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The Imperial Agricultural Research Institute

THE Scientific Report of the Imperial Agricultural Research Institute, for the year ending June 1938, records the results of work during the first year of its settled existence in its new home, after its transfer from Pusa to Delhi.

It will be recalled that when, as the result of damage to the Institute at Pusa by the devastating earthquake in January 1934, the Government of India decided to transfer the Institute to Delhi, misgivings were felt in some quarters whether owing to soil and climatic differences, the work on many important crops could be continued at Delhi from the point at which it was left at Pusa. It is gratifying to note from the report that the actual results obtained with several crops belied the apprehensions, and that the continuity of the programme of field research and experiment has not suffered by the transfer.

The Imperial Agricultural Research Institute, familiarly known as the Pusa Institute, has successfully striven, since its establishment in 1903, to advance the nation's most vital industry—agriculture—by bringing science and agricultural practice into close contact. As a central research organisation, the Institute made great and enduring contributions to the improvement of agriculture and to the scientific knowledge of the agricultural problems of the country, during the past three decades. The Institute at Pusa, being the first of its kind in the country, provided for many years the main stimulus for agricultural research. Many recent agricultural developments in the country owe their foundations to the constant care and wider imagination exercised in seeking for the directions of advance, and in giving the lead which the Institute had offered in the early days of agricultural research in India.

On the practical side, tangible economic results have accrued to the cultivator from the improvements effected by the Institute

in the fruitful fields of crop and animal husbandry. The Pusa wheats speedily earned a distinction and spread even beyond the borders of India. The remarkable development in the Indian sugar industry is due in a great measure to the planned researches conducted at the Coimbatore Station of the Institute. Coimbatore sugarcane has definitely become a household word in the sugarcane growing tracts. The work on tobacco and its flue-curing have enabled the production of tobacco leaf of the colour, necessary for the modern cigarette, and have contributed to developments in the cultivation, trade and industry of cigarette tobacco. In a previous report and in a popular account of the work of the Institute, the Director has stated, we believe on justifiable grounds, that the increase in the agricultural income to the cultivator in one year directly arising from the work of the Institute, exceeds the total amount of money spent on the Institute in thirty years.

The scientific work leading to these practical achievements is a long list of impressive scientific papers on soils, fertilisers, crops, pests and diseases, contributed mostly to the scientific publications of the Institute, popularly known as Pusa Memoirs and Bulletins.

The transfer of the Institute from Pusa to Delhi, marks a new epoch in the history of agricultural research in India, and coincides with important developments and new ventures in the science and practice of agriculture in India. There have been important developments within the agricultural industry itself. The economic significance of Indian agriculture is not now confined to the production of food crops and peasant agriculture. Power farming on estate basis and intensive cultivation are developing. Movements in marketing organisation and the introduction of grades and standards demand in agricultural produce a very high quality for trade and industry. A more recent and a very important development is the interest in national nutrition, which calls for the production of sufficient food with high nutritive value. These insist upon fresh knowledge on problems of soil fertility, cultivation and plant nutrition and in the ways of protecting crops from damage by insect pests and disease, paying due regard to the fact, as it is known now, that the nature and intensity of the processes in the soils and crops of the tropical and sub-tropical regions are different from those that obtain in temperate regions. The programme of research and investigation besides being a continuation or the corollary to the work that has been in progress requires such modifications or additions as are demanded by current problems and the trend of future developments.

In the report under review, the Director of the Institute introduces the scientific work of the year in the different sections of the Institute and gives a general survey of the nature of problems under study and the objective thereof, mainly for the information of the non-technical reader.

A perusal of the Report has convinced us that the Director and his colleagues are intensely alive to the problems of contemporary scientific agricultural practice. The active programme of research at the Institute is based on the recognition of the vital need for greater production, having regard to the increasing demands of the consumer and a safe margin for the producer; but what is important is the realisation of the fact that the degree of economic success of the agricultural industry depends on the extent to which various other subsidiary industries of the farm such as crops, livestock, implements, processing of produce,

utilisation of waste, can be blended into a harmonious whole.

