

CHAPTER VI.

AGRICULTURAL INFORMATION.

119. A comprehensive account of the Agriculture of Cuttack has been written by Mr. Banerjei of the Agricultural Department* and notes on the principal crops have been written by Mr. Arnott, of the Public Works Department, and by Messrs. Nathan and Walsh, when Assistant Settlement Officers in Puri.

There is therefore little new information to be given, and this chapter can be but little more than extracts from the existing reports, to which I would refer those requiring further details.

120. The first point to be considered is the nature of the soil. The cultivators of Orissa recognise a large number of different classes of soil, each having a name of its own which may vary in different localities. In an ordinary village the lands fall primarily under three main divisions, according to their situation, viz.—

Jala or wet lands, embracing all the rice lands of the village.

Kala, literally 'black', meaning the high lands about the homestead which, enriched by manure and household refuse, are used to grow vegetables, cotton, jute, and other valuable crops.

Pal, or riverside lands which receive a deposit of silt (*pattu*) and are suitable for growing tobacco, cotton, mustard, and other *rabi* crops.

Again, according to their elevation, the arable lands are known as *khal*, or low lying, and *dhipa*, or high lands. Very low lands in hollows almost always full of water, so that they can only grow crops in the dry season or very coarse varieties of paddy, are called *gahira*, while in hilly country the lands at the valley bottom are known as *garara*. High lands that suffer from want of silt and water are commonly contemptuously referred to as *thenga*, *thangi*, or *dangar*.

Again, according to their composition, soils † are classed as follows :—

- (1) *Matal* is the name given to all kinds of stiff clayey soils. Rice and sugarcane are the principal crops grown on them, but besides these wheat, *bir hi*, and *kulthi*, are also cultivated.
- (2) *Chikita*, is a strong sticky clay, which is almost too stiff to be used for successful cultivation, and grows for the most part coarse varieties of the *sarad* or winter rice. The outturn on such lands is said to be generally very poor.
- (3) *Chauria* is also a hard clay, which is very liable to cake on being exposed to the sun when ploughed. It generally cracks into hard blocks on getting dry, and is altogether an inferior soil.
- (4) *Dorosha* is a mixture of sand and clay in nearly equal parts. It is used for *biali* or autumn rice and for all *rabi* crops. It is easily worked and is retentive of moisture.
- (5) *Telbalia* is the name given to a loam which contains a larger admixture of sand than the *dorosha* lands. It is looser in texture, and being poorer requires more manuring than a *dorosha* soil.
- (6) *Baliamatal* is a loam with a large admixture of earth; in other words, a rich sandy loam.
- (7) *Rangamati* is a red ferruginous sandy loam occurring near laterite rocks. Like *telbalia* it requires a great deal of manuring before it can produce a good crop.
- (8) *Thengajami* is an elevated sandy laom, with very little moisture, which as a rule is allowed to lie waste, though sometimes ploughed up for growing

* Report on the agriculture on the district of Cuttack, 1893.

† Taken from Mr. Banerjei's report.

biali, paddy, *mandia*, and *kulthi*. The crops on such lands are necessarily very poor.

- (9) *Balia* is the name given to very loose sandy soils which grow poor specimens of *rabi* crops.
- (10) *Pattu* is an alluvial soil, formed from silt deposited by floods. It is used for tobacco, mustard, jute, coriander and cotton, and is taken advantage of to grow all kinds of miscellaneous crops.
- (11) *Pankua* is a black mud unmixed with sand, such as is found at the bottom of ponds and tanks.
- (12) *Rektimatal* is a stiff rich soil.
- (13) *Pansia* is a loose though comparatively fertile soil.
- (14) *Gangutia*, as the name would signify, is applied to a clay containing an admixture of *ganguti* or lime, to be met with near those river beds which abound with nodulous limestone. An admixture of clay and limestone dust is in some places known as *khali* soil.
- (15) *Nunajami* is land which is more or less of a saline nature. It is generally of very little use. A few varieties of *laghu sarad* rice are grown on it, when it does not contain an excess of salt.

