

APPENDIX

Extract on Indigo Industry from the "District Gazetteer of Darbhanga" (1907) by L. S. S. O' Malley, from pages 97—108.

THE INDIGO INDUSTRY

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; and by the end of the 18th century the present concerns of Dalsing Sarai, Jitwarpur, Tiwara and Kamtaul had been founded. In 1788 there were 5 Europeans in possession of Indigo works in Tirhut; in 1793 the number of factories had increased to nine; and by 1803 altogether 25 factories had been established. 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 during the next few years was rapid, though there appear to have been many failures, probably owing to over-production. In a report submitted in 1810 the Collector of Tirhut 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. 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, 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. By 1874 there were altogether 126 factories and outworks engaged in the production of indigo, and the area under cultivation was nearly 100,000 acres. At this time, Darbhanga contained the largest concern in India, Pandaul, which with its outworks comprised an area of 300 square miles; it was subsequently split up, the northern outworks being purchased by the Maharaja of Darbhanga, who abandoned the cultivation of indigo in them a few years ago. Difficulties were now threatened by the feeling of tension between the ryots and the factories produced by certain abuses which had crept into the system of cultivation. A report submitted to Government by the Commissioner of Patna in 1877 showed that the system 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 an object 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 general embitterment of 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, any 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 its members. Owing to the efforts of the Association, there has been no recurrence of the old complaints, and very cordial relations have existed up to the present between the planters and the cultivators.

Until the discovery of the Badische artificial dye the area under cultivation appears to have been steadily on the increase, and by the end of the 19th century indigo had spread into every thana of the district, though it was always more prevalent in the north, where the soil has never been altogether suitable for the crop. The industry is now suffering from the competition of the artificial dye in Europe, and from the high prices of foodgrains and the consequent demand for land in Bihar. The price of the natural dye has consequently fallen, and many factories have had to abandon or contract very greatly the growth of indigo. At the time of the last settlement 52,136 acres or 3 per cent of the cultivated area were under indigo, while there were 28 head factories, with 36 outworks in the district. In 1904 their number had fallen to 24 with 27 outworks, and the area under cultivation had also diminished considerably; it was estimated at 34,000 acres in 1903-04, while the final forecast of the indigo crops in Bengal returned the area sown in 1906 as 28,400 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 other country crops. Most of the area now under indigo is in the Samastipur subdivision; the plant is grown to a smaller extent in the headquarters subdivision; and the industry is no longer of any practical importance in Madhubani, as all the factories in the north and east have ceased to grow the crop.

The gradual decline of the industry in recent years will be sufficiently apparent from the following statistics showing the outturn, value and price of the indigo manufactured :—

Year.	Outturn in maunds.	Value in Rs.	Price per maund in Rs.
1895—1900 (average)	11,599	21,34,895	184
1900-01	9,540	12,87,900	135
1904-05	1,673	2,50,950	150

Cultivation.—The land on which indigo is to be grown is prepared for sowing as soon as the *khari* crops have been 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 re-ploughed until the clods are all pulverised, and after being manured, it 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 coulters about 5 or 6 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 obtainable in September, but usually yields less than the first crop, the outturn of which is ordinarily 80 to 120 maunds of green plant per acre. The yield of 100 maunds of good ordinary plant should be about 10 seers of indigo.

Soil and manures.—Indigo may follow indigo, but is more generally rotated with such crops as sugarcane, tobacco, poppy, cereals and oil-seeds, as it is an exhausting crop, which cannot well be grown on the same land for more than three successive seasons; on the other hand, being a deep-root crop it forms an excellent rotation crop for those which have surface roots, as is the case with many foodgrains. It is usually grown on high lands beyond the reach of floods, the soils are 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. 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. Farm manure, chemical manures, such as saltpetre and lime, bone-dust and oil-cake are also used.

Seed.—The seed used in Tirhut comes for the most part from the United Provinces, as there is a general belief among the planters 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 however caused deterioration in the varieties commonly 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 not *Indigofera tinctoria*, as was formerly supposed, but *Indigofera sumatrana*, which was introduced about 150 years ago.

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, and will produce excellent cuttings for two years in succession and mediocre plants for a third year, whereas other varieties have to be re-sown annually. 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 in an extensive 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.—After they have been cut the leaves are taken to the factory and are there steeped in large vats until fermentation is complete. The old system of treating the plant required two sets of vats, one on a lower level than the other, those on the highest level being used for steeping the
 Steeping. 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), and causes 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 10 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 shown by experiment 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 and contains 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 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, the colour of which consequently changes, and the beating is continued until a little of the liquid placed in a saucer readily throws a dark blue precipitate, itself remaining of a clear amber colour. If there is any delay in oxidation, there is a considerable loss of colouring matter, and the indigo produced is inferior. Oxida-

tion 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, which is used in a few Bihar factories, 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 form, 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 (*mal*) which remains in the vat is boiled, strained and made up into cakes for the market. The first process in these final stages of manufacture is to boil the precipitate which settles after oxidation; the indigo produced from it is improved, if sulphuric acid is added. The dye matter is next 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 contain 60 per cent or more of indigotin, should be bright and of a dark blue colour, with a coppery gloss, and should break with an evenly coloured fracture.

