

ENCLOSURE II.

Extract from the chapter on 'the Indigo Industry' of the Muzaffarpur District Gazetteer, 1907.

PROGRESS OF THE INDUSTRY.

Indigo was a product of North Bihar long before the advent of the British, but its cultivation by European methods appears to have been started by Francois Grand, the first Collector of Tirhut. Writing in 1785, three years after his appointment as Collector, he claims to have been the pioneer of the industry, and says:—"I introduced the manufacturing of indigo after the European manner, encouraged the establishment of indigo works and plantations, and erected three at my own expense." It is at least from this time that the manufacture of indigo began to develop into an industry, and to attract European enterprise. In 1788 there were five Europeans in possession of indigo works; in 1793 the number of factories had increased to nine, situated at Daudpur, Saraiya, Dhuli, Ottur (Athar), Shahpur, Kanti, Motipur, Deoria and Banara; and by the year 1803 altogether 25 factories had been established in Tirhut. During these early days the industry was directly fostered by the East India Company, and special permission had to be obtained by Europeans wishing to engage in it. In 1802, however, the Board of Directors passed orders that no further advances or other pecuniary encouragement should be given to the planters, as the large profits obtained from the sale of the product made such aid unnecessary. Indigo accordingly became an independent and self-supporting industry, the pioneer planting industry in Bengal.

Its progress in Tirhut during the next few years was rapid, though there appears to have been many failures, probably owing to over-production. In a report submitted in 1810 the Collector stated that taking one year with another, the district seldom sent less than 10,000 maunds of indigo to Calcutta for export to Europe; that 30,000 to 50,000 souls received their principal support from the factories; and that on the average each factory disbursed from Rs. 25,000 to Rs. 30,000 per annum in hard cash to the labourers and cultivators for some miles round the various concerns. He estimated that in this way not less than six or seven lakhs of rupees were circulated every year by the planters in Tirhut, and urged that the advantages of the industry to the labouring classes were so great that Government should encourage it in every possible way. "Let the speculator win or lose," he wrote, "acquire a princely fortune or die a pauper, the district is equally benefited by his industry, and his struggles for prosperity do rarely succeed. Some of the planters succeed, but the majority of them fail." Difficulties appear to have arisen later through the competition of rival concerns, and in 1828 the Collector represented that indigo cultivation had extended so greatly that some restriction on it was

desirable for the benefit of the district. " From the misunderstanding, ' he wrote, " which has prevailed and still prevails amongst the European planters, disputes with one another are of very frequent occurrence: disputes have, however, of late occurred through descendants of Europeans embarking in indigo cultivation, worked chiefly, if not entirely, by native agency. For the peace of the district and welfare of the established planters, it therefore appears highly desirable that the Government restrictions regarding the erection of factories by Europeans should be extended to the descendants of Europeans, and power be vested in the Magistrate to prevent engagements for the cultivation of indigo plant by other than the proprietor or proprietors of one established factory. "

In 1850 there were no less than 86 factories in Tirhut, several of which were used for the manufacture of sugar, but about this time sugar was finally superseded by indigo as the European industry of the district, and many refineries were converted into indigo concerns. Difficulties were at one time threatened by the feeling of tension between the *ryots* and the factories produced by certain abuses which had crept into the system of cultivation; but the danger was averted by the planters themselves, who in 1877 formed the Bihar Planters' Association in order to put matters on a satisfactory footing.

Since that time the area under cultivation appears to have been steadily on the increase until the discovery of the Badische artificial dye. In 1897 it amounted to 87,258 acres or 5.62 of the cultivated area of the district, and in that year the Settlement Officer enumerated 23 head factories, with an average of three outworks under each, belonging to the Bihar Indigo Planters' Association, besides nine independent factories; while the industry was estimated to give employment throughout the year to 15 per cent of the labouring classes. Since then the industry has suffered from the competition of the artificial dye in Europe and from the high prices of food-grains and the consequent demand for land in Bihar. The price of the natural dye has fallen rapidly, and the area under cultivation has diminished, being estimated at 35,000 acres in 1904, while the final forecast of the indigo crop in Bengal returned the area sown in 1905 as only 25,000 acres. Government has come to the aid of the planters with substantial grants for scientific research, the aim of which is to ascertain whether it is possible to increase the outturn and quality of the dye at a cheaper cost; excellent work in the chemistry, bacteriology and agriculture of indigo has been done and is still progressing; and every effort is being made to improve the quality of the plant by importing fresh seed from Natal. But so far these experiments have not succeeded in arresting the decay of the industry. The price obtained for indigo is barely sufficient to cover the cost of production and many factories are either closing altogether or are reducing the area cultivated with indigo, growing in its place sugar, cotton, and country crops. The figures given below

show sufficiently clearly how greatly the outturn has decreased in consequence of these adverse conditions :—

