https://doi.org/10.29321/MAJ.10.A01413

EXTRACTS.

The Rice Problem in the Pacific Countries.

The question to be dealt with in this article is one of special interest at present on account of the coming Fourth Pacific Science Congress which will be held at Bandoeng (Java) from 16 to 25 May 1929. It relates to the production and consumption of rice in the Pacific countries. The problem of the food supply in rice of these countries has undoubtedly become of the greatest interest in the course of the last few years and particularly in regard to questions of production and trade. This article may serve as in some sort an introduction to further and more exhaustive investigation.

The countries and colonies forming the subject of our enquiry are the following:

1. In *America*: the United States of America, Guatemala, Costa Rica, San Salvador, Panama, Honduras, Nicaragua, Columbia, Ecuador, Peru and Chile.

2. In *Asia* (i): Kwang Tung, China, Hong-Kong, Macao, Corea, Formosa, the Philippines, Japan, Brunei, Sarawak, the Dutch Indies.

3. In *Oceania*: New Guinea, Papua, Queensland, New South Wales, Fiji, Hawaii, Guam, Marianne Islands, the Caroline Island, New Hebrides, New Caledonia, Samoa British Oceania and the French Establishment in Oceania.

There are many gaps in our information as to the production, consumption and trade in rice in these countries. Precise information exists only for the countries shown in the following tables. It is impossible to give figures in reference to Honduras, New Hebrides, Samoa, the caroline and Marshall Islands, New Guinea, Marianne Island and Guam. Such figures would however have but little importance, as in these countries there are in all only 1,200,000 inhabitants and they are not large rice consumers.

(1) Siam and Indo-China are not counted as countries situated on the Pacific Ocean

Rice in the Asiatic countries.—In these countries rice is a food of prime necessity and consequently indispensable. This is shown from the fact that the average consumption per day and per person is 375 grammes for China, 470 grammes for Japan, 275 grammes for the Dutch Indies. In the following table the high production of these countries is shown. Unfortunately for want of precise documentation this table cannot be made to include all the Asiatic countries situated on the Pacific.

It will be at once remarked that these statistics should be accepted with a certain reserve since they only refer to one period of a year and therefore cannot reflect the important fact of crop fluctuations. For example the figures for Japan, Java and the Philippines are extraordinarily high for this period 1927—28.

It will also be seen from the figures of production per hectare that the same crop conditions do not prevail in the different Asiatic countries and that cultivation is not developed to an equal degree in each. Although the averages relating to a series of years are not available, it is possible to gain an idea of the natural and technical conditions for rice cultivation. The yield per hectare, for instance, for British Borneo, indicates that there is scope for crop improvement. Rice is grown in this country in accordance with the customary cultivation methods of all the islands of the Archipelago, a small proportion without irrigation and the remainder on flooded rice fields. A special feature of the methods followed in these islands is that no fertilisers are applied. Soil regeneration has to be effected at the expense of the nutritive substances contained in the water of irrigation. Another feature of the rice growing in the flooded rice fields is the transplanting of young plants from special seed beds. Speaking generally intensive work is given to the wet rice fields involving a considerable supply of labour. On the other hand the dry cultivation is frequently primitive and the lands when exhausted are left fallow for several years. In 1927–28 there was an excess of rice imports into British Borneo of 460,998 quintals. Hence it appears that this country cannot feed its population from its own production.

TABLE I.

	Population.	Period.	Hectares under crop.	Production quintals.	Yield per ha. quintals.	Kg. produced per person.
British Borneo	 298,0000	1927–28	28,959	454,997	15·7	150
Corea	 19,015,526	1927–28	1,558,998	31,282,961	19·7	160
Formosa	 3,934,810	1927–28	585,040	12,511,630	21·4	320
Philippines	... 11,583,000	1926–27	1,807.060	21,776,630	1·11	190
Dutch Indies	 51,511,688	1927–28	3,542,616	54,489,000	15·4	100·5
Japan	 60,521,600	1927–28	3,147,244	112,302,611	35·7	180
Kwang Tung	 1,089,678	1927–28	2,647	17,803	6·7	1·5

In the Dutch Indies, the native agriculture is based on rice. The same methods of cultivation prevail as in British Borneo, *viz.*, irrigated and non-irrigated fields. In the first class are included : rice fields that can be flooded at will, those that depend on the rainfall, and those situated on marshy ground. Only in certain localities is there a systematic use of fertilisers ; as a rule no fertilisation is attempted and a large quantity of organic matter which might be highly fertilising is completely wasted. In comparison with Japan and Hawaii the yields per hectare are lower. In the Dutch Indies the costs of rice growing should not be high and the cultivation is so far extensive, but on the other hand if the quantity of labour applied is considered it is intensive. As in Borneo improvements in cultivation are required. Among these the principal are: 1. the systematic utilisation of fertilisers both natural and artificial ; 2. selection of productive varieties ; 3. use of improved implements. There are however a number of factors militating against the improvement of native agriculture the chief one being that the cultivators own only very small plots, the average area not exceeding 0·75 hectares for irrigated rice, and consequently their economic position is precarious. In 1927–28 this colony had to import 968,603 quintals of rice.

