

HUGH MARTIN LEAKE : A HISTORICAL MEMOIR

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Hugh Martin Leake was a pioneering agricultural scientist, who worked in India from 1901 to 1923 in various capacities such as, a Biologist to the Bihar Indigo Planters Association at Pemberandah (Bihar) 1901 to 1904; Economic Botanist and Geneticist-United Provinces, Cawnpore 1904 to 1915 ; Principal, Cawnpore Agricultural College, Cawnpore 1915 to 1919, and Director of Agriculture-United Provinces Lucknow 1919 to 1923. Leake made significant contribution to agriculture science in India and improving the opium and cotton crops by genetical means.

He made efforts to improve the yield of indigo crop through genetical means. He recorded that the seeds of indigo from western parts of U.P. gave plants with vigorous growth with abundant foliage and a suitable material for genetical improvement. He also resolved the problem of low percentage of indigo seed germination due to hard seed coat by feeding seeds to ducks and collect these when ejected. Second method was the mechanical method in which the seeds were mixed with emery powder and then beaten the mixture in a sack and then separated. He introduced Zamindari course at Cawnpore Agriculture College but it failed due to non-cooperation of the then Zamindars. He also wrote a few books. A brief description of his research work & publication are given.

Key words : Agriculture Directorate U.P.; Cawnpore (Kanpur) Research Station; Cotton, Hugh Martin Leake, Indigo industry, Opium.

INTRODUCTION

While I was a Volunteer Abstracter from the year 1966 to 1980 for the journal *Economic Botany* for the *Biological Abstracts* published from Philadelphia U.S.A., an article came to my notice in 1976 on, "An Historical Memoir of the Indigo Industry in Bihar" by Hugh Martin Leake. The name

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of the author was familiar to me, since I was interested in another short note on "Cultivation of *Atropa belladonna* in Mussorie" by the same name published in the *India Agriculture Journal* in the year 1914. I wanted to know whether both the authors are the same person and I wrote to him a letter. To my surprise I received a reply stating that he was the same person and he was 98 years of age. Immediately I thought it would be quite fascinating to get the first hand personal information from him and about his contribution to Indian Agriculture. Leake provided me his bio-data and a photograph and the anecdotes of his personal life. The information I received from Leake through my correspondences with him and collections from the journal of *Economic Botany* and from the U.P. Archives, are being presented in form of the present article.

EDUCATION AND ARRIVAL IN INDIA

Hugh Martin Leake was born on October 28, 1878 at Harley, Middlesex in England and he studied at Dulwich College and Christ College, Cambridge. In 1900 after obtaining a degree in science at Cambridge, he spent a year on research on diseases of Hop plant under Marshall Ward, who was then Professor of Botany.

Knowing that the post of Biologist to the Bihar Indigo Planters Association in India was vacant, he immediately applied and received a reply that the post was already filled up. But, again after a month another letter was received by him asking if he was then available as their nominee had died of cholera, on arrival in Bihar. Leake had close connection with India as his grand father had commanded the Punjab army in pre-mutiny days and several of his relations were still serving in India—that instilled him a sense of adventure and curiosity and he accepted the post. In the late autumn of 1901 he arrived at Muzzaffarpur, the Head Quarter of Indigo Planters Association in Bihar.

He was given a passage to Bombay from England and was also promised a passage back again to England on expiry of his services and Rs. 1080/- was sanctioned to him on his return in 1923 to England [Box No. 61 File No. 117 1924 U.P. Archives].

ABOUT HIS BOSS AND MARRIAGE

Sometime, in 1903 at Pemberandah, where Leake was working, W.P. Bloxan from England joined as a chemist. Writing about Bloxan, Leake (1975) stated.

“He had been a lecturer at the Royal Naval College, Greenwich, and had come to India as prospective professor of chemistry at the University of Madras on the understanding unfortunately, not in writing that he would be confirmed in the post, when the present Professor then on leave prior to retirement, actually retired. However, he decided not to retire and on resuming his post, Bloxan was left stranded. Nearly double of my age, I willingly accepted him as my superior and incharge of the Research Station. That he lacked any practical knowledge of agriculture was evident and I have no idea as to the research programme, he set himself but he was the best fellow and, some ten years later, just before his death, he endowed me with the perfect wife, in the form of his younger daughter, who has now looked after me for 60 years.”