Landed Interests.—The chief feature of the industry in this district as compared with the other indigo growing tracts in North Bihar is the large area cultivated direct by the factories themselves; it was, in fact, ascertained in the course of the last settlement operations that the factories in the Samastipur subdivision had in their direct cultivation no less than 94 per cent of the total area under indigo. The area held by them as landlords is far smaller than elsewhere in North Bihar, amounting to only 6 per cent of the total area of the district. The fact that the Darbhanga factories grow the greater part of the crop themselves, instead of merely purchasing it from others, has been of great advantage to them in the present depressed state of the industry, when the falling price of the natural dye has made the ryots unwilling to grow a crop which does not pay them so well as ordinary crops.

The total area held by them as proprietors or permanent tenure-holders is even smaller, being under one per cent of the total area; and the greater part of their interests as landlords are derived from temporary tenures. The reason for this is that a factory has seldom an opportunity of buying an estate with lands situated conveniently for its purpose. The sale of estates is regarded as a social disgrace only to be resorted to in the last extremity, and

consequently proprietors will not part with their rights unless absolutely forced to do so; 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 loans or are simple farming leases (*thika*). The latter 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.

The *thika* leases are the commonest of all; and it is to the *thika* system and to his influence as a considerate landlord that the planter owes the strength of his 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 *zarpehgi* or *sadua-patua*. In the former case the interest on the loan is paid yearly by deducting it from the rent payable to the mortgagor, 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, and the tenure thus returns to the latter free of encumbrance at the end of the term agreed upon. The *zarpehgi* leases are most in favour with the factories, as the proprietor is frequently unable to repay the principal on the expiry of the lease, and the factory consequently acquires a quasi-permanent interest in the land.

Under-tenures.—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 jurisdiction, 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.

The tinkathia system.—A factory, taking a lease of an estate, acquires direct possession over all the lands which were formerly cultivated by the proprietor, and also over any lands which may become vacant during the period of the lease, by abandonment or surrender on the part of their original occupants. In addition to this, it was formerly the universal custom for the ryots to surrender to the factory for indigo cultivation a certain proportion of the lands of their holdings, usually three *kathas* in the *bigha*, the ryots receiving an abatement of rent for the area so given up, and a

promise that it would be returned to them on the cessation of the factories connection with the village. This system of acquiring lands was always intensely unpopular with the ryots, and is not now generally practised by the best factories. As indigo cultivation usually entails the breaking down of field boundaries and the amalgamation of many small plots into one large one, it was generally practically impossible for any factory, even with the best will in the world, to trace out and restore to the ryot his original plot, on the expiry of a long-term lease; and consequently the system was a fruitful source of dispute and discontent. It is satisfactory, therefore, that it is being abandoned, and that most of the land, which is found in the possession of a factory in its capacity as a temporary tenure-holder, is that which it has acquired unobjectionably as the representative of the superior proprietor.

Ryoti interests.—The very considerable area held by the factories on ryoti interests is mainly acquired by the purchase of ryoti rights, either privately or through the Civil Court. The law facilitates the acquisition of occupancy rights by tenure-holders in an area like Samastipur, where petty proprietors predominate and great subdivision of proprietary rights prevails. A person who does not hold the whole of the proprietary interests of an estate or *patti* in farm, is not debarred from acquiring occupancy rights in the lands of the estate during the term of his lease; and consequently a factory, holding only a share of an estate in lease, as is very common, is frequently able, on the expiry of the lease, to retain in its own possession lands in which it has managed to acquire an occupancy right during the continuance of the lease, by means of direct cultivation and payment of rent to the non-leasing proprietors. This method of acquiring occupancy rights is of considerable importance in Darbhanga, for the factories in Samastipur have occupancy rights in nearly a quarter of the land in their own cultivation.

Kurtauli leases.—The land held by the factories as under-ryots is mainly acquired by what are known as *Kurtauli* leases, which 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. The only risk run by the factory is that the ryot may go off with the advance, without paying the rent to the superior landlord, who may then sell up the holding and refuse to recognize the factory in any way. But in practice this is not a serious danger, for *kurtauli* leases are generally executed for part holdings only, and the ryot remains in the village to cultivate the portion which he has not sublet to the factory. An analogous form of mortgage sub-lease 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. But, here again, want of security other than the land, which is worthless if the ryot should abscond, prevents the system from being very common.