The cultivation of rice in the Philippines does not present any special feature as compared with its cultivation in other Asiatic countries. The great extension of dry cultivation may however be noted due to the low crop yields. In many of the islands the cultivation is still extensive, but an adequate yield per person is as sured. There is a small excess of imports *viz.*, 121,648 quintals in 1927—28.

As regards China, no sufficient data exist on rice cultivation, production and yield. All that is known is the total excess of imports which in 1927—28 amounted to more than 11,000,000 quintals of cleaned rice. Generally speaking, Chines methods of cultivation resemble Japanese. Farms are small, but absorb considerable labour; fertilisers, especially organic, are largely employed. Kwang Tung, Hong-kong and Macao, though of little impartance agriculturally, have rice fields of the Chinese type, and import large quantities of cleaned rice, more than 150,000 quintals

being imported by Kwang Tung in 1927—28. A considerable quantity of rice is used by the Chinese in the manufacture of alcoholic drinks (brem, samsan, arak).

In Japan, including Formosa and Corea, rice cultivation is much more developed than in the islands of the Archipelago, and nearly as much as in China. As throughout the Far East, labour is very freely applied, but in Japan large capital expenditure is also made on the crop. Systematic use is made of artificial and natural fertilisers for regeneration of the rice fields, and in consequence the average yields per hectare are very high (see Table I). The yields are lower in Formosa and Corea as the methods of cultivation are more backward. The high yields of Japan are not entirely due to sound methods of cultivation but also to the effect of a subtropical climate with summer rains which are especially favourable. Japanese rice growing presents no other special features and is as elsewhere an intensive cultivation with nurseries and transplanting. Most of the varieties of rice cultivated in Japan are distinguished by their short straw and their high yield. In spite of these satisfactory good conditions, Japanese rice growing is not adequate to meet the consumption demands of the country and the export to the colonies. Moreover large quantities exported from Formosa and Corea into Japan—respectively four and seven and a half million quintals in 1927–28—have not proved sufficient and it has has been necessary to import a total of 17 millions of (cleaned) rice. These very large rice requirements are due to the large demand of the manufacture of saké, an alcoholic beverage made from rice residues, of which about 6,820,000,000 litres are manufactured annually.

Since 1928 the zone of rice production has been pushed considerably further to the north. In the north-east of Asia rice cultivation has advanced to Lat. 51° N. as the result in the first instance of Corean enterprise. In 1927 there were in Manchuria alone more than 15,000 hectares of ricefields to the north of Lat. 44° N., and in the Russian Far East more than 25,000 hectares. The average yield is more than 3,200 kg. of paddy or rough rice per hectare. Estimates for the future development amount to an area of 4,000,000 hectares in ricefields.

TABLE II

	Population.	Period.	Area under crop (ha).	Production (quintals).	Yield per ha.	Kg. produced per ha.
Colombia	8,026,300	1926–27	17,850	159,330	8 6.	1·9
Costa Rica ...	471,525	1925–26	7,059	41,507	5·9	9
United States ...	118,628,000	1927–28	400,238	8,211,952	20·5	7
Guatemala	2,004,900	1927–28	1,550	15,198	9·8	0 07
Mexico	14,953,334	1927–28	45,031	695,958	15·5	4
San Salvador	1,657,000	1924–25	5,200	100,000	19·2	6
Peru	5,000,000	1926–27	26,175	397,870	15·2	8

Rice in the American countries.— In none of the American countries under review here does rice occupy an important place either as a food or as an industrial product. The figures of average consumption are in fact very low : in the United States, for example, they are 10 g. per day per person. In these countries rice growing is looked upon as a useful element in rotation of crops rather than as a crop of first importance as in the Asiatic countries. In Table II the figures are given which relate to rice growing in the American countries on the Pacific.

The small importance of rice growing in these countries is easily seen from this table. Although the average quantity per inhabitant is very small, it is in excess of the needs and the United States, Mexico, and even Ecuador (which does not appear on this table) are rice exporting countries : in 1927–28 they exported respectively 881,713; 98,473 and 3,043 quintals of cleaned rice.

The American countries situated on the Pacific having an excess of imports are shown in the following table.

TABLE III.