Year.		Outturn.	Value.		Price per maund.
			Mds.	Rs.	
1895—1900 (average)	..	14,573	27,14,800	186	
1900-01	..	14,185	19,85,900	140	
1904-05	..	4,045	6,06,750	150	

CULTIVATION.

The land on which indigo is to be grown is prepared for sowing as soon as the *kharif* crops are reaped, as it is of great importance that the soil should retain the moisture supplied by the rainfall in October and November. The land is ploughed and reploughed until the clods are all pulverized, and after being manured, is levelled and smoothed with a plank roller composed of a long heavy beam on which two men stand. The seed is sown at the beginning of the hot weather, as soon as the nights begin to get warm, a special drill, with coulter about five or six inches apart, being used for the purpose; and after sowing, the roller is again used to level the surface. The seedlings are very delicate until their roots are well developed, and many perish owing to dry west winds; but moist east winds after sowing, and spring showers later, are very beneficial to the young plants. They make slow progress until the monsoon sets in, when the growth becomes very rapid; and they are ready for cutting, which takes place immediately before they flower, in July or August. A second crop is obtained in September, but usually yields less than the first crop; the average outturn of which is 80 to 120 maunds of green plant per acre; the yield of 100 maunds of good plant should be about ten seers of indigo.

Soils and Manures.

Indigo may follow indigo, but is more generally rotated with such crops as sugarcane, poppy, tobacco, cereals and oil-seeds. It is usually grown on high lands beyond the reach of floods; the soils are necessarily varied in character and composition, but deep alluvium loams seem to suit the crop best. Many soils of this description are deficient in phosphoric acid and nitrogen, but are generally rich in other useful constituents; while extensive experiments have proved that superphosphate and nitrate of potash can be economically applied to them. The refuse indigo plant (*sith*) is the manure most easily obtained, and is very valuable; but it is less suited for indigo itself than for rotation crops. such as sugarcane, tobacco, poppy, cereals and oil-seeds. It produces heavy crops of indigo, but the leaf is deficient in colouring matter; and indigo grown on land heavily treated with *sith* is liable to injury from insect-pests.

•Seed.

The seed used in Tirhut comes for the most part from the United Provinces, as there is a general belief that the best seed is obtainable there, and that local seed does not keep good from season to season and does not germinate properly. The system of getting seed in this way, without any special selection, has caused deterioration in the varieties generally grown, and there is little doubt that the plant commonly cultivated does not now produce a satisfactory amount of dye matter, particularly on worn-out indigo lands. The chief cultivated form is *Indigofera Sumatrana*, which was introduced about 150 years ago, and not *Indigofera tinctoria* as was formerly supposed.

Within recent years Natal indigo (*Indigofera arrecta*) has been introduced, the seed being obtained direct from Natal and also from plants acclimatized in Java. This plant has been found to give a very considerable increase of colouring matter from the unit area of land. It has a much more vigorous habit of growth than the old variety, and the leaf contains a larger proportion of the colour-yielding principle. It appears to be eminently suited to the soils and climate of Bihar, and farms have now been established in three districts for the cultivation of its seed on an extended scale.

Colouring matter.

The colouring matter from which indigotin is derived exists almost entirely in the leaf of the plant. It increases as the plant grows, but deteriorates after a certain stage, and harvesting and steeping have therefore to be carried on expeditiously. Plants which have been cut some time and become blackened by heating in bulk contain very little dye matter, so that the green plant cannot be carted very far. A plant which is forced by manure to very active growth also gives a poor percentage of dye matter.

MANUFACTURE.

Steeping.

