



Breaking up the land for cultivation.

INDIGO PLANTING IN INDIA.

By M. N. MACDONALD.

INDIGO, the most beautiful and expensive of all dyes in common use, has ever been closely related to India, as its name implies.

From India the ancient Greeks and Romans drew supplies of the blue dye, and although it was lost to Europe during the greater part of the Middle Ages, enormous quantities have been imported for commercial purposes during the last hundred years. To-day, nearly all the blue uniforms of our Navy and Army, and policemen and postmen, are dyed with the purest natural indigo, which resists bad weather and sea-water better than any other dye. For similar purposes, the United States demand as large a quantity as we do, while France, Germany, Italy, and Russia are also extensive buyers of the Indian blue.

Indigo is cultivated all over India, giving employment to millions of natives and thousands of Englishmen. In three districts alone, in Behar, where some of the finest indigo is grown, European capital is invested to the extent of no less than £5,000,000. Some 370,000 acres are under cultivation. There are seven hundred English gentlemen managing and working on the "concerns"—as the factories and plantations are always called—and 1,500,000 natives.

As a rule, the concerns are under English management. The manager, after the proprietor, holds the most important post. There is no other profession in India which calls for so much judgment and sagacity. Every detail of cultivation and manufacture is worked out in the manager's "katchary," or office. He is in charge of the extraordinarily complicated account books, and of the expenses of the establishment, English and native, a large correspondence, and often an unending array of lawsuits. The manager is responsible for his assistants—young men from England who, until they come under his care, have generally the vaguest notion of what it means to be "in indigo."

The assistant's life is by no means a bad one, although society is scarce in the outlying concerns. He will have his little bungalow, and his native servants, and his bamboo cart and ponies. Occasionally he will drop into "tiffin" with a neighbouring assistant. In the Behar district the planters have formed a Volunteer corps—the Behar Light Horse—now close upon 400 strong, well mounted, and fine riders all. Fifty of them are now serving in South Africa. This corps, by the way, saves the Government the expense of keeping a cavalry

regiment in the district, as formerly. The planters, having an intimate knowledge of the natives and the country, also help the Government in time of famine by lending their carts for the distribution of grain. With polo and pig-sticking, and, during the cold weather from November to the end of January, racing, cricket, hunting, and hockey meets, there is no lack of good sport.

An indigo concern may occupy anywhere between 1000 and 10,000 acres, each cultivated acre producing, on an average, about 15lbs. to 20lbs. of indigo. As soon as the manufacturing of one year's crop is at an end, the cultivation of the land for the next crop is commenced. The fields are prepared with as much care as though they were intended for flower gardens. The first process is the "tumnee," or digging. This is done by rows of men in line. Each man is armed with a "kodal," or native spade, and all are carefully watched by native superintendents and probably, also, by the English assistant.

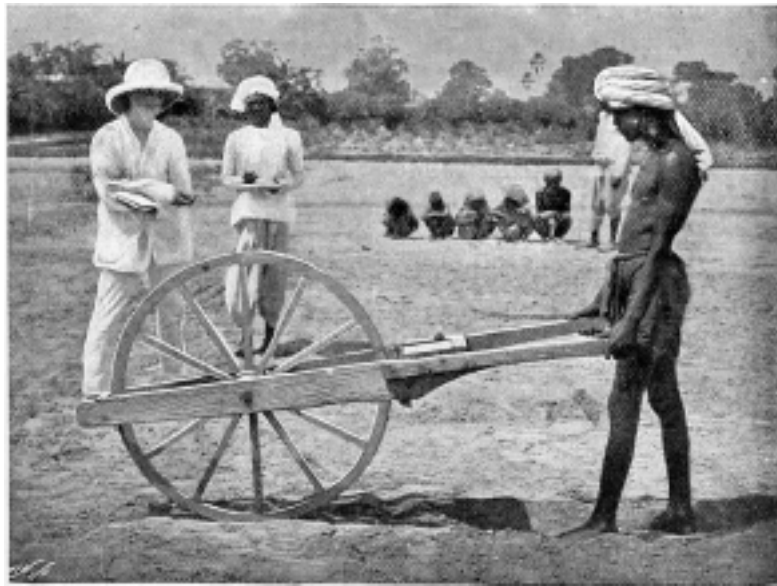
Now a spade, as the word is generally understood, is unknown to Indian natives—give a man a spade and you give him a problem. He has no use for it—in the first place it requires to be pressed into the ground with the foot, and the Indian's bare feet, although tough, are hardly tough enough for this—in the second place he has not enough strength to use it with effect. Therefore he digs with a "kodal," a kind of hoe.