		Period.	Excess of imports	Kg. imported per person.
Costa Rica	...	1925	21,034	0.4
Colombia	....	1925	185,600	2.3
Chile	....	1927	194,197	7.8
Guatemala	...	1927	4,158	0.2
Nicaragua	....	1926	13,914	1.9
Panama	....	1924	54,503	12
Do. (canal zone)	...	1927	13,096	
Peru	....	2926	314,985	6

Motoculture is applied to rice growing in the United States both for cultivation and for harvesting and in spite of the improved machinery utilised it is noticeable that the yield is somewhat low. Rice is in fact a plant which demands more attention and exactitude in its cultivation than can be supplied by the automatic working of machinery. In the other countries the methods of cultivation

are generally still somewhat primitive. The total production in the American countries under review is considerable if compared with that of the Asiatic countries, and amounts to about 10,000,000 quintals.

Rice in Oceania.—It is only within comparatively recent years that rice has been consumed in Oceania, and in consequence it has not yet reached the stage of a crop of the first rank. It may however be said that the use of rice is increasing every day in these islands in close relation with the development of agriculture in Oceania and its participation in world markets. As the native populations give up their earlier habits of eating tapioca, sago and millet, they take to rice. The trade in copra which is exchanged for rice also tends to encourage the consumption.

TABLE IV.

	Population.	Period.	Area under crop ha.	Total production (quintals)	Yield per ha.	Kg. produced per person.
Australia	6,110,514	1926–27	1,605	58,476	36.4	0.9
Fiji	171,644	1925–26	3,936	85,104	21.6	50
Hawaii	328,444	„	2,300	134,002	58.3	40
New Caledonia	53,000	1927–28	400	2,000	5	3.7

The principal data relating to the cultivation of rice in Oceania are shown in the table below.

TABLE V.

	Period	Excess of imports (quintals.)	Kg. per person imported.
Australia	1927	171,638	28
French Establishments	„	11,393	32.5
Fiji	1926	24,060	14
Hawaii	1927	309,136	96
New Caledonia	„	18,493	34.9
New Zealand	„	36,114	2.5
Papua	„	22,343	9

From Table IV it will be seen that there is only a very small production of rice in Occania; it does not in fact exceed 280,000 quintals, the greater part being grown in Hawaii and Fiji Is In the same way, Table V shows that the excess of imports is very small, about 600,000 quintals. Owing to excellent natural conditions and improved methods of cultivation the yields in Hawaii are high, more so even than in Australia where however the methods of cultivation are also of an improved type.

The trade balance of rice in the countries round the Pacific.—To show the balance between the production and consumption of rice, it is clear that figures are necessary showing the averages over a number of years, as the yearly figures are subject to considerable fluctuations following the natural conditions and the population requirements, which are constantly changing. With tropical peoples consumption will vary extraordinarily in accordance with possibilities of supply, much more so than with the populations of temperate countries. For this reason it is difficult to form a precise idea of the fluctuations which may occur in the consumption of the Pacific Asiatic countries.

So far it has only been possible to obtain a very few of these figures and accordingly a completely accurate balance cannot yet be established. Very careful investigation must be made on the subject in many of the Pacific countries with a view to thorough documentation. From the above tables however it is clear that it is only for the Asiatic countries on the West Coast of the Pacific that the question of rice is one of really great importance, and it is the more important because these countries are among the most populous in the world. Attention must however be given to consumption in other countries where the use of rice as a food, even though secondary, is on the increase. Moreover in these same countries the industrial uses of rice and its utilisation as a stock feed are increasing, and this is also the case in the islands of Oceania which have only lately entered modern life.

From the previous tables it can be shown that the total excess of imports into American countries for the

period 1927–28 was about 800,000 quintals, while the exports (from the three exporting countries) amounted to rather more than 900,000 quintals. This indicates that in these countries there will be no difficulty as regards the rice supply, the less so as these regions can obtain their rice also from other countries than those of the Pacific.

Oceania requires 600,000 quintals and the Asiatic countries on the Pacific coasts require about 30,000,000 quintals, of which Formosa can supply 3,000,000 and Corea 7,500,000 quintals. The 20 millions remaining have to be supplied by the three great rice exporting countries, Burma, Siam and Indochina, and 40 per cent of the production of these countries is used to meet these requirements. In the Far East the only exporting countries are Formosa and Corea. As has just been said Japan draws its supplies from them, and is obliged also to apply to California. It must not be forgotten that Japan exports a little to its own colonies, the Marianne Islands, Marshall Islands.

Although the production of Japan and her colonies is regularly increasing the rice imports of those countries are also steadily growing. In 1928–29, however, owing to exceptionally large crops, the situation has abruptly changed and the supplies within the country are in excess of requirements, and hence the Japanese Government has decided temporarily to prohibit all importation except from the colonies.

The Dutch Indies imported from India and also from Siam and India—China, to a total of more than 1,000,000 quintals in 1927. The Philippines draw their supplies of of rice mainly from Indo-China, and a little from other sources. China imports from Indo-China more than half its rice. The ports of Hong-Kong and Singapore receive more than 3 million quintals from Indo-China, re-exporting a large proportion of imports.