When cut the leaves are taken to the factory, and are there steeped in large vats until fermentation is complete. The old system of manufacture requires two sets of vats, the vats on the higher level being used for steeping the plant, which is kept submerged by logs of wood or bars fixed in position. During this process active fermentation takes place through the action of soluble ferments (enzymes), causing the formation of a compound which is easily convertible into indigotin by the action of air. The period of steeping varies with the temperature of the air and water. If the temperature of the water is 90° to 92°F., steeping for ten hours is sufficient, but instead of varying the time, it is preferable to heat the water in the reservoir to a definite temperature. It has been found that when the plant is steeped in water at 150° to 160°F., the colouring principle is extracted in half an hour, and indigo made in this way is superior in quality, containing about 75 per cent of indigotin.

Oxidation or beating process.

When fermentation is complete, the liquid in the steeping vats, which varies in colour from bright orange to olive green, is drained off into the lower oxidizing vats, and is there subjected to a brisk beating, the effect of which is to cause oxidation and separate the particles of dye. As the oxidation proceeds, dark blue particles of indigotin appear in the liquid, and the beating is continued until a little of the liquid placed in a saucer readily throws a dark blue precipitate. If there is any delay in oxidation, there is a considerable loss of colouring matter, and the indigo produced is inferior. Oxidation was at one time accomplished by hand-beating, but in most Bihar factories it is now done by a beating wheel worked by power from a central engine.

Lime and ammonia process.

The improved method of treating the plant known as Coventry's lime and acid process requires a vat intermediate between the steeping and beating vat. Lime is added to the indigo liquor, and a precipitate of calcium and magnesium carbonates then forms, which also carries down various other impurities. The cleared liquor, when run off into a lower vat and oxidized, yields indigo of good quality, and a substantial increase of colouring matter is obtained. An ammonia gas process patented by Mr. Rawson in 1901 also produces a direct increase of colouring matter.

Boiling and final preparation.

Finally, the sediment (known as *mal*) is boiled, strained and made up into cakes for the market. The precipitate which settles after oxidation is first boiled, and the dye matter is then placed on a cloth strainer until it becomes fairly dry. It is then carried to the press and subjected to gradually increasing pressure until it has taken the form of firm slabs, which are cut into cakes and slowly dried on racks. Good indigo should be bright and of a dark blue colour, with a coppery gloss, and should contain 60 per cent or more of indigotin.

LANDED INTERESTS.

In the course of the last survey and settlement operations it was ascertained that, in their capacity as superior landlords, the indigo factories held 17.59 per cent of the district area, but that their landed interests were secure only in a little over 2 per cent, which they held as proprietors or permanent tenure-holders. The reason for this is that a factory has seldom an opportunity of buying an estate with lands situated conveniently for its purposes, as the sale of estates is regarded as a social disgrace only to be resorted to in the last extremity; while the practice of granting permanent leases has almost entirely died out with the rise in the value of land. Factories are, therefore, mainly dependent on temporary leases for acquiring interests in villages in which they wish to extend or maintain the cultivation of indigo.

Such leases are granted as security for mortgages or are simple farming leases (*thika*). The latter, which are also called *khushkpatta*,

are due to the financial embarrassment of proprietors and to their desire to avoid the troubles of management. The term of the lease may vary from 5 to 20 years, and its renewal is generally made an opportunity for increasing the rent. These *thika* leases are the commonest of all; and it is to the *thika* system and to its influence as landlord that the factory owes the strength of its position.

The other class of leases common in the district consists of usufructuary mortgages, under which the factory grants a loan at a moderate rate of interest and receives the land of an embarrassed proprietor as security. Leases of this kind are either *zarpeshgi* or *sadua patua*. In the former case the interest on the loan is paid yearly by deducting it from the rent, and the principal is repayable on the expiry of the lease; in the latter both principal and interest are liquidated by deduction from the yearly rent due to the proprietor. It pays the factories to invest money in this way, as it gives them a footing in the villages, and, the mortgagors being generally unable to repay, the lease gives the planter greater security for his continuance in possession.

In some cases factories take a lease of an under-tenure, this lease being known as *katkana*, e.g., if two factories quarrel about their respective jurisdictions, a sub-lease from one to the other generally forms the basis of a compromise. Again, a proprietor is prepared to grant a lease of his estate to a factory on condition that it takes the whole, but part may fall within the jurisdiction of another factory. In such a case, the good services of the Indigo Planters' Association are called in to arrange for the latter factory taking a sub-lease from the former, and thus the danger of friction is avoided.