It is of the utmost importance that the digging shall be done deep and well—on this depends the health of the future indigo plant. But the native has a natural aversion to driving

his kodal to its full depth in the ground, and the "bandmashee" coolies—rascals, that is—will so scamp their work, that although on the surface the ground appears to be thoroughly dug, in reality only the top soil has been turned. The assistant requires all his wits about him to get the work done thoroughly.

After digging, the ground is ploughed, perhaps three or four times, and the clods are rolled down. Then gangs of fifty or a hundred women, boys, and girls, squat on the ground in long rows, and with short sticks, amid unceasing din, break up every clod that remains, until there is not one the size of a walnut.

The lands lie fallow until February or March, when sowing begins. The indigo seed is sown from drills, drawn by bullocks. The drills are primitive instruments made of shisham, the oak of India, from which the



Measuring the fields.

seeds are sown in much the same way as are turnips in this country. A primitive harrow, resembling a bamboo ladder, is drawn by bullocks in the wake of the drills, and smooths the earth over the seeds, this completing the cultivating work. The first leaves of the plant will actually make their appearance after two or three days.



Loading a vat with the indigo plant.

Before the crop is sown, the land is measured in a curious way, with the assistance of a wheel, twenty revolutions of which go to the length of a "biga"—about three-quarters of an acre. At every revolution of the wheel, a little piece of iron on its edge strikes a bell, and the revolutions are carefully counted. If the assistant now judges the plant and the crop to be of poor quality, owing perhaps to bad digging in the first place, the ground must be broken up again, and the crop re-sown.

The plant grows to a height of between three and five feet. It is in the leaves that the colour-yielding matter chiefly resides, they being at their fullest at the time when the flower buds are about to bloom; but the leaf, of a yellowish-green colour, gives no indication of containing anything which will yield a blue colouring matter.

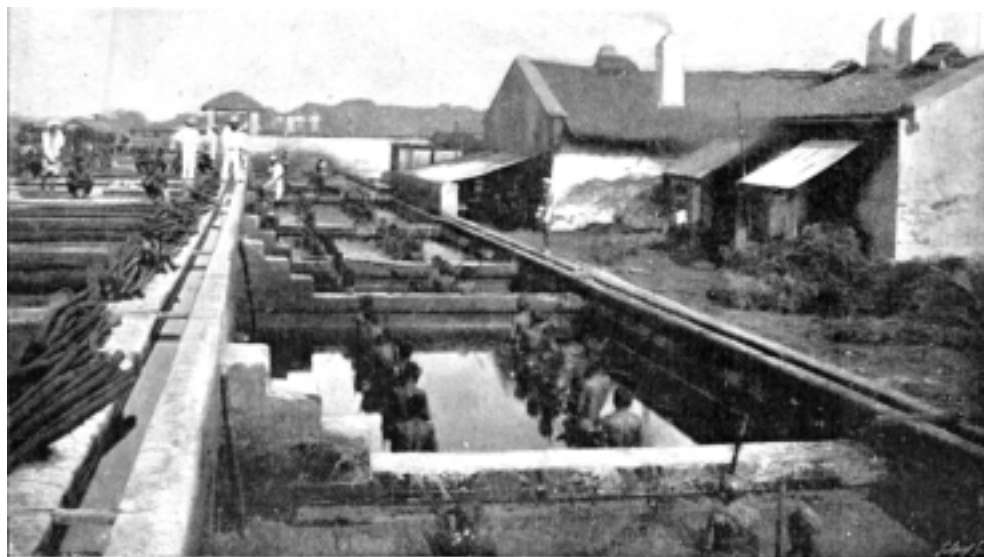
The crop is very precarious, for when young a slight shower will often be sufficient to ruin it completely, while too little rain is equally destructive. The plant may appear to be flourishing beautifully, to be all that could be desired; then suddenly the tap-root enters a dry layer of soil, and the plant withers and dies. In bad seasons it is no uncommon matter for the planter to be forced to re-sow his fields three or four times. Caterpillars and locusts will also create great havoc, while continuous hoeing is required to

save the plants from being overpowered with weeds.