According to their fertility, soils are divided into four classes : first (*aul*), second (*dayam*), third (*sayam*), and fourth (*chaharam*); but to hear the ordinary *raiyat* talk, one would not believe that there was any first class land in the Province, and might be inclined to put down all fields under one of three heads 'Water holes' (*pani-gahira*), 'uplands where the foxes have their earths' (*kenkshiali pasiya*), 'river sand,' the ordinary terms used by the cultivator in describing the fields of his holding.

121. Rice lands are generally manured with cowdung-ashes and house-hold refuse, more rarely with rotten cakes of unburnt cowdung. The cowdung is carefully gathered by the women and children, but, except in a few favoured localities, has to be used for fuel, and can only find its way to the soil in the form of ashes. It is spread on at the time of the first ploughing at the rate of about half a ton (dung and refuse) to the acre, except on flooded lands which are enriched by silt. Sugarcane, *pan*, and vegetables are more heavily manured, and oil-cake (*piria*) is often used in their cultivation.

Ordinary manure (*khata*) costs about two to four annas per cart load of 10 maunds, but it is rarely sold, except near the towns, each cultivator using the produce of his own home.

122. Water is wanted chiefly at three times of the year; in May-June for ploughing; in July and August for *bhiushan* or ploughing up of the young rice plants, and in October for the final ripening of the crop. In areas irrigated by canals, water is taken from April to December, but in most parts of the district irrigation from streams and tanks is only resorted to for paddy in October-November, and is generally confined to the more valuable crops such as sugarcane, tobacco, and cotton.

Irrigation from wells I have not come across, and the tanks which at one time abounded in certain Parganas have to a great extent silted up; but water is taken from the *nallas* or *jores* in the low-lying tracts near the coast by means of the *tenda* or bamboo water-lift. Where the water had only to be raised a few feet it may be scooped up in a *senz*, a sort of basket made of split bamboo which two men use. Holding by the ropes attached to either side, they swing it backwards and bringing it down sharply into the water, carry the forward motion of the swing through until the *sen*, now full of water, is raised to the level of the water channel, when the contents are poured out.

Another way of lifting water a short distance is with a *janta* (the *karin* of Bihar) made of a single piece of wood about six feet long, hollowed out and shaped like one-half of a canoe; the broad open end resting on the head of the water channel while the pointed closed end dips into the water. When this is raised the water pours naturally into the channel. It may be worked by one man either directly or with the help of a bamboo crane and counter-poise as in the *tenda*, but cannot lift

more than a couple of feet. It is not uncommon for two of these methods to be combined, the water being lifted by the *tenda* into a reservoir, and from that into the water-channel by a *sena* or *janta*.

I have seen tobacco being watered from earthen pots (*mathia*) carried a considerable distance by coolies, but this can only be done for very valuable crops, and where I saw it tried, it would have been such a simpler to have made a channel from the river. Mr. Banerjei estimates the cost per acre of irrigating a field once with hired labour at from Re. 1 with the *janta* to Rs. 3 with earthen pots.

Along the foot of the hills fields are often irrigated from the small streams, and, the lift being small, the expense is less.

123. A full description of the principal agricultural implements is to be found in Mr. N. N. Banerjei's report and in Mr. Arnott's notes.

The plough.

The plough (*nangal*) is made and kept in repair by the village carpenter for a yearly payment of a couple of *gaunis* of paddy, worth say two annas. The wood is sometimes supplied by the zamindar but more often has to be bought, and costs about eight annas. The share is made by the village blacksmith for another couple of *gauni* of paddy. The plough is light enough to be carried on the shoulder of a man, and with it a pair of bullocks can plough a third of an acre in a day. It is said to be a very indifferent instrument for turning over the soil, but its lightness and cheapness recommend it to the Uriya cultivator.

The *mahi*, or harrow, consists of two straight pieces of *sal* wood or bamboo joined together by rungs like a ladder. To this the cultivator harnesses his bullocks and standing on the middle of it is dragged across the ploughed field breaking up the clods under it, and giving the land a level surface. It is used both in preparing the soil to receive seeds or seedlings, and afterwards to give young plants a firm foothold.