On the whole it may be said that Japan and China depend on rice exports coming from countries not on the Pacific; of the two China is more dependent having to import more than 11,000,000 quintals from such sources.

If it is desired to establish a balance of rice in the future, attention must be given to the regions of Manchuria and of the Russian Far East where Coreans and Russians are devoting themselves with so much success to rice cultivation. There is little doubt that these regions are likely to become very important new exporting areas for the Asiatic countries of the Pacific.

Crop fluctuations and Losses.—In establishing a rice balance the extensive crop fluctuations must be shown which occur periodically from time to time. Rice more than any other cereal, is subject to good and bad sersons. Among the chief causes are; drought, floods, attacks of pests, root diseases etc. These disasters are in part the result of atmospheric conditions, but their gravity varies according to the greater or less degree of improved techinique in the cultivation. Such periodic crop failures have a great influence on consumption, imports, exports and prices of rice. It is these fluctuations which give rise to the speculation which is so prejudicial to a well balanced trade. Systematic returns of all the diseases and other disasters which visit the Pacific rice crops are not yet made for all countries.

In reviewing a rice balance account must be taken of the losses due to the commercial preparation which is not uniform in all countries or even in all parts of the same country. On an average it may be said that 100 kg. of "paddy" or rough rice will give from 65 to 80 kg. of cleaned rice. The margin between the two figures depends on the cleaning process. When rice is prepared for home consumption the losses of nutritive substances are less than in the other case. Importations of rice may be reduced by a better preparation which avoids losses of nutritive substances.

Improvements.—The question of rice in the Pacific—and especially in the Asiatic countries of the region—will not be serious so long as that region can draw supplies from other parts and there is in consequence no food shortage. But certain difficulties are to be anticipated; as the economic conditions of the great exporting countries im-

prove there will be more home demand for rice which will progressively reduce their exporting capacity to the Far East. Certain political difficulties are also to be feared which might hinder regular export. China would be the first to suffer from any check on exports.

What means must be found to prevent the aggravation of the problem ? It does not seem very possible to replace rice by other foods ; it might be done, but it would only be an expedient for a time. The alternative is to increase the annual average production per head of inhabitants. This may be attained in two ways : by an extension of the areas under rice and by an increase of the yield per hectare. Certain States have taken measures for extending their rice-growing areas. For example in the Philippines immense areas are being divided into lots and granted for the purpose of rice growing. New land is however not always available and it is the second method which must call for attention. Improvement of yields can be effected either by the application of better methods of cultivation or by the selection of more productive varieties. In certain Asiatic countries the rice cultivation is already highly improved and a higher degree of cultivation should not be contemplated as there is a risk of exceeding economic possibilities. Even if this improvement was possible, speaking from the economic point of view, it would be essential to ascertain whether the additional production would suffice to feed the additional labour required, and whether the final result might not be a reduction in the average yield per person. As regards dry cultivation it is still more improbable that improvements could be economic. In certain countries such as Guatemala, Costa Rica and Colombia, cultivation methods stand in need of improvement, but for most of the others it appears to be uneconomic to make the attempts.

The same however does not hold good in regard to the systematic employment of fertilisers ; in China and Japan they are already extensively used and the other countries would undoubtedly derive great advantage from their application to the rice fields. If there is a shortage of the natural organic manures, recourse should be had to artificial fertiliser.

The remaining type of improvement, the newest and least often adopted, but the most important is the selection of varieties. Up the present a considerable number of varieties have been cultivated in the Far East, and as many as 6,000 in Indo-China alone. The number is not really so large as it would appear, since the same variety is frequently designated by many different names. Even taking this fact into account however it may be said that the native cultivators grow several hundred varieties, not all of which are of value whether from the point of view of yields or resistance to disease or from that of commercial value.

Moreover in all the dry regions quite inferior varieties are grown. It would seem that it is essential to limit cultivation to certain varieties which have been thoroughly studied and are well known universally if a good commercial product is to be obtained. responding well and completely adapted to climatic conditions. Where rice growing is not an old cultivation this has been clearly understood and in these countries, e. g., Java and many American countries, only certain well chosen varieties either Chinese or Japanese are always found.

It must be admitted that there is very little progress in improvements in strain although a certain number of experimental stations are already at distributing improved seeds to a large number of small cultivators in the Asiatic countries. but with little result so far.

It has not yet proved possible to find a really practical classification of the different strains, although there can be no selection without such classification. Among all the proposed classifications there is not one which is based on definite characters which remain constant. Thus for example without any good grounds a distinction is made between mountain and plain rice. But there is really no true distinction known between them. Varietal improvement can only be real and effective if a solid basis with due safeguards against future departures from type is successfully given to the section of strains.–(A.J.K. in the International Review of Agriculture Part II.February 1929).