In May and June, when all the country is parched and scorched, the indigo fields are a mass of waving green, very pleasant and restful to the eye. Towards the end of June, or as soon as the monsoon has set in, the crop is cut, and the work of manufacturing commences. The first manufacturing, called "morhum mahai," lasts generally to the middle of August. By this time the stems which have been cut have shot up again, and in September a second crop is taken from the same plants—sometimes three crops are taken in one season.

As indigo is grown nearly all over India, it is only natural that there should be various methods of cultivation, adapted to various circumstances. The system of sowing the seed in Lower Bengal, for instance, where the land is annually flooded by the Ganges, is quite different to the system just described, common in the Behar district. The sowing is begun when the waters of the Ganges begin to return to their bed. Then men go out along the banks of the river, and wherever there is a likely alluvial deposit of thick, soft mud, they scatter the seed broadcast. Frequently they wade in mud up to their waists.

"Cheetanee" sowings, as they are called,



Beating the vats in an indigo factory.

are simple and cheap ; but afterwards an unending battle must be waged to keep down the rank weeds which grow up and choke the seeds. Whilst sowing or weeding operations are carried on, the assistant patrols the river in a little flat-bottomed houseboat.

In most concerns the simple, primitive processes of manufacture are still adhered to, for planters and old hands are strong believers in the original true blue, and will have nothing to do with new fangled ideas and chemical admixtures. As a rule, an indigo concern has several scattered factories, each dealing with the plant that grows within five miles of it. In an average factory hundreds of loads of plants will be treated in a day, and as may be imagined it is a busy and picturesque scene in the mornings as the long lines of bullock carts slowly wend their way in from the fields.

Every day the vats in which the plants are steeped—the first process of manufacture—are cleaned out by coolies. The plant is stacked upright, to allow air to escape, and is kept in position by long pieces of bamboo. Then water is run into the vat, which, however, is not quite filled, since the plant expands, exerting an enormous pressure that might easily crack the vat's sides.

The plants take a long while to soak. The

leaves are not easily wetted. They are covered with an immense number of water-repelling hairs. After two or three hours, however, action takes place, the liquor rises, and a thick froth covers the surface.

When the plants have been steeped for about ten hours, the colour-yielding matter will have been extracted. Precisely in what state of chemical combination the colour principle exists in the leaf is not known, in spite of innumerable investigations, nor is there any precise theory as to the changes which take place during its conversion into indigo blue. The vat overseer, however, does not trouble himself about this—he knows that when the liquid subsides the plant has been steeped long enough. At this stage of the process, if a light be applied to the surface of the vat, a blue flame, several yards in length, will often result, owing to the gases given off.

The liquid is now run off into lower or "beating" vats, and the extracted plant, or "seet," is taken out, to be subsequently employed to fertilise new crops. The running liquid varies in colour from bright orange to olive green. It is necessary that it shall now be kept in a state of violent agitation. In concerns where primitive methods are still in use, natives, armed with long bamboos, enter

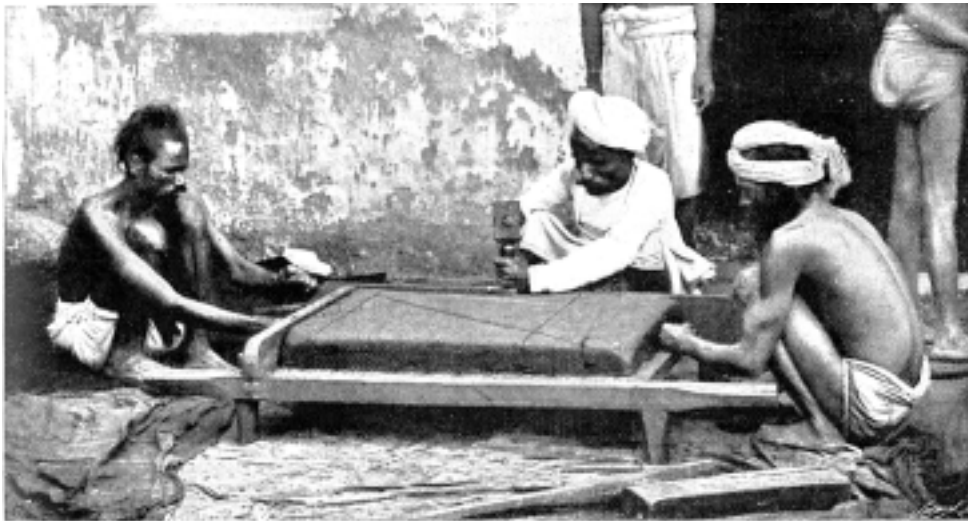
the vats and beat the water incessantly to expose new surfaces to the air.