A FUTILE CONTRIBUTION TO THE INDIGO INDUSTRY

When Leake was appointed as a biologist to the Bihar Indigo Planters Association at Muzaffarpur (Bihar), his main task was to build a sound policy for the improvement of the Indigo crop production. And, for this Leake wanted to undertake two investigations on indigo crop, one to increase its production with genetic means and other to increase the germination percentage of the seeds as the seed had a very hard coat and which lowered down the germination of the seeds.

Then, in India, *Indigofera tinctoria*, (indigenous) *I. sumatrana* (exotic) and *I. arrecta* (exotic) used to be cultivated on large scale. And there was a time, when practically nine tenth of the international trade in indigo was Indian.

Indigo (or *anil*) is a natural blue dye obtained from several of the 700-old species of *Indigofera*; it has been used for over 4,000 years and is fast to water and light. The species, which yield indigo, are tall herbs and are cut before flowering and steeped in water, producing a yellowish solution. Aeration by stirring or beating causes the colouring agent (indican) to oxidize, forming a blue precipitate, which is made into 'indigo cakes' after drying.

It was decided by the Bihar Indigo Planters Association that the seeds as genetical material ought to be procured from different places. Leake was entrusted the job to collect the seeds from the area in which the crop was being cultivated for seeds, and A.T. Gage from Indian Medical Service, who was then the Deputy Director of the Botanic Gardens, Sibpur, Calcutta to accompany him on tour. Their tour started from Delhi where they had first attended a meeting of the indigo merchants controlling the seed supply. In the meeting their proposal of investigation was resented and they were suggested to cancel their tour.

Despite this discouragement, they continued their tour. Captain Gage was very helpful for owing to his official position, he was able to arrange for the Collector (Deputy Commissioner) of each district to supply samples of the seed from the plant grown in his area. These collected seeds were duly sown by Leake the next year. He observed that different types were clearly shown to be linked with the district of their collection. Seed from the Western United Provinces gave plants of the most vigorous growth 1 to 1.5 m high and with most abundant foliage and there was ample material for improvement of crops. Passing west, growth became less and less, until, across the Indus, the plant was dwarf, scrubby and a typical product of desert conditions.

Second research problem, which he undertook to resolve was of real commercial interest that the species had a seed with a very hard coat and the germination percentage was about 10 to 15 percent. Treatment of the seed, either mechanical or chemical, was essential. A machine designed for treating clover seed to improve germination was ordered but it arrived too late to be used before Leake resigned from his post as Biologist. Meanwhile, something had to be done and the first attempt was to feed the seed to ducks and collect it as ejected. This proved quite ineffective because the time of passage was too short. The next and sufficiently successful attempt was to mix the seed with emery powder so graded that subsequent separation was easy. The mixture was then either placed in sacks, only half filled and beaten with heavy sticks or spread on a smooth concrete floor and jumped on by the village lads.

Leake presented these findings in a meeting before the Bihar Planters Association. Needless to say no action was taken probably because it was envisaged that the death of the indigo industry was inevitable because a clean synthetic product had already been produced and patented in Germany and production of natural indigo was declining day by day during the first and second world wars the industry had died almost completely [Leake, 1975].

JOINING INDIAN AGRICULTURE SERVICE

In 1904, the Government of India began to recognise its responsibilities in the field of agricultural research. There was a large Government owned state lying unused in Pusa (Bihar) to which it was proposed to transfer the research station at Pemberandah under Mr. Conventry, the Planter in Charge of the estate. It had already become clear that the Indigo Industry could not be saved, and under these circumstances. However, before this scheme could mature it was superceded by a far more grandiose project under the initiative of the Viceroy Lord Curzon, for an All India Agricultural Service with Pusa as its Research Station under the Central Government and an Agricultural Department in each Province, with its research station and college at which district staff was to be trained. As soon as this big scheme became effective Leake received an offer of a post at Pusa, which had then become the Head Quarter of Indian Agriculture Services.