The Harrow.

The *bida*, or rake, consists of a *sal* wood beam about 5 or 6 feet in length with twelve to sixteen iron tires or prongs about 14 inches in length. To this bullocks are harnessed by means of a pole and they drag it across the fields to loosen the soil and uproot the weeds. Generally it has to be dragged twice across, first in one direction and the second time at right angles to the first in order to completely get rid of the weeds. It is only used on fairly dry land.

The Rake.

For digging, a *kodali* or *kuri* is used, as in other parts of India. They are of varying sizes and weights according to the purpose for which they are intended.

The Mattock.

For reaping, a small toothed sickle or *dao* is generally used. Another form of *dao* with a straight and heavier blade is used for cutting jungle wood and fodder.

The Sickle.

Grass for cattle or horses is scraped off the slopes of river banks or waste lands with a sort of small trowel called a *khurpi*.

The grass Scraper.

Grain is generally husked with a *dhenki*, which consists of a beam of wood about 3 or 4 feet long hung at about a quarter of its length on a pivot between two uprights. At the head of the long end is a thick wooden peg that comes down like a hammer into a stone mortar. To work the machine the mortar is half filled with paddy: the woman (it is generally a woman) then places her foot on the short end of the beam and throwing her weight on it depresses it. The foot being removed, the peg at the other end falls like a hammer on the grain, and so *dacapo*. Less commonly a pestle and mortar is used for husking.

The Grain Husker.

Flour is little used by the Uriya, but for crushing pulses a *janta* or *chaki*, consisting of two circular millstones working one on top of the other in used, as in other parts of India.

Flour Mill,

The Uriya cart is peculiar. It consists essentially of two poles of *sal* wood or bamboo about 12 feet long tied together at one end about 3 feet apart at the other, and joined by cross bars at intervals. This framework rests on a pair of wheels about

Carts,

4 feet high and 4 feet apart, and there is as much behind as in front of the axlebar. The bullocks are yoked one on each side of the narrow end and will drag half a ton 15 or 20 miles a day on a metalled road.

From the Garhjats come heavy buffalo carts, shorter and broader, with low wheels of solid wood, and with the advent of the railway the light little Madras hackeries drawn by a single bullock have become common in Cuttack town.

For carrying grain a long coffin-shaped basket of spilt bamboo called an "odaro" is fitted on to the cart and will take some 10 maunds or more.

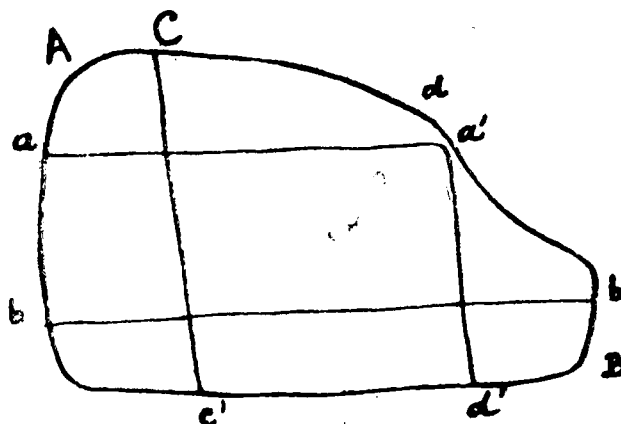
124. I propose to say as little as possible on this subject for fear that zamindars may again revert to the very inaccurate methods formerly in use. At the last Settlement the internal village measurements were made by Uriya amins with measuring rods of local length; these measurements were converted to standard measurement, and in the case of many estates were again reconverted to local measurements. It may be added that the external circuit of the villages as well as the area were surveyed and computed by professional surveyors. As a rule, the Uriya amins measured cultivated lands with fair correctness, but the most confusing mistakes were made in the measurement of large areas of waste lands. In order to fit the areas of waste lands as well as of the cultivated lands within the area ascertained by the professional circuits, the records of the last Settlement contain many ingenious devices, while in not a few cases the attempt was abandoned as hopeless. I may add that sometimes the length of the rod is not stated, so that such local measure as will fit the area of the professional circuit should presumably be used. We have also frequently found that the rod has changed in length since the last Settlement.