Several new and interesting lines of study are described in the Report under review. The studies on the theory and practice of mixed farming are of inestimable importance to Indian agriculture as a means of maintaining soil fertility, which is the main link between land and stock. These studies have for their objective the judicious blending of crop and animal husbandry so that the land supports the animal and the animal comes to the relief of the land as far as possible. Interesting results are recorded from early maturity and early mating experiments in the investigations on cattle breeding for milk production. It would appear, from the results of experiments which have been in progress for seven years, that the progeny of early matured and early mated heifers and bulls, can in no respect be considered inferior to the progeny of animals that ordinarily mature late and, therefore, mated late, in appearance, stamina or in milk yield per lactation. This means that bringing animals to early maturity and mating them early, give a greater number of lactations, an increase in the number of calvings and a more abundant supply in the total milk yield in the animal's life. Another very striking and interesting result is that obtained from stimulation experiments. When uncovered heifers are stimulated, they yield milk with normal composition and proper nutritive value. Stimulation of the act of milking and manipulation have apparently a much greater effect than hitherto supposed.

The study of the all-important soil condition as a medium for crop growth is directed to exploring the possibilities of increasing fertiliser and manurial efficiency in crop production. Connected with this is the investigation on the nutritive value of foods and fodders as influenced by the nature and extent of nourishment given to crops, and this will reach its culminating point in the evolving of a rational system of manuring for higher crop production. Another important and interesting line of study is that on the fixation of atmospheric nitrogen in the soil by itself and by leguminous and cereal crops. A clearer understanding of the mechanism of the processes of fixation under Indian conditions and the conditions that favour it is likely to lead to methods of cheap nitrogen nutrition of soils and crops by suitable soil management and crop rotations.

New lines of work in the evolution of crops are taken up. Breeding crops for drought and disease resistance has reached a stage at which knowledge is required on the application of modern theories of heridity in the further advance on plant breeding work. These are being studied in the field and in the laboratory in connection with the problem of breeding wheats which are comparatively resistant or immune to the attack of rust disease in India, and the breeding of disease-resistant potatoes. Few achievements of the Institute are more widely known than the contributions made by sugarcane research. Particular attention has been directed to the production of canes suited to the requirements of the sugar industry both in regard to quality and quantity. A very notable line of work in sugarcane breeding is the hybridisation between bamboo and sugarcane. It is perhaps too early to visualise the economic possibilities of such crosses, but the fact remains that a new line of work has been opened up, which may have a far-reaching effect in course of time.

It is one thing to grow better and more

crops, and it is a different matter to protect the crops from the ravages of insect pests and diseases and to gather the harvest in full. Ecological studies on insects, and surveys of important diseases of crops and breeding and testing of crops for disease-resistance are new lines of work, aimed at controlling insect pests and diseases of crops. Particular attention was paid during the year to researches on the control of borer pests of sugarcane about which widespread concern is felt in the cane-growing tracts.

While the Imperial Agricultural Research Institute, as its name implies, is well known for its research activities, it is not adequately realised that it is both an educational as well as a Research Institute. It gives post-graduate courses for higher instruction in different branches of agricultural sciences. During the year under report ten post-graduate students successfully completed their course and qualified for the Diploma of the Associateship of the Institute, and three completed one year course in Farm Organisation and General Farm Engineering, while four students were admitted for short periods of study in special subjects. The provision for post-graduate instruction at the Institute is a wise step, for the demand for research should be met by a steady supply of trained workers. It is only fitting that, in an agricultural country like India, the supply of trained workers should come from an institution within the country.

In opening the Institute on 7th November 1936, H. E. the Viceroy, whose solicitude for agricultural development and everything that pertains to the improvement of the village population is well known, concluded his address with the following significant words:—

"The Institute has in it, I am confident, the power for further service of infinite value to India; alike to the Provinces and to the Indian States. Its tradition and its reputation are those of established distinction. It has been served by many able and distinguished men with a loyal and disinterested devotion throughout the many years of its existence. I am confident that the present staff will amply sustain the past record of the Institution for scientific achievements of the highest standard. In to-day declaring open its new home I do so with the wish, which all of us share, that, under its new auspices, its future may even be more brilliant and the service it renders to India even more distinguished than ever before."

Under the distinguished administration of the present Director and with the active and energetic co-operation of his loyal colleagues, the Institute has already fulfilled the ardent wish of H. E. the Viceroy, and the more beneficent results of successful scientific experiment which the Institute may yet produce will, besides enhancing its prestige, make momentous contribution to national well-being and prosperity. India's wealth is its soil, its pillars are the villager and his cattle. Science must arm the one with knowledge and protect the other in the production of more wealth. This task is as arduous as its responsibilities are great. We confidently rely on the inspiring guidance of the Director and the devotion of his staff for results which would ensure the steady and increasing prosperity of the agricultural population.