AT CAWNPORE RESEARCH STATION

After joining the Indian Agricultural Service in 1904, Leake was posted as Garden-in-charge at Saharanpur and when the station was established, he was posted as the Head of the Botany Section. In that newly created section there was no existing staff, therefore he was to select his own staff. He had selected two persons as his assistants—Sri Ram Prasad Singh and Mune Ki Kabir Khan, and both of them were uneducated fellows. Recalling his past impressions about Ram Prasad Singh and Kabir Khan, Leake in a letter to the author stated, "The former, I selected less on account of his practical knowlede but because of his high standard of intelligence. The

latter, as one with a good knowledge of agricultural procedure". He further stated, "These two selections proved most satisfactory. Ram Prasad became my right hand man through all my breeding work and Kabir Khan proved a highly efficient land manager." Ram Prasad Singh with Leake accomplished outstanding research work on cotton, crop and later he became Rai Sahib Ram Prasad Singh at Cawnpore.

Leake worked as Economic Botanist and Geneticist at Cawnpore Agricultural Research Station, and in 1915 he was also assigned an additional post of Principal, Cawnpore Agricultural College, Cawnpore which he continued up to 1919.

RESEARCH ON COTTON

While at a Cawnpore, the main research problem which Leake undertook was on hybridization of cotton with a view to transfer to the cultivated type some of the useful characters from the American and wild cotton and to improve the yield and quality of the crop. Leake and Ram Prasad found out a clear cut correlation between the plant and the ginning percentage. They established that shorter the cotton plant the higher was the ginning percentage and the closeness of hairs on the seed surface increases the ginning percentage but no direct proportionality exists between the two. They also developed a number of improved varieties to cotton plant [Leake, 1914-15]. According to Leake (1975), prior to the 16th century cotton was a little known commodity in England and as cotton textiles became more and more popular and fashionable, the import of cotton from India increased. In 1870, the Indian exports again fell down due to the Indian textile industries rooting their holds and since then neither cotton cultivation nor the cotton textile, industry have looked back in India.

RESEARCH ON OPIUM

Opium is the air dried, milky exudation obtained by incising the unripe capsule (technically known as lancing) of Poppy plant, and from opium the worlds greatest pain killer morphine is extracted. During Mughal period

the Poppy was cultivated in Bengal and Orissa and during recent years it has been almost entirely limited to Uttar Pradesh & Madhya Pradesh. During first World War, with its consequent demand for medicinal opium and its derivatives, an intensive study of the poppy plant, *Papaver somniferum* was made by Leake and H.E. Annett. Leake worked on the botanical and Annett on the chemical aspects of the plant. Leake and Annett found out a number of races, which yielded maximum opium and these races are still in cultivation. Not only this, they also determined the morphine content of large number of races and selected the best ones. Seasonal and local variation of morphine contents were also studied by them [Leake & Annett, 1920].

FAILURE OF ZAMINDARI COURSE

According to Leake (1975), the past cultivation in India was based on the small holding the *raiyatwari* system, the '*raiyat*' being an occupant, either as owner or tenant of some one or two hectares of land. It was Akbar who, in the 16th century, was largely responsible for developing the zamindari system of landownership, when he awarded his leading followers with gifts of land of a considerable area development which mainly involved land in the Gangetic plain, particularly in the Western United Provinces (now Uttar Pradesh). But the zamindar or landowner was little more than a rent collector living on his rents, part of which he passed on to Government. In practice the '*raiyatwari* system' remained the basis of agricultural production; such produce as became available, after the raiyat's needs had been satisfied, was sold to the 'bania' or trader.

In those early days, land was in practice the only source from which the revenue required to meet Government expenses could be drawn and in the Gangetic plain the tax was based on a re-valuation of the land every 30 years—the 30 year Settlement. In Bengal and a few of the Districts of the United Provinces bordering Bengal after the English had assumed control this settlement was replaced by what came to be known as the permanent Settlement of Bengal, it may also have applied to Assam. It was in this area and particularly in Bihar that the English acquired large estates, in fact

they became zamindars with the difference that they undertook the responsibility of crop production from a large part of their estates by the use of hired labour. It was probably the establishment of this system in Bihar in particular that led to the establishment of the major indigo industry in that area, thereby an adequate supply of the crop became assured. With that assurance capital became readily available for erecting an up-to-date factory for extraction and its conversion to indigo.

