more upon the regrettable outcome of the modern method of teaching than upon education proper.

Sj. Awdheswari Prasad also discussed the topic.

After short review of both the papers, the President concluded with an instructive discussion. In his opinion the truth of the necessity of education for the development of the economic, social and political condition of a country required no learned speculation, a comparative study of the condition of agricultrists in America and India serving as its ample proof. While dwelling on the efficiency of education, he pointed out the additional advantages which America gained over India through the benefits of better education. In his speech he explained why the prosperity of a country was fast locked up in the arms of education and elucidated it with copious illustrations from all the countries where the income per head had gone up by leaps and bounds synchronously with the spread of education.

The subject for the next sitting was settled to be 'Cotton-manufacture in India' and Sj. Apurbakrishna De was selected as the essayist.

The meeting dissolved with a vote of thanks to the chair.

SALILKUMAR BANERJEE,
Honorary Secretary.

INDIA AND SCIENTIFIC AGRICULTURE. *

In whatever district of India we travel,—be it the hilly tracts of the Himalayas or the deltaic swamps of Bengal or Burma, or the dry land of Central India or the tropical regions of Madras or the elevated plains of the Deccan or the dreary desert of Sind or Rajputana,—vast fields smiling with golden harvests will, no doubt, be a good treat to our eyes and it will thus be no exaggeration to say that India is the favourite haunt of Ceres of the classical mythology. Except in a few cities, the atmosphere is altogether agricultural; over vast tracts of the country, the only common interest is agriculture, the monsoon, the state of crops, the health of cattle. Of its immense population, at least two hundred millions are dependent for their livelihood on agriculture, or industries subsidiary to it. The annual value of the agricultural produce of British India is over 15 hundred crores of Rupees.

This important branch of industry, affording us the sources of maintenance and yielding such rich fruits is nearly left in the hands of unlettered and uncultured peasants only. Their tillage implements are not

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* A paper read at the 2nd sitting of the College Economics Association.

perfect, so the ground is not properly cultivated. Their method of seed selection is defective, so crops do not grow abundantly. The utility of the irrigation and drainage systems are not thoroughly understood, so heavy as well as light rainfalls threaten them with the chances of serious failure of crops. The state of cattle is deplorable, so labour is not applied most advantageously. Manuring, on a large scale, there is practically none, so it is that the law of diminishing returns is in so much force here. Broadcast sowing is prevalent, but this must be supplanted by the system of transplantation. Harvesting is not always managed skilfully, and thus results a gradual decrease of the total outturn.

Though the practice of regular rotation of crops is not adopted in general, yet the commoner system of growing mixed crops serves in many respects the purposes of rotation. Still it can be maintained in avour of them that on the whole, the general efficiency of Indian cultivators is not condemnable. Let us look into Dr. Voelcker's statement in his Report on the Improvement of Indian Agriculture. He says, "At his best, the Indian ryot or cultivator is quite as good as and in some respects, the superior of the average British farmer, while at his worst it can only be said that this state is brought about largely by an absence of facilities for improvement which is probably unequalled in any other country."

Their marvellous assiduity will be attested by the hardy hillmen who cultivate terraced patches on the slopes of the foothills of the Himalayas and by the Bengal peasants who drive on persistently their pair of poor bullocks in knee-deep water and through pertinacious clay. Yet all of us must regret the physical and moral deterioration of our peasants and most of all, the poor economic state of our country. And why ?—the reasons are obvious.

1. In the days of yore, we could be content with the gross produce of our land ; we could conceive of a golden age, confined as we were within the precincts of our homesteads. But as our relations with foreign countries extended with the rapid spread of locomotives, as we have to feel the daily increasing mouths of our countrymen, we have to meet the demands of other nations, we have to exchange our exports with their imports. No more can we remain content with the produce yielded by the traditional modes of cultivation.

2. Manufacture there is none, though agriculture can be relied on. But it is not a sound policy to have agriculture without manufacture Indeed, both of them go hand in hand ; they are the 'win sisters whom we have to worship before we can gain access into the domain of Prosperity and Plenty. Agriculture will produce good cotton and manufacture will turn it into the necessary articles of our daily consumption. The former will grow "strong" wheat, the latter will change it into flour ; the former will help us

to develop the total outturn of rice, the latter will save our troubles to separate it from its husks, the one will produce sugarcane while the other will squeeze out of it juice to concentrate it ultimately into sugar, the one will show us the method of cultivating jute on a large scale, the other will make use of it in various ways. So we cannot dispense with the one without affecting the prospects of the other.

