 6,772,000 bushels), respectively, were higher than in 1928, their financial returns were disappointing owing to continued price declines and slow sales. Exports of hard wheat are very small but the greater part of the soft-wheat crop is shipped abroad, mainly to France, where it enters duty free on a contingent basis.

Other crops are maize, sorghum, beans, oats (cultivated almost exclusively by colonists), and chickpeas; rather large areas are devoted also to coriander, millet, peas, lentils, and cummin. To render Morocco less completely dependent on its cereal crops, efforts are being made to develop vineyards and fruit trees; plantations of olive, palm, fig, almond, and citrus trees are consequently becoming more and more extensive. The climate of Morocco is also favorable to flax and, while only 3,700 acres were under cultivation in 1929, it is felt that a much wider area could profitably be given to that crop.

The protectorate Government has adopted an elaborate system of colonization in order to favor the establishment and growth of a permanent European population in Morocco. French colonists, numbering about 2,900, constitute the great majority of these settlers and occupy nearly 1,800,000 acres of land.

In recent years the colonists have experienced considerable financial difficulties from crop failures and low grain prices. Their total indebtedness stands at approximately 260,000,000 francs, principally

on agricultural machinery, petroleum products, and mortgages and loans. This situation places a heavy burden on Moroccan trade as a whole, since the colonists as a group are normally the leading purchasers of agricultural machinery and the important consumers of such items as automobiles, household appliances, and other luxury articles. A certain amount of relief has been made available through the agricultural credit associations, with the assistance of the Government; these associations are guaranteeing the obligations of colonists for three years. In addition, the Government is making disbursements in the form of insurance against damages by locusts. These steps should lead to a marked betterment in the condition of the colonists.

Most of the agricultural implements used in Morocco are imported from America or Europe. The trade is at present in the hands of large firms able to sell their machinery on the installment plan, the only successful method in Morocco.

Manufacturers of agricultural equipment which is to be exported to Morocco should bear in mind that peculiar soil conditions exist in that country. The soil is particularly compact, and the extremes of humidity and dryness make it very hard. Consequently, more power is required in plowing than in France or in the United States. The usual ratings of tractors do not apply under Moroccan conditions, and the implements themselves must be particularly strong to withstand the usage.

Other considerations—notably the badly leveled fields and those newly cultivated—place a great strain on equipment, which very often is not sufficiently sturdy to withstand the stress of the work. Furthermore, the local labor, which is never skilled and usually negligent, imposes a handicap to the use of machines which can be met only by extreme simplicity in design and high factors of safety in construction.

In the absence of customs statistics, a survey of agricultural implements in use on European farms shows that France has been so far the principal exporter to Morocco of small and medium-size plowing equipment—plows, hoes, subsoil plowing equipment, cultivators, harrows, etc. However, a large number of tractors of foreign make are sold in Morocco, and the farmer is naturally inclined to buy French equipment. Germany is also making headway and is becoming a strong competitor of France. As for sowing equipment, manure spreaders, etc., French manufacturers are placed in an unfavorable position on account of the growing demand for power-driven equipment.

Morocco is rapidly becoming an interesting market for harvester-threshers suitable for average farms. Silos will find a ready market for various reasons: Necessity to have important reserves of fodder, creation of silos for grains, and the poor quality of the material available for the local construction of silos.

Farm appliances, including ensilage cutters, root cutters, sorters, grinders, pulverizers, etc., were formerly supplied exclusively by French manufacturers, but foreign exporters are making headway. The machines they offer are better constructed and better adapted to

Moroccan conditions. Dairy equipment and oil and wine presses are still supplied by French manufacturers.

The table below shows the imports into Morocco of agricultural implements in 1928 and 1929.