Occasionally the factory acquires land as an under-ryot under what are called *kurtauli* leases. These correspond to the *sadua patua* leases granted by proprietors to tenure-holders; the factory gives the ryot an advance of so many years rental of the land taken up, and in return is allowed to cultivate the land for that period, giving it back to the ryot on its expiry. *Kurtauli* leases are generally executed for part-holdings only, and the ryot remains in the village, cultivating the portion which he has not sublet to the factory. An analogous form of mortgage is the *sud-bharna*, in which, as in a *zarpeshgi* tenure, the factory gives an advance on which the interest only is liquidated by deduction from the annual rent for the land sublet, the factory retaining possession until the principal is repaid.

SYSTEMS OF CULTIVATION.

Ziraat.

The three main systems of indigo cultivation are commonly called *ziraat* or direct cultivation by means of hired servants, *asamiicar* or cultivation through factory tenants, and *khushki* or cultivation through outside ryots. The term *ziraat* includes all land in the direct occupation of the factory, whether held by it as proprietor, tenure-holder, ryot or

under-ryot. Altogether 61½ per cent of the area under indigo is *zirat*, out of which the factories hold 38½ per cent under *thika* leases, and have therefore only a temporary landlord interest; in 11 per cent the factories have the rights of *ryots* or under-*ryots*; and in practically all the remainder they have a permanent landlord interest as proprietors of permanent tenure-holders (*mukararidars*).

Asamiwar.

When the system of *asamiwar* cultivation is followed, the indigo is grown by the factory tenants at fixed rates per *bigha*. Generally documents, called *sattas*, are executed, the *ryot* receiving an advance and binding himself to grow indigo on a certain specified portion of his holding, and to pay damages if he should fail to carry out his agreement. All the expenses of cultivation are paid by the *ryot*, but the seed is given by the factory, which also cuts and carts away the indigo, the *ryot* being paid for the indigo at a rate fixed by the Indigo Planters' Association.

Khushki.

Agreements executed by *ryots* who are not the tenants of the factory are called *khushki sattas* or voluntary agreements. In this case the factory merely supplies the seed and pays for the crop when delivered; it sometimes also gives an advance to the cultivator at a light rate of interest. The amount of *khushki* cultivation in Muzaffarpur is small, as, if it is to pay, indigo requires selected lands, carefully cultivated, and rotated in an intelligent manner. These conditions are all wanting in the *khushki* system; the rate of remuneration has to be high in order to induce the outside *ryot* to grow indigo; and the factory therefore cannot afford this system of cultivation.

INFLUENCE OF THE INDUSTRY.

Regarding the general effect of the industry on the district, the following opinion of the Settlement Officer may be quoted:—

“ That a district should contain a large community of honourable English gentlemen joined together by a common bond of interest, anxious and prompt to devote their time and energies to the service of Government in times of danger and difficulty, is a source of political and administrative strength too obvious to require more than a passing notice. ” After reviewing the relations between the indigo concerns and the zamindars and *ryots*, he sums up the position as follows:—

“ My general conclusions are that the indigo industry confers a very material benefit on the district. It has saved many a proprietor from inevitable ruin; it has brought immense profits to the poorest and most depressed portion of the population; the political and administrative advantages that accrue to the Government cannot admit of question. Against these advantages are to be set the possible disadvantages, and perhaps, in isolated cases, hardships of the *satta* system to a very limited portion of the cultivating classes. The aggregate balance of advantage is clearly on the side of the indigo industry. ” “ The agricultural classes ”, he says, “ have the advantage of knowing the

ordinary indigo-planter to be a good and considerate landlord. It is an axiom of the Association that the successful concern is the one on good terms with its tenants. The general tone in this respect is thoroughly sound and good, and Government, the indigo community itself, and the cultivator are largely indebted to the Indigo Planters' Association for its introduction, as well as for the cordial relations that exist between indigo-managers and the local administration. "

THE BIHAR PLANTERS' ASSOCIATION.