For two or three hours the natives savagely lash the water with their poles. Then the overseer gives the signal to cease beating. A strange evolution is now performed. With a view to giving the liquid a rotary motion, the natives run round the vat several times, jump quickly out, and leave the indigo to settle. It is a curious and a comical sight to those who see it for the first time.

In up-to-date factories, a simple machine—a wheel revolving like a steamer's paddle—does the work more effectively than hand-beating, and saves the natives an unpleasant

After beating, the fecula is allowed to settle for two or three hours, and then the water is run off. The grain is collected, passed through various strainers, whence it flows to a well, and is elevated by a steam injector to an iron tank. It is now boiled, to prevent any further fermentation, and then the hot concentrated stuff is run through strainers on to a filter table.

The resulting pulpy paste, not unlike coloured whipped cream, is pressed and cut into small cakes, each stamped with the mark of the factory, the date, and the number of the day's boiling. The cakes are put away to dry on bamboo shelves, being



Cutting indigo into cakes.

indigo bath; although one or two coolies must enter the liquid, and with a cloth stretched across the vat, bring the froth, which forms on the surface to a depth of perhaps 3ft., under the beating wheel, where it will be broken up.

The froth is at first blue, then white, and soon disappears. The liquid, after passing through various colour changes, turns from green to dark, rich indigo blue. The overseer, to test whether the beating process is sufficient, takes a little liquid and pours it on to a plate—if the grain, or "fecula," readily settles, leaving a clear fluid, the beaters jump from the vat, or the wheel is stopped.

carefully dusted and turned every few days until ready for packing.

A buyer of indigo judges the quality by the shade of colour. The best indigo is of the familiar rich, purple-blue shade, with a coppery lustre. There are many different kinds of indigo, and many different qualities of each kind—of Bengal indigo, for instance, the expert can distinguish upwards of forty qualities.

The manufacturer, having made his indigo, sends samples to the brokers at Calcutta, who pronounce judgment. Calcutta is the central market for all India, and sales are held here from December to February, agents coming to buy from New York, London, and the

European capitals. In London, curiously enough, the offices of the chief indigo merchants are all situated together in one quarter of the City. A glance at an indigo office will reveal the extraordinary qualities of the dye, for floors, walls, ceilings, desks and papers, and even the merchant's clerks themselves, are all stained with the strong, irrepressible, and tenacious blue.

Prices of indigo vary greatly. At the present time they are about the lowest on record, the finest indigo, which a few years ago would have fetched about 6s. per pound, now being worth only 3s. or 3s. 6d. This fall in prices is due chiefly to over-production, and to a less extent to the manufacture of purely artificial dyes. However, there is no falling off in the demand for India's indigo. In the year 1877, 100,000cwt. of indigo were exported; last year nearly 200,000cwt. In 1877, 61,000cwt. were sent to the United Kingdom and 6000cwt. to the United States; twenty years later 62,000cwt. were sent to the United Kingdom and 22,000cwt. to the States.

Fortunately for the indigo planters, there are at present difficulties in the way of manufacturing a purely artificial, chemical indigo for commercial purposes.

Besides, the artificial indigos being more expensive than the natural, they are not half so good; they will not stand the rough wear and tear that natural indigo does. Although all, or nearly all, the artificial indigo dyes are made in Germany, the German Government have issued orders that for their Army and Navy uniforms only natural indigo must be used in future. This in itself shows that the planter need not fear—at all events, for the present—that natural indigo will be ousted by the artificial dyes.

From a scientific point of view the production of an artificial indigo would be a grand achievement; but—to quote the words of a learned expert on the subject—to replace a manufacture that depends on an interesting organic process, that is carried on under healthy conditions, mostly in the open air, that brings wealth into poor districts, and introduces system, order, and civilisation among uncultured people, by one possibly carried on in some dingy, sepulchral cave in a chemical works, might, from a higher point of view, be a doubtful advantage.

It would, in fact, be the ruin of the indigo planters of India, and, on this account, a national calamity.

