I have given you indications of our supply, the nature of imports and the movements of home produce. I have also indicated to you the lines on which future research work on varieties, cultural methods, storage and the transforming and preserving of fruit, will help us. I have stressed the need for standardisation in our marketing methods and the growth of healthy organisation towards such ends. I am sure that the fruit research station on which devolves some of the technical problems of our future will give ample scope for the expansion of the activities which the marketing staff are now engaged in.

AGRICULTURE IN BURMA

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[Under the auspices of the Madras Agricultural Students' Union, a meeting was held on Monday the 16th December, when Mr. K. Ramiah, who had recently been on a tour to Burma, spoke on 'Agriculture in Burma'. Mr. R. C. Broadfoot, President of the Union, who presided on the occasion, referred in the course of his introductory remarks, to the impending separation of Burma from India and observed that apart from its importance as a producer of rice, timber, oils and minerals, this separation would result in Burma having a commendable say in the future trade of the East.

Below is an abstract of Mr. K. Ramiah's speech. —Ed. M. A. J.]

Rice and Agriculture. The title I have chosen, sounds ambitious, but, actually a talk on Burman agriculture will essentially be a talk on rice cultivation in Burma; because, rice is the most important and wealth-producing crop of the province. This can be gauged from the fact that the total value of rice and rice products exported annually from Burma, is to the tune of 30 to 40 crores of rupees, while the total value of exports of other products in which Burma is rich, namely, minerals, timber and oil, all put together amount to only 20 crores. In fact, the whole population in Burma is directly or indirectly dependent on rice.

The Agricultural Zones. Agriculturally Burma can be divided into three zones:—a wet zone on the north, a dry tract in the middle, and another wet zone in the south. The northern zone is a hilly tract most of the areas being unfit and still unexplored for cultivation. A number of mountain ranges start from this part of the country, the most important being the Arakham, the Shan and the Pegu ranges. The total rainfall in this zone amounts to about 80 inches annually. The middle zone is dry and crops are raised here only with artificial irrigation. Most crops including rice, are grown only in this area, which receives only about 20 to 30 inches of rainfall. Lower Burma, the third and the most important zone receives the full benefit of the south west monsoon with about 100 inches of rain while a narrow strip of country between the coast and the mountain ranges both on the west and eastern ends of this zone receives even as much as 200 inches. In

addition to these three there is the Shan States, a big plateau of 3 to 5 thousand feet above sea level, practically undeveloped. It is stated that it may prove a valuable tract for sheep farming.

The importance of rice. As mentioned already, rice is the most important crop, occupying 75 % of the cultivated area or about 13 million acres, of which nearly 11½ million acres are in Lower Burma, about a million being in the middle zone. The only difference between these two zones is that in Lower Burma, rice is cultivated entirely as a rainfed crop, while in the dry middle zone it is grown with artificial irrigation as in Madras. The immensity of rice cultivation in Lower Burma is prominently brought to one's notice, as one travels through this tract. One sees on all sides vast sketches of paddy fields, with green and luxuriant crop and with trees almost absent in the landscape except on the borders of creeks. The only relieving feature is the short palm, *Nipa fruitescens*, which looks like a big fern, with leaves like those of the coconut. These leaves are used for roofing houses and occasionally toddy also is tapped from this palm.

The History of Rice Cultivation. Until the middle of the 19th century, Burma rice was not known outside that country the production being just sufficient to meet the internal consumption. The lower Burma was all a swamp and undeveloped. There were no settlers and no roads, and rice cultivation was only done in patches here and there, like the hill cultivation in Malabar and Agency tracts. After the British occupation however, (about the years 1870—1880), development took rapid strides. Government opened up roads, put up embankments and bunds to prevent flood water getting in, and dug channels to drain off water, and serve as water ways. Thus land which was previously subject to floods and was precarious for rice cultivation, now became eminently suitable for the rice crop. Settlers from North Burma moved over, as also emigrants from Madras, to occupy the reclaimed swamps on which lands were given on favourable leases.

The Madras emmigrants were chiefly *Nattukotai Chetties*, who financed the cultivators and it is the enterprise of these Chettiars, that has been responsible, in no small measure, for the development of the Burma rice industry. The venture of these people was something like a speculation in financing a new and promising business, and although it has been alleged that in their financial dealings they have not been overscrupulous in their methods, it must be remembered that these people far away from their homes were taking a great risk. It is now estimated that the total amount invested by these *Chetties* in lower Burma amount to nearly 60 crores of rupees.

The Cultivation. The cultivation of the crop starts with the south west monsoon. The soils of lower Burma are like those of o deltas, only they contain more silt than clay, as different fr

Madras soils which contain a bigger fraction of clay than silt. The cultivation details are not very different from those obtaining here, but one interesting thing is that the lands are ploughed only once, after which two implements unknown to us, one the Burmese Harrow, and the other the Burmese settoon—which has a number of rotating blades which cut weeds and curdle the soil—are passed a number of times. Considering that with a single pair, a tenant is able to finish 2 acres a day with these implements, they are worthy of trial in our country, as their adoption would result in considerable saving of expenses towards preliminary cultivation; and there is room to think, that these implements may be effective on our soils also to provide the required tilth, because, the soils of the dry middle zone, unlike those of lower Burma, are clayey like those of our deltas, and even in this zone, these implements are in vogue.

There is practically no manuring given to the crop, although recently the Agricultural Department have been experimenting with fertilisers and have found Ammonium Phosphate 20 : 20 to give increased yields; this however has not been found to be paying enough in the present depressed state of the rice market.

The harvest is peculiar in that the whole plant is not cut, but only the earhead with about a foot of the straw. Actually the plants grow very tall, 5½ to 6 feet, and some times even 7 feet, and the straw is stiff and coarse; after harvest, the straw is either left in the field and grazed by cattle, or some times burnt away; some times it is also cut off and used for roofing houses in towns and villages.

Holdings. The main difference between Madras and Burma in the size of the holdings; in our deltas it is probably less than 4 to 5 acres, but in lower Burma it is somewhere between 22 to 25 acres and in upper Burma 10 to 15 acres. A tenant usually manages 25 acres, with a single pair, hiring out an extra pair for the season only and the animals are after all small sized, just like our small *Kangayams*. This of course is due to the thinner population with less pressure on the land unlike our deltas, and thus the bigger size of the holding is a definite factor that goes towards decreasing the cost of production of rice in Burma.

Land tenure etc. More than 50% of the holdings are managed by tenant cultivators. In recent times, a new phase has come over the old state of things. The old Burmese settlers, have gradually become more and more indebted to the *chettiars* who have been financing them and with no prospect of the loans being returned, the land has gradually passed over into the hands of absentee landlords. This can be seen from the fact that while in the earlier years only 6% of the holdings was owned by chettiars, in 1935 it is estimated that nearly 22% of the area in lower Burma is owned by them. This state of affairs has been mainly brought about by the Burmese trait, which is a national characteristic almost, namely a pleasure-loving disposition with never a

tendency to save or to repay loans. In spite of his big holdings, the Burmese ryot is always involved in debt.

Rice varieties. There are three classes of varieties agriculturally, the early, the medium and the late; the last two of 5½ to 7 months' duration are the most important and comprise about 70% of the total. There is no variety less than 4½ months in duration.

Out of a total production of 7 million tons nearly 3½ million tons are exported as milled rice, and thus, trade requisites have resulted in a number of classifications amongst the rice exported from the country.

There is an impression here that Burma rice is not good; this is hardly the case. What actually happens is, that Burma rice is sent to two markets, the eastern and the western. In the former in which is included South India, the chief consideration is cheapness and in the latter, those of European countries, the criterion is quality. Thus price outside decides quality, and therefore, South India which imports only the cheap rices gets the poorer quality. There are several fine varieties of rice and it will not pay to import them into Madras.

The Agricultural Department and Rice. In Madras our chief aim is the increase of yield; in Burma, however, while reasonable yield is desired, the attention of the department is directed more towards the evolution of strains with better milling qualities. The milling industry has thus a large voice in directing the policy of the Agricultural Department. There is always a close co-operation between the department and the millers and no variety or strain is passed out by the department which has not been approved by millers.

Seed farms run by the Department are more highly developed than in India. A large amount of *poromboke* unassessed lands classed as grazing areas which are leased out to tenants on definite conditions, have been handed over to the Agricultural Department for use as seed farms, and agricultural officers corresponding to our Demonstrators, are put in charge of these areas. Each demonstrator has about 10 or 12 seed farms under him. There are two kinds of seed farms; the major seed farms are those at the headquarters of the demonstrator, and provided with threshing floor and storing fecilities. The minor seed farms are with the tenants themselves with a supervision by the demonstrator. In 1935, there were 23 major farms with a total area of 2800 acres and 153 minor farms with an area of 9000 acres, the total produce distributed as seed being nearly 8 thousand tons of paddy. The Agricultural Department works in close co-operation with the millers and often act as the buying agents of the mills.

Milling and Trade. Milling in Burma is different from our conception of what it is in our country, their mills being very much bigger, some with a turn-over of even 200 tons of rice per day.

The trade is mostly in the hands of Europeans, and is a highly organised industry with headquarters in England and with a large amount of English capital. These English companies are mostly in charge of the big mills and, creating a demand in the United Kingdom carry on a flourishing trade. The trade with India and Ceylon is not done by these companies but by Gujeratis from Bombay; there are neither cultivators nor millers, but only brokers; they get telegraphic communications of market fluctuation and buy and sell rice. Moghul street, Rangoon, where the rice brokers all reside, strongly remind one of the Wall street of New York or the Stock Exchange of London in a smaller degree.