In the old Settlement records, the proceedings regarding area refer to the professional survey as "the surveyor's *sahib's* account," and the other is referred to as "the account of the Uriya *jarib*".

The Uriya measures with a *padika* or rod, and I have more than once inspected a village containing portions of two estates, each using rods of different lengths. These rods are supposed to be kept in the custody of the village *chaukidar*, and in theory should not be used by the *gomastha* or *sarbarakar* except in the presence of the *chaukidar*. In fact the latter is the "official measurer". We find, however, in villages where the *sarbarakar* and raiyats do not get on well, that the latter keep a rod of their own, generally several inches longer than that of the *sarbarakar*.

The following note by Mr. R. Nathan on the Uriya system of measurement and area calculation used at the time of the last Settlement is inserted by way of illustration.

Take any field A B



Calculate roughly average length and average breadth by measuring lines *aa'* and *bb'* (length) and *cc'* *dd'* (breadth) with the *padika*.

Let *aa'* = 12 *padikas*, *bb'* = 15 *padikas*, *cc'* = 13 *padikas* *dd'* = 8 *padikas*.

Then average length = $\frac{12+15}{2} = 13\frac{1}{2}$ *padikas* = 3 *kahans* 6 *pans*.

Average breadth = $\frac{13+8}{2} = 10\frac{1}{2}$ *padikas* = 2 *kahans* 10 *pans*.

N. B. 4 *Padikas* = 1 *kahan*; 1 *padika* = 4 *pans*.

To calculate the area multiply the average length by the average breadth omitting the term formed by the product of "*pan*" into "*pan*" and remembering that the area of a square of which the side is 1 *kahan* is 1 *gunt* and that the area of a parallelogram of which the length is 1 *kahan* and the breadth 1 *pan* is 1 $\frac{1}{4}$ *biswa*.

Thus, area, = (3 kahans + 6 pans) (2 kahans + 10 pans)
 = 6 gunts + 12 biswas + 30 biswas
 = 8 gunts 10 biswas.

The term formed by the product of 6 *pans* and 10 *pans* is omitted.

The error caused by the omission is 60 square *pans* or $\frac{60}{16}=4\frac{1}{4}$ *biswas*; i. e., about 3 per cent.

One result of the system is, therefore, that the area recorded in the old Settlement papers is, generally less than the true product of the recorded length and breadth of the plot, and therefore, other considerations apart, the recorded area is in general less than the actual area.

The maximum error that can occur is 15×15 *pans*, or rather less than one *gunt*.

To take an actual case—

MAUZA BHATBANDA—*Bhowria* No. 589.

As recorded—average length [calculated from three traverse lines]=3 kahans, 3 pans
average breadth=7 kahans, 8 pans.

recorded area=23 gunts, 13 biswa.

Area according to rule = (3 kahans + 3 pans) / (7 kahans × 8 pans)

$$= 21 \text{ gants} + 24 \text{ biswas} + 21 \text{ biswas}$$

$= 23$ gunts 13 biswas.

and the error = 24 square pangs = $1\frac{1}{2}$ biswas or 4 per cent.

The general explanation of the local land measure is as follows: Every *padika* is so many *dastis* in length, a *dasti* is supposed to be $4\frac{1}{2}$ inches or the width of a man's fist across the knuckles.

To account for inaccuracies of measurement, *e.g.*, the slipping forward or backward of the rod, and to give the raiyat every allowance for *hira* and *ahri* (the embankments within and the ridges on the border of his field) a *kani** is added to the number of *dastis* of which every *padika* is composed. A *kani* varies according to the number of *dastis* in the *padika*; in theory, at least, it is larger where the number of *dastis* is larger, but zamindars give *kanis* of different sizes, and some give no *kani* at all. It is for this reason that an 18 *dasti padika* in one local area may be of quite a different length from a *padika* of that name in another.