The present state of affairs is in striking contrast to that previously existing, some idea of which may be gathered from the account of the origin of the Association given in the Bengal Administration Report of 1877-78. According to this account, a report submitted by the Commissioner of Patna conclusively showed that the system of cultivation then prevailing involved an amount of lawlessness and oppression, principally in the shape of extorted agreements to cultivate and of seizure of ploughs and cattle, which could not be tolerated. On receipt of this report, some of the leading planters as well as the officials of Bihar were consulted through the Commissioner. It was important to do nothing which would unduly excite the mind of the *ryots*, and to avoid any such agitation as might lead to breaches of contract and the general embitterment of the relations between planters and *ryots*; and as some of the leading planters declared themselves sensible of the necessity of reform and willing to assist in the work, and for this purpose undertook the establishment of a Planters' Association, action on the part of Government was postponed and the matter was entrusted to their hands. This body showed a sincere desire to place the relations between planters and *ryots* on a more satisfactory footing, and drew up a series of rules embodying very important reforms for the guidance of the members of the Association. The remarks quoted above show that since that time it has been successful in maintaining friendly relations both with the cultivators and Government; and that it has helped greatly in advancing the development and prosperity of the district. This is the more satisfactory when it is remembered that the cultivation of indigo is not very popular with the *ryot*, as though it is raised on only a small proportion of his holding, indigo is not so remunerative as other crops which he might grow on the same land; he does not like the constant worry of being supervised by the factory servants, and there is consequently the risk of friction with the factory. On the other hand, the planters have consistently shown themselves true friends to the cultivators and labourers in periods of adversity. Their readiness to help the latter was very clearly shown in the last famine of 1896-97, and the value of their services at this time of distress may be gathered from the remarks of the Commissioner, who wrote—

" The planting community, as in 1873-74, proved to be of inestimable value in the crisis. In the former year many of these were stimulated by the prospects of pecuniary advantage; in 1896-97 no such stimulus was offered; but

at an early stage of the operations their services were offered gratuitously—an offer which they more than redeemed. Numbers of them sacrificed time, ease and health to assist Government, and many of them have been losers by their public-spirited efforts. Yet the work has been cheerfully done, and the community have once more proved themselves invaluable to the administration."

FACTORIES.

The following is a list of the factories in the district with their outworks :—

HEADQUARTERS SUBDIVISION.		HAJIPUR SUBDIVISION.	
Factories.	Outworks.	Factories.	Outworks.
Bhikhanpur	{ Bochaha. Jhapaha. Sahajpur. Simraha.	Agrail	{ Bela. Dubaha.
Daudpur ..	{ Arijpur. Chhajjan. Musahri.	Bhataulia	Ramdaspur.
		Chaksikandar.	
Deoria ..	{ Karamwari. Majhaulia. Sherpur.	Chhitwara ..	{ Bishunpur. Harpur (Sul- khani).
Dhuli ..	{ Barauli. Sakri. Sarbnaha.	Karhari.	
Kanti ..	{ Lautan. Nariar. Raghai.	Kutubpur ..	{ Chapta. Dharampur.
Karnaul ..	{ Gaura. Manain. Tajpur.	Mian Chhapra.	
		Pokhraira.	
Motipur ..	{ Bariarpur. Chaklahran. Jagannathpur. Murarpur.	Shahpur Mircha.	

HEADQUARTERS SUBDIVISION.		SETTAMARHI SUBDIVISION.	
Factories.	Outworks.	Factories.	Outworks.
Ottur (Athar).	{ Ghosrama. Hasna. Muhammadpur.	Baluaha.	
Mahual.		Belsand ..	{ Belah.
Pirakpur.			{ Bhagwanpur.
Saraiya ..	{ Azizpur. Karneji. Kewalpura. Muhammadpur.	Dumra ..	{ Bokraha. Narkatia. Panchaur.
Thikaha ...	{ Pakri. Godai.	Runi Saiyad- pur.	

[For more details Munden Wilson's History of Bihar, Stevenson Moore's Settlement Report, Gandhiji's Autobiography, Dr. Rajendra Prasad's Champaran Satyagraha, Dr. H. R. Ghoshal's Economic Transition in Bengal and P. C. Roy Choudhury's Gandhiji's First Struggle in India may be consulted.]