As the result of the developments in land tenure and ownership noted above the sources of the plant from which indigo was extracted at the factory were triple: first from estate owned land where cultivation was by paid labour under estate supervision. Second from Zamindari land leased to an estate where cultivation similarly was by paid labour and third to smaller extent from independent raiyats who were paid on the basis of a valuation of crop area or on the weight of cut plant delivered to the factory. It was interesting to note the high productivity of those raiyats whose land bordered the factory owned estate.

Leake was the first agricultural scientist, who proposed for a reform in this system of cooperative farming. His main object was the zamindars to play an important role in co-partnership with the *raiya*t*s* i.e., a type of cooperative farming. For this he also introduced a *zamindari* course at the Cawnpore Agricultural College but it failed owing to the non-cooperation of the Zamindars.

PUBLICATIONS

Possibly, his first publication was '*Studies in the Experiment of the Indian Cotton—An Introductory Note* in the year (1908). In the beginning of 1919 Leake visited Egypt as an adviser to the Egyptian Government on Cotton and its cultivation. In the end of 1919 he became the first Director of Agriculture United Provinces with an ex-officio seat in the Legislative Council. He remained as a Director of Agriculture upto 1923. In the year 1920 he wrote a book, *Basis of Agricultural Practices and Economics in the United Provinces India*, which was based on the lectures delivered by him at Cawnpore Agricultural College. The foreword of the book was written by

J. Mackenna, the then Agriculture Adviser to Govt. of India and he commented, 'the main feature of Leake's work is the emphasis of the economic aspects. It is the first serious contribution to the study of the Indian Agriculture in its economic bearings'. He further continued, "For the present it is only desirable that we should get some idea of the complexities of the subject and some idea of the extent to which agriculture is dependent on its economic system. If we have really understood the importance of a possession of the knowledge of that system, the possession of this knowledge will be seen to be still more important if we have followed and understood, what we have repeatedly stressed on that this system is at present time undergoing rapid change, the time is a time of progress and the man who is going to make his way in agriculture and reap the largest reward as the one who understands these matters and is consequently able to anticipate their effects."

The book received favourable reception by the press and it was adopted by several agricultural educational institutions in their teaching courses. Leake published the contents of the book again in 1923 with a changed title, viz., '*The Foundation of Indian Agriculture*.'

His other books are : *Land Tenure and Agriculture Production in the Tropics* (1927), *Present Advances in Agriculture Plant Breeding* (1933) with H.H. Hunter, and *Things not Generally Said* (1949).

DEPARTURE FROM INDIA

Leake (Fig. 1) left India for Sudan on 10th Oct. 1923, where his services were loaned to study and report on the Gazira Cotton Growing Scheme with Sir John Russel of Rothamstad, the authority on cotton at that times. Later, his services were extended to work on the southern Sudan and its agricultural potentialities. Later he joined as Principal, Imperial College of Tropical Agriculture, Trinidad, West Indies from where he did not return to India and he was relieved from the post of Director of Agriculture United Province on 21st Dec. 1925. [U.P. Archives Box no. 6, File no. 117, 1924].

From 1932 to 1960 he served as Agricultural Editor to "*The International Sugar Journal*".

At his last stage of life Leake had completely lost his eye-sights and all his correspondences and writing work, etc. was done by his devoted wife, who had looked after him for 62 years. On April 20, 1977 Leake died in his 98th year at Wardington, Oxon in U.K. where he had settled (Shah 1978). During his last days he remembered India very much, where he had spent his youthful days and started his carrier. He was infact very much delighted, if anyone from India wrote to him.



Fig. 1. Hugh Martin Leake (1878-1977)

He trained a number of Indian scholars in the field of agriculture and plant breeding and he contributed a lot to the science of agriculture as a teacher and researcher, when it was at its infancy. He was truly an avid and highly skilled agricultural scientist of the bygone days.

NOTES AND REFERENCES

1. Leake, H.M. *J. Genetics*, 4 (1914-15) 42.
2. Leake, H.M., & Annett H.E. *Agri. J. India*, 15 (1920) 124.
3. Leake, Hugh Martin, 'An Historical Memoir of the Indigo Industry of Bihar'. *Econ. Bot.* 29 (1975) 361-371.
4. Shah, N.C. Hugh Martin Leake : A Memoir, *National Herald*, 1977, Jan. 2, p. 11.
5. Shah, N.C. 'Hugh Martin Leake'. *Sci. & Cult.* 44 (1978) 159 (Obituary).