The trade is keenly alive to tastes and demands. Twenty years ago, only white rice was being exported; now, since there is a demand for parboiled rice in South India, it is being prepared and exported. The millers who are doing business on a large scale are out to improve the processes of preparing parboiled rice and are keenly alive to the problems arising in it. Whenever necessary, they engage chemists specially to attack special problems. In the preparation of whole rice for the western markets some of the finer kinds give only about 25 to 30 % head grain the rest being classed into different grades of broken rice. This broken rice, a by product, is usully sent to south India where there is a ready sale. There is a complaint that they have lost some of this trade since the coming in of Siam in the picture.

Other Crops. The other crops grown, besides rice, in order of area and importance are beans, gingelly, groundnut, sorghum, maize, chillies, rubber and sugarcane. Most of these are grown in the dry middle zone, and also on a narrow strip of tract on either side of the Iravady, the latter known as the riverine corresponding to our *Padugai*, cultivation on river banks.

Conclusion. The rice cultivator in Burma has a number of advantages; he spends comparatively less on preliminary cultivation, his implements are more efficient than the plough; he uses no manure, the Iravady brings him plenty of silt, his yields compare well with ours about 1700—2000 lb; his assessment is low, only about 3 to 5 rupees; his holdings are large; and his mode of transport is cheap and efficient.

[In his concluding remarks, the Chairman congratulated Mr. K. Ramiah on his extremely practical and interesting paper and observed that Burma's example, in a number of instances, was worth being followed. There was no reason, why with a number of Irrigation Projects launched in our Presidency, Madras should not be self-sufficient in the very near future, as regards her rice production.

At the instance of the Chairman, a number of questions were put to the lecturer who in the course of his replies, gave the following further information about Burma.

1. The grazing problem is not serious; the villages scattered, the cattle are few and there is enough straw left on the fields after the harvest.

2. Green manuring is not done and in fact, when tried, was a failure; this is because, no rains are received at all during summer, when cracks develop in the soil, making it unfit for crop growth; the soil again gets soaked only with the receipt of rains in May.

3. He was inclined to think that if not the *settoon*, at least the Burmese harrow could be used with advantage on our soils.

4. The size of fields varied from 20 cents to 5 acres depending on distance from channels.

5. The labour population, not only for agricultural but for other purposes, is mostly supplied by emmigrants from Vizagapatam, who regularly sail over to Burma in batches, during the season; this is because Burmese labour is poor.

6. The cost of production of rice per acre, which 3 years ago was about Rs. 15 now ranges from Rs. 20 to 22]

POPULATION AND PRODUCTION IN INDIA, 1920–32.[1]

By P. J. THOMAS, *Professor, Madras University.*

The increase of 10·5 per cent. in the population of India between 1920 and 1930 has created considerable uneasiness in many quarters. The author of the Census Report, 1931, views it with alarm and this is shared by a large number of publicists. Mr. R. W. Brock, formerly the Editor of *Capital*, made the following statement at a meeting of the East India Association in 1932:—'So far as the official figures indicate there has certainly not been any increase in India's agricultural and industrial production, in any way proportionate to the increase of her population, and the only possible inference appears to be that there has been a fall in the average income and therefore the average standard of living.'[2] This startling statement challenges a statistical examination of the problem.

There is one serious difficulty in accurately estimating production in India. Not less than 70 per cent. of the people are dependent on agriculture, but the available statistics of agricultural production are hardly reliable, as they are based on a very imperfect system of crop forecasts. The forecasts of crop outturn in India are based on (1) area under cultivation; (2) the standard of normal outturn per acre; and (3) the condition factor or the annavari estimate. The figures of area are supplied by the Revenue Department, and are fairly reliable except in the permanently settled tracts of Bengal, Bihar and Orissa, and parts of the United Provinces. The standard outturn is 'the average yield on average soil in a year of average character'. The outturn figures are deduced from crop-cutting experiments, but in most provinces such experiments have not been systematically carried out, and in some they have not been undertaken since 1919; and although in the meantime considerable increase in the area under improved varieties of crops has taken place, the figures adopted in 1919 are still used for estimating crop yields. The worst link in the chain is the annavari estimate which is submitted by the village patwari. The annavari represents the relation of the crop reported on to the normal crop per acre, but it is based on guess-work.

The result is that year after year, the crop forecasts made have proved either an under-estimate or an over-estimate, generally the former. In the case of two crops—cotton and jute—it is possible to test the forecasts by a post-mortem examination. Such a test showed that in both cases the forecasts had been under-estimated. In the case of cotton, the difference is 17 per cent. and in the

1. I am grateful to Dr. A. L. Bowley and Mr. Sundararama Sastri for help in regard to the method and the tables.

2. *Asiatic Quarterly*, 1932, p. 440.