I need only give one instance of the *padika* to illustrate its use as a land measure. The so-called standard *padika* is 10 feet 5 inches and 1 *job* in length where a *job* is that fraction of an inch which will make a square *padika* equivalent to a *biswa* of size sufficient to be equal to $\frac{1}{16 \times 25}$ of a *man* or acre. The standard *man* therefore consists of 25 *gunts* and a *gunt* of 16 *biswas*, and a *biswa* is one square *padika* of 10 feet, 5 inches and 1 *job*. The standard *padika* is called the "24-dasti *padika*".

				Ft.	ins.	job.
24 dastis	Of $4\frac{1}{2}$ inches each	...	...	=9	0	0
Add a kani	...	...	...	=1	5	1
Total	...	...	...	=10	5	1

I do not attempt to describe the lengths of the different *padikas* because, as I have shown, the name is no certain indication of the length of any *padika*. It is only necessary to add that the *padika* varies so as to produce a *man* varying from .248 of an acre to 1.39 acres.

We have endeavoured to avoid any use of the local measure in the final records. This principle was very successfully followed in the Khurda Settlement of 1881, and at the present day raiyats now talk of their "*acres*" and their "*decimals*". At attestation, of course, every raiyat had his area explained to him in local measure as well as in acres and decimals, and was satisfied as to the area in his possession. It is hoped, therefore, that in a short time a uniform system of measurement may be in force throughout the Province.

* Not to be confused with the *kani*, meaning 5 gandas or one-fourth of a *biswa*.

125. The standard of weight for ordinary articles of merchandise is the **WEIGHTS AND MEASURES** seer which in Balasore is the standard *seer* of 80 *tolas* (a *tola* is the weight of one standard rupee=180 grains, Troy) equal to 2.0532 lbs. avoirdupois. In Cuttack and Puri the *seer* in common use is one of 105 *tolas* known as the "*Katki seer*" and weighing 2.7104 lbs. avoirdupois.

The parts and multiples of the *seer* are—

4 <i>chataks</i>	=	1 <i>pao</i> .
4 <i>paos</i>	=	1 <i>seer</i> .
40 <i>seers</i>	=	1 <i>maund</i> .

Salt is always sold by the Balasore *seer* of 80 *tolas*. Metals, vegetables, molasses, fish, and a few other articles are sold by the '*pal*' and *bisa*.

A '*bisa*' weighs 120 *tolas*, or one-and-a-half standard *seers*, and is divided into 20 to 30 '*pals*'. The explanation of the use of this measure is that the articles in question are commonly weighed on a steel yard (*bisa kati*), the interval between the point where it balances when the scale pan is empty and that where it balances with 120 rupees in the pan being divided into 20 or more divisions, each called a '*pal*'.

On the standard yard used for metals and molasses there are twenty such divisions and a *pal* is 6 *tolas*. For fish and vegetables the common division is into 25 *pals*, but 22, 28, and 30 *pals* are also found.

The divisions and multiples of the *bisa* are :—

4 <i>dhans</i>	=	1 <i>rati</i> .
4 <i>ratias</i>	=	1 <i>china</i> .
10 <i>chinas</i>	=	1 <i>marha</i> .
4 <i>marhas</i>	=	1 <i>karsi</i> .
4 <i>karsis</i>	=	1 <i>pal</i> .
20 <i>pals</i>	=	1 <i>bisa</i> .
80 <i>bisas</i>	=	1 <i>chhala</i> .

For the precious metals and jewels the standard is the *bhari* or *tola* of 180 grains, troy, which is divided as follows :—

1 <i>bhari</i>	=	10 <i>mashas</i> or 2 <i>marhas</i> .
1 <i>marha</i>	=	8 <i>ratias</i> or 2 <i>chinas</i> .
1 <i>rati</i>	=	4 <i>dhan</i> .

For the sale of rice, paddy, and other grain the standard of measurement is the *gauni*, also called in Balasore the *puri*.† This is a basket with a capacity varying locally from 1½ to 6 *seers* of rice and called accordingly "*tin sir gauni*," "*char sir gauni*" etc.