MOROCCAN IMPORTS OF AGRICULTURAL MACHINERY, 1928 AND 1929, BY COUNTRIES

Country of origin	1928		1929	
	Weight, in kilos	Value, in francs	Weight, in kilos	Value, in francs
<b>Machinery other than tractors:</b>				
France.....	1, 770, 594	8, 993, 584	2, 087, 346	10, 831, 187
England.....	300, 254	1, 995, 823	151, 349	1, 154, 643
Germany.....	398, 554	1, 981, 011	284, 866	1, 921, 729
Spain.....	150	902		
Belgium.....	9, 245	25, 079	17, 104	74, 523
Italy.....	572	3, 213	3, 500	29, 427
Austria.....	82	520	107, 528	808, 742
United States.....	992, 869	5, 810, 448	1, 737, 989	10, 240, 671
Czechoslovakia.....	43, 908	199, 432	21, 928	113, 559
Sweden.....	372	4, 054	2, 836	19, 962
Tunisia.....	400	1, 000		
Other countries.....	429, 827	2, 293, 190	451, 925	2, 537, 307
Total.....	3, 946, 827	21, 308, 256	4, 866, 171	27, 731, 750
<b>Tractors:</b>				
France.....	93, 680	1, 393, 240	1 33	959, 140
Germany.....	238, 298	2, 656, 230	1 104	3, 156, 739
United States.....	671, 214	7, 248, 864	1 52	1, 786, 952
Sweden.....	3, 200	44, 172	1 2	83, 617
Belgium.....			1 2	24, 098
Other countries.....	45, 734	493, 668		
Total.....	1, 052, 126	11, 836, 174	1 193	6, 010, 546

<sup>1</sup> Number of tractors.

#### MADAGASCAR

The principal crops produced in Madagascar are cacao, cloves, coffee, corn, haricot beans, Lima beans, manioc, peanuts, rice, sugar-cane, tobacco, vanilla, and ylang-ylang.

Crops in Madagascar are still cultivated for the most part in a primitive manner. There are but few large plantations, and the use of farm machinery is limited. Rice, the island's principal and most important crop, is raised almost entirely, if not exclusively, by native growers on small holdings rarely exceeding a few acres in size, and only the most simple of hand tools or implements are ordinarily employed by the latter in its cultivation, chiefly a spade for turning over the ground and harrowing (in the more remote rural districts the ground is harrowed by leading cattle back and forth over the flooded holdings) and a knife for harvesting. The sowing is done by hand and the grain threshed by beating with ordinary bamboo sticks. Manioc, maize, and Lima beans (pois du cap) are similarly grown for the most part on small holdings and cultivated with simple hand implements.

A few large plantations devoted to the cultivation of manioc and maize are operated by local milling companies, but in general the operation of large plantations in Madagascar is restricted to the production of coffee, vanilla, and sugar on the east coast, and vanilla and



sugar in the northern Provinces of Diego-Suarez, Nossi-Be, and the Comoro Islands.

A few disk and share plows, disk and teeth harrows, small cultivating plows, and tractors are in use on the manioc and maize plantations operated by the local milling companies and on coffee, vanilla, and sugar plantations in the east coast and northern Provinces. In general, the use of such machinery even on the large plantations is exceptional, dependence being placed for the most part on manual labor, due in part to the cheapness of such labor, and in part to the lack of sufficient mechanical knowledge among natives for the proper operation, upkeep, and repair of machinery, and, in the case of tractors and tractor drawn implements, the high cost of gasoline and kerosene, the only two liquid fuels available locally. A few rice threshers, probably not more than 10, are operated locally by rice dealers, millers, and exporters; hay mowers are used to a limited extent in the Provinces of Diego-Suarez and Majunga.

Although varying to some extent from district to district, the average wage paid to native agricultural laborers in Madagascar at the present time is about 4.50 francs (\$0.18 in United States currency) per day, including food. On the other hand, gasoline and kerosene, the only liquid fuels available locally, are quite expensive, the former selling retail at the present time at approximately \$0.54 per gallon, the latter at \$0.45 per gallon.

Practically all the agricultural machinery locally used is of French manufacture. Tractors are an exception: there were 13 in the island as of December 31, 1929, comprising 9 machines of American origin and 4 French machines (Lantz and Renaults).

The quantity and value of the imports of agricultural machinery into Madagascar during the calendar years 1928 and 1929 are shown herewith by country of origin.

IMPORTS OF AGRICULTURAL MACHINERY INTO MADAGASCAR, 1928 AND 1929

Countries	1928		1929	
	Kilos	Francs	Kilos	Francs
England.....	1,646	8,230	7,967	39,835
France.....	154,905	774,525	343,274	1,716,370
French colonies.....	19	95	1,900	9,500
Germany.....			10,097	50,485
Mauritius.....	28	140		
United States.....	3,603	18,015	5,541	27,705
Other countries.....			355	1,775
Total.....	160,201	801,005	369,134	1,845,670

Agricultural machinery is not, as a rule, carried in stock by local firms. It is usually imported direct from foreign manufacturers or export houses to consumer or is made the subject of a special order through one of the local general importing firms, hardware distributors, or manufacturer's agents.

Exports of agricultural implements from France into Madagascar during the year 1930 are given below.

## FRENCH EXPORTS OF AGRICULTURAL IMPLEMENTS TO MADAGASCAR IN 1930

Item	Weight (kilos)	Value (francs)	Item	Weight (kilos)	Value (francs)
Cultivators, spring harrows, horserakes, hayrakes, single plows.....	39,500	214,000	Tractors.....	14,400	146,000
Mowers.....	800	4,000	Gasoline motors.....	3,800	65,000
Brabant plows.....	109,700	479,000	Diesel motors.....	25,000	258,000
Others.....	44,000	218,000	Others.....	9,000	85,000
Spare parts.....	21,200	97,000	Semi-Diesel.....	12,500	118,000
			Steam engines.....	26,300	109,000
Total.....	215,200	1,012,000	Total.....	91,500	781,000

## FRENCH WEST AFRICA

The following colonies are included in French West Africa: Senegal, French Guinea, Ivory Coast, Dahomey, Sudan, Upper Volta, Nigeria, and Mauritania. The agricultural implements census in French West Africa shows 3,689 plows and 2,640 harrows in French Guinea, 1,076 plows in French Sudan, and 536 light hoes and 216 sowing machines in Senegal.

The area of cultivated land in 1930 was:

	Hectares		Hectares
Rice.....	967,521	Manioc.....	91,237
Peanuts.....	959,321	Palm trees.....	912,000
Vegetable gardens.....	129,725	Coco trees.....	40,000
Cereals.....	3,326,485	Cotton.....	206,393
Banana trees.....	200	Corn.....	412,744
Tobacco.....	20,105	Sweet potatoes.....	190,210
Sisol.....	5,970	Various products.....	217,098
Coffee trees.....	7,000	Kapok.....	1,125

## GUADELOUPE

Guadeloupe and its dependencies in the West Indies, with a population of 280,000, cover an area of approximately 175,000 hectares. Only 75,000 hectares are under cultivation, the principal crops and the area devoted to each being:

	Hectares		Hectares
Pineapples.....	300	Manioc.....	7,000
Cacao.....	5,000	Tobacco.....	3
Coffee.....	7,000	Vanilla and other spices.....	400
Sugarcane.....	35,000	Bananas.....	500
Cotton.....	1,250	Beans, angolo peas.....	12,000

Almost all the agricultural implements imported into Guadeloupe are used in connection with the growing of sugarcane. This equipment comprises single and double plows drawn by oxen or by American and European tractors, a few hoes, and cultivators. The sugarcane is transported to the plant in small wagons equipped with steam engines.

Dairy apparatus are almost unknown. Rollers, manure spreaders, sowing machines, mowers, and binders are unknown.

The following table shows imports of agricultural machinery into Guadeloupe from 1924 to 1929.

Item	1924	1925	1926	1927	1929
Agricultural implements:					
France.....	25,634	77,895	54,278	576,630	768,888
Foreign countries.....	8,259	5,087	4,615	4,257	28,208
Hand tools:					
France.....	27,296	12,812	9,722	682	6,510
Foreign countries.....	1,139			3,505	

#### OTHER COLONIES

The agricultural-implement market in the French colonies, mandated territories, and protectorates other than those discussed in this publication is so insignificant at this time that it may be assumed to be nonexistent—even in French Indo-China. The latter, although enormous in extent and of extreme fertility, is so little touched by western civilization, in all but those parts immediately surrounding the principal ports, that even the simplest implements, such as steel share plows, are unknown. Those markets have enormous potentialities, but for some years to come American agricultural-implement manufacturers can not possibly hope to realize on them.