Systems of cultivation.—The three main systems of indigo cultivation commonly practised are *ziraat* or direct cultivation by means of hired servants, *asamiwar* or cultivation through factory tenants, and *khushki* or cultivation through outside ryots.

Ziraat.—The term *ziraat* includes all lands in the direct occupation of the factory, whether held by it as proprietor, tenure-holder, ryot or under-ryot. In Darbhanga by far the greater part of the area under indigo is cultivated direct and it is estimated that the amount of indigo not grown direct by the factories cannot exceed 10 per cent of the total.

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 usually 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 Darbhanga is very small as indigo, if it is to pay, 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 cannot therefore 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:—

“The ordinary cultivator in Darbhanga is little affected by indigo cultivation, except in so far as he may have an indigo factory for his landlord; and as this usually implies protection from enhancement of rent, it is a pure gain to him, provided the factory does not force him to grow indigo against his will, or to

give up his lands for the cultivation of indigo. The small area in which indigo is grown, otherwise than by the factories direct, renders the first danger inconsiderable, and the second has been minimized since the practical abandonment of the *tinkathia* system. Hence it may be said that the cultivators of the district derive nothing but advantage from having indigo factories as their landlords; and how great the advantage of stability of rents is, can only be appreciated by those who have seen and realized the constant and vexatious enhancements which, prior to our operations, were always going on in the estates of ordinary native landlords.

"The indigo industry may, without any qualification whatever, be pronounced a boon to the proprietors and labourers of the district. The manner in which embarrassed proprietors turn to indigo factories for loans has already been described. Even for proprietors who are not financially embarrassed, it is no small benefit to be able to rid themselves of the trouble of management, by handing over their property to a tenure-holder, who will pay a full rent punctually and manage the estate efficiently. The benefit of the industry to the labourers is clear. It has been calculated that on the average 172 labourers are required for one day per annum per acre for the cultivation and manufacture of indigo. This means an expenditure on wages alone of at least Rs. 20 an acre, so that the annual total wages bill for the 50,000 acres under indigo* must exceed ten lakhs of rupees. The cultivation of none of the ordinary food crops gives employment to so large a labour force as this, and the benefit of the indigo industry to the labourers of this district is enhanced by the fact that a good deal of the work has to be done in the hot weather when little other employment is available.

"It may be said, therefore, that the indigo industry is an unquestionable benefit to all classes in the district, with a possible reservation as regards the ryots who grow the crop on the *satta* system, and whose profits are not so large as they would derive from the cultivation of other crops. They are, however, compensated in other ways, and, in any case, their number in Darbhanga is so small as to render them of little importance in estimating the effect of the industry on the district as a whole, and in this connection the valuable services rendered on many occasions by members of the planting community to the general administration should not be forgotten."

To this it may be added that 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

*The area under cultivation has since decreased to 28,400 acres.

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 them 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.”

Principal factories.—The following are the principal indigo factories in the district:—

Factory.	Outworks.	Factory.	Outworks.
<i>Headquarters Subdivision—</i>		<i>Samastipur Subdivision—</i>	
Anar .. ..	.. ..	Banhar	
Buchauli .. ..	.. ..	Chal Mehsi	
Baghauni .. ..	.. ..	Gangauli	Alampur.
Benipur	Harsinghpur.		{ Balampur.
Daulatpur	{ Meghaul.	Harsinghpur	{ Bhawara.
	{ Ramnagar.		{ Rahimabad.
Hathauri	Rasulpur.	Ilmasnagar	Masena.
Hathi .. ..	.. ..	Jitwarpur	{ Daudpur.
			{ Hasauli.
Mangalgarh	{ Kursauli.		
	{ Motipur.		
<i>Madhubani Subdivision.</i>			
Jaynagar	Nararh.	Keota	{ Chatra.
			{ Gobindpur.
Pandaul	{ Lahra.		{ Kamla.
	{ Lohat.		{ Pambahanda.
Rayam .. ..	.. ..	Khan Mirzapur	{ Sahpur.
			{ Tappa.

Factory.	Outworks.
<i>Samastipur Subdivision</i>	
Maniapur	{ Budaya.
	{ Kalyanpur.
Muktapur	{ Kalyanpur.
Rewari	{ ..
	{ Undi.
Shapur	{ Barauli.*
	{ Sakri.*
	{ Subnaha.*

*Outworks of the Dhuli factory in the Muzaffarpur district.