In a few markets the capacity is expressed in *seers* of *birhi*, so that the 3½ *seers gauni* of north-eastern Cuttack contains only 2½ *seers* of paddy; but rice is the common standard, and the ordinary 5 *seer gauni* holds about 3½ *seers* (Cuttack weight) of dry paddy. The measure for large sales of paddy, etc., is the *bharan* of from 80 to 200 *gaunis*, while petty retail vendors use a small measure called a *katha* or *kancha* which is generally a reputed *seer*, but in parts is one-tenth of a *gauni*.

The common multiples of the *gauni* are —

(1) 20 <i>gaunis</i>	=	1 <i>pauti</i> .
2 <i>pautis</i>	=	1 <i>chhela</i> .
4 <i>chellas</i>	=	1 <i>bharan</i> .

Found in Balasore where the *gauni* is 2 *seers* and the *bharan* 8 maunds.

(2) 10 <i>gaunis</i> (Puri).	=	1 <i>pautti</i>
4 <i>pautis</i> ...	=	1 <i>chhela</i> .
4 <i>chhelas</i> ...	=	1 <i>bharana</i> .

Found in Balasore with a *gauni* of 2½ *seers* and *bharan* of 10½ standard maunds.

(3) 10 <i>gaunis</i>	=	1 <i>pauti</i> .
4 <i>pautis</i>	=	1 <i>chhela</i> .
5 <i>chhelas</i>	=	1 <i>bharan</i> .

* In volume LXI part I the Journal of the Asiatic Societies page 43, there is a very interesting paper on "Troy weights and general Currency of Orissa" by Babu M. M. Chakraverti.

† Also called "*nauti*" in Puri, but elsewhere a *nauti* = 3 *nautis*.

Found in the Jajpur sub-division of Cuttack with a *gauni* of $2\frac{1}{2}$ standard *seers* and a *bharan* of $12\frac{1}{2}$ maunds.

(4)	10	<i>gaunis</i>	=	1	<i>pauti</i> .
	5	<i>pautis</i>	=	1	<i>chhela</i> .
	4	<i>chhelas</i>	=	1	<i>bharan</i> .

In northern and eastern Cuttack the *bharan* varies from 12 to 16 maunds.

(5)	20	<i>gaunis</i>	=	1	<i>chhela (or pauti)</i>
	4	<i>pautis</i>	=	1	<i>bharan</i> .

This is the genral measure in Cuttack, Khurda and Puri, and the *bharan* varies from 6 to 10 maunds, and is generally 8 Cuttack maunds or $10\frac{1}{2}$ Balasore maunds.

To sum up, a *bharan* is in Balasore 160 *gaunis* and varies from 8 to 16 standard maunds; in Cuttack and Puri it is generally 80 *gaunis*, in a few places 100 *gaunis*, and in north Cuttack 200 *gaunis* and varies within much the same limits.

The ordinary measure of distance is the *kos* = 2,000 *dhanu* or 4,000 yards, though the villager commonly uses such indefinite terms as a "stones throw" or "shouting distance."

Distances.

126. Appendix F shows, District by District and Thana by Thana, the areas under the principle crops grown in the Province. Rice occupies (including Khurda sub-division) about 21,82,000 acres, or nearly 88 per cent. of the cropped area. The next crop in importance is *mandia*, a millet grown on some 42,000 acres, or on rather less than 2 per cent. of the cropped area. *China* is a millet of but little importance, though the area sown with it is probably more than the 500 acres shown in the crop statements.

Other food-grains in column 10 are generally *rabi* crops grown on twice-cropped land. They occupy over 9 per cent. of the cultivated area, and include *kultha* (*dolichos biflorus*), *birhi* (*phaseolus radiatus*), *muga* (*phaseolus mungo*), *harar* (*cajanus indicus*), *chana* (*lathyrus sativus*), *barguri* (*vigna catjang*), and *makka* (*zea mays*). Of these the first four are the most important, and I should estimate that a third of the total area shown represents *kultha*, and not less than a sixth, *harar*.

Linseed, *til* (*sesamum*), and castor are grown on small areas, generally in riverside lands. Others, in column 13, represents chiefly mustard, grown after rice on valuable lands.