When the dark shadow of famine falls on India, when province after province is laid waste by the consequent pestilential diseases, the importance of such problems regarding scientific agriculture along with manufacture is brought home to us. Then only we turn our attention to the means of obviating these calamities, to the problem of the improvement of scientific agriculture.

To free ourselves from the blame of ambiguity, we shall give the full significance of the term 'scientific agriculture' used by us so often. With the use of the term we should not at once let into our mind the idea of every sort of costly and impracticable apparatus ever invented by science. Simply we mean to do a thing more rationally and sensibly, we wish to be less dependent on the tender mercies of frolicsome Nature, and simply we want to bring the natural forces under our control. We should not ignore the hereditary knowledge of our peasantry but we want our peasants to adapt themselves to the varying circumstances and to meet the increasing demands of our society. Why shall we not bring in our aid what chemistry suggests as best manures, what mycology advises as the best preventive for fungi diseases, what botany reveals as the essential food-materials of plants, what veterinary science declares as the best remedy to check cattle-diseases, and in a word, what science in its usual sense, holds before us as the best implements for cultivation, for harvesting and farming.

But, in India, there arise certain initial difficulties in the way of the introduction of such a mode of cultivation. First, our defective law of inheritance allows us to divide the land-property among the inheritors, so it is not possible to cultivate these small plots of land scientifically. Next, the want of technical education makes the peasants sometimes a little conservative. But we can again refer to Dr. Voelker's Report where he admits—'the native, though he may be slow in taking up an improvement, will not hesitate to adopt it if he is convinced that it constitutes a better plan and one to his advantage." Thirdly, in Madras, in the Punjab, in Behar the *ryotwari* system prevails, and the average size of the parcels of land held by occupants direct from the Government does not exceed four or five cultivated acres. Besides there is the lack of whole-hearted interest due to rights of non-occupancy which takes away the cultivated areas from the tenant to be given to the highest bidder after a certain number of years. A large portion of the holdings are held by

'occupancy' tenants, who usually[sub-tenant them ; besides, with increasing numbers of proprietors of the same plot of land, there is an increasing tendency towards the partition of cultivating units and consequently the first difficulty appears with all its drawbacks. Fourthly, our cultivators generally live from hand to mouth, they can hardly bear themselves up under any exigency ; and this is the stumbling-block to their adoption of any sort of improvement. Co-operative Credit Societies are doing them an inestimable service ; still the Government and landholders shall do them a distinct service if they encourage them by the remission of a certain amount of land-revenue and by making free gifts to make improvements.

But we will not hide facts in determining the share of the Government in the improvement of Indian agriculture. After the appalling inroads on the national wealth caused by successive famines, the attitude of the Government decidedly changed for the better. The first step towards a change was the constitution by Lord Mayo in 1871 of a separate department of Government for Land Revenue and Agriculture but it was abolished for financial reasons in 1879. On the recommendation of the Famine Commission of 1881, the department was reconstituted but its activities were restricted only to the land-revenue. In 1889, the progress made in the organization of the revenue records, collected at the suggestion of Sir E. C. Buck resulted in the initiation of the agricultural department. A report was made to this end by an expert chemist, Dr. Voelcker ; and as a result of his recommendations an Agricultural Chemist was appointed by the Government of India in 1892. The continuance of financial trouble, however, postponed further development for a while. Since 1901, the superintendence of agricultural interests has been entrusted to an Inspector-General of Agriculture who acts as a technical adviser to both the supreme and the Provincial Governments ; and the chief agricultural experts of the country—a Civilian Director in each Province with a Deputy Director as his assistant—have been constituted into a Board of Agricylture which is convened at suitable intervals to discuss outstanding agricultural questions and to submit recommendations to Government.

But it must be asserted that the efforts made by them at first were not in keeping with the public requirements. Up to 1904 they had groped in the dark and their schemes had been practically failures, because in their eagerness to do good to the people they committed the blunder of foisting western ideas on the east, disregarding the local conditions. The differences of climate and environments were not taken into consideration when they introduced exotics in preference to indigenous elements. After the establishment of the Agricultural College at Pusa in 1904. they hit upon the right method practicable in India. They chalked out the true line of developement. Peasants cannot be troubled with the process of discovery but they shall

be presented with concrete results of chemical, botanical, and bacteriological researches. Besides, in the financial statement of 1905 to 1906 the sum of 20 lakhs (afterwards 24 lakhs) was available for the improvement of agriculture. And there with were established Colleges in Poona, Cawnpore, Sabour, Nagpore, Lyallpur and Coimbatore. The Government also employed certain specialists in different profitable branches of industry. For the distribution of good seeds, seed-farms, and Co-operative Societies were established.

To impart agricultural education to the people, the Government has hit upon the following plan in which different courses of study should be prescribed to different classes of people. There are primary schools in which text-books are on familiar subjects in nature ; in these schools sons of illiterate peasants shall be taught. Interest in nature-study and the power of keen observation shall be created in them. There shall be secondary schools in which a shorter course in agriculture supplementing general education will be recommended and in which sons of small landholders shall be educated so that they may in time handle their own estate properly. Lastly there will be a collegiate course which will train boys for the Agricultural Departments and to this branch, sons of big landholders specially shall be attracted to ensure permanent success on this side.

In conclusion, let us suggest a scheme which should be adopted to improve our agriculture. First of all, we should bear in mind that we cannot proceed in a condemning spirit, not can we do much by revolutionising the whole fabric of our agricultural system. Next, we should proceed in the work very cautiously and slowly, sounding the peculiar circumstances at every step ; in our zeal we should not overstate facts and ignore the legitimacy of indigenous methods. Last of all, we should remain undaunted, though at first we may experience some failures and though the net return for our outlay may not be satisfactory. Still we may be hopeful when we read His Majesty the King-Emperor's favourable views about scientific agriculture. He admits, "Latterly the resources of science have been brought to bear upon agriculture and have demonstrated in a short time, the great result that can be secured by its application." Consulting statistics we shall find that the value of the agricultural products has increased $3\frac{1}{2}$ crores of rupees annually. Now we lay down the positive means which will pave the way for the course of gradual scientific agriculture.

1. From Dr. Voelcker's Report we find the paramount importance of irrigation above all other improvements. Because he says, "The normal state of the English soil is 'wet' and that of most Indian soil is 'dry.'" So the irrigation system, though already existing, must be more extended.

2. "Water and manure together represents in brief the ryot's main want," so says Dr. Voelcker. So we should be more alert to save the wastage of town

and village-refuse and should utilise urine and dung as manurial matters. We shall over-rule the prejudice against using bones as a valuable manure.

3. Waste cultivable land should be reclaimed by irrigation and colonization.

4. The construction of farm-buildings should be encouraged to improve the state of the cattle—the agricultural live stock—who are generally ill-fed and ill-bred. A Civil Veterinary Department should be established in each Province to prevent the progress of deadly cattle-diseases.

5. Agricultural co-operations not only at times of ploughing and harvesting but also in the purchase of machinery or for the sale of cattle and produce are necessary. If possible, there should be institutions for the insurance of animals or of crops or of farm-buildings.

6. Our landholders should be more forward in providing their tenants with scientific implements and machines to improve agriculture. They should advance loans to buy good seeds and good cattle. Besides, there should be agricultural exhibitions at the expense of the Government, where not only reward should be awarded to the best producers but also the new experiments of agricultural science should be displayed.

7. Compulsory, free primary education, both general and technical, of agricultural classes should be taken up wholly by the government, to broaden the receptivity of their mind to increase their efficiency.

8. Last but not the least, more Co-operative Credit Societies should be started to relieve the distresses of poor cultivators and to release them from the clutches of Village Mahajans. Credit Societies are doing inestimable work no doubt; still to make scientific agriculture more effective, general private enterprises can not always suffice, so in all the above cases Government should come to their aid, otherwise the scheme of agricultural development shall fall to the ground.

When our young students getting a sound agricultural education shall prefer a lifelong devotion to the cause of the circulation of true agricultural knowledge among poor unenlightened peasants to a lucrative government post, when earnest students of economics without despising the traditional experience of ignorant farmers shall try to make them understand every possible utility of their products and to teach them to grow more with less labour, when the sons of petty landholders shall not hold in contempt the depressed classes, shall not feel it beneath their dignity to hold intercourse with them, to supervise and manage with their own eyes their holdings, we will, then, bring about the salvation of our country, we will then herald the dawn of economic evolution in our poverty-stricken and ignorance-ridden people.

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Fourth Year Class.