Condiments and spices include coriander seed or *dhania*, ginger or *ada*, turmeric or *haldi*, and some garden crops such as onions, chillies and arrowroot. The total area is only 850 acres, as most of these crops are grown in the homestead lands shown in column 27. Sugarcane is grown in rotation with paddy on well irrigated lands. Only 1,700 acres are shown under this head in the statement, but I am sure that in ordinary years the area planted with this crop is not less than 5,000 acres. As it is grown on rice land, and an extra rent is often payable for its cultivation, it would be natural that amins should have been persuaded to understate the area.

Cotton and jute are valuable crops, but the former is grown on less than 1 acre in a thousand, and the latter on less than 1 acre in two thousand. Other fibres include *dhaincha* and *sunni*, which are grown to a very small extent.

Many dyes are used by the Uriyas, and are prepared from earth and leaves, etc.

Kusuma or safflower is grown in homesteads chiefly in the Puri District. Indigo is grown in a few villages of Cuttack District and in small patches in Puri.

Pan is the betel vine grown for its leaves, in which the *supari* nut is wrapped before chewing. It is grown on only 500 acres but is an extremely valuable crop.

Tobacco is grown all over Cuttack on the silt-covered lands on the banks of rivers; the total area shown under this crop, 3,400 acres, represents about the area planted in an ordinary year. In favourable years there is much larger area under it.

Inkar is a reed grown to make supports, etc., for the betel vine. The area is certainly under-estimated, as 500 acres of *pan* gardens must represent at least as much *inkar*.

Homestead lands represent what is shown in the *khasras* as *bari* without mention of crop. It includes courtyards and threshing floors, waste lands at the

back of the house, and gardens within the compound wall. It is not possible to estimate the amount of land bearing crops, but the greater part of it grows cucumbers or spices, and miscellaneous herbs or fruits or pulses for home consumption.

Maize is often grown, and so are plantains, *bael*, etc., while in the out-lying plots *chana* and *kultha* are often to be found. I estimate that of 1,14,000 acres shown under this head at least half must actually grow some sort of crop.

Garden produce and fruit-bearing orchards, represents mango groves, plantations of plantains, *pulang*, jack fruit, toddy palm, and other trees, and gardens where such are distinguished from homestead. Probably of the 51,000 acres about 40,000 represent groves of mango and other trees, which at 25 trees to the acre would give a total of a million trees in the Province besides the isolated trees on raiyati holdings, or on homestead lands or along the roads.

Under yams are included the true yam or *khamba alu* and the commoner *khandamul* or sweet potato. About 3,500 acres are shown under this head, but this is exclusive of the areas included under homesteads in column 27 (Appendix F).

Baigun or *Brinjal* (*solanum melongena*) is the most popular and widespread of Orissa vegetables. The area shown under this head in the *Khasras* is only 2,800 acres, but there must be quite another 10,000 acres included under columns 27 and 29.

Others in column 30 includes chiefly various kinds of melons, pumpkins, and cucumbers grown on the sand-covered banks of rivers, and a small area under onions and *saru* (*colocaria antiquorum*). Much of the area under these crops is however, included in homestead land.

127. Maps Nos. VI to VIII show the differences in the proportion of land in each local area growing *sarad* and *biali* rice, and it will be observed that there is a very great variation in the figures for the different districts :—

		PERCENTAGE ON NETT CROPPED AREA OF—				
District.		Early rice.	Winter rice.	Spring rice.	Twice-cropped land.	Homestead land.
Cuttack	....	13	70	2	14	5
Balasore	....	1	91	....	1	5
Puri (Sadar Sub-division)	....	6	78	4	10	3
Khurda	....	....	85	....	3	2
Orissa		6	80	1	8	5

It will be seen that Cuttack and Puri Sadar subdivision contain far more twice-cropped and *biali* land than Balasore. Khurda grows practically no *biali* or *dahua*, there being but a small area of *jheels* suitable for the latter, while the people seem to have an aversion to sowing early rice and prefer the more risky but more prolific *chhota laghu*. It is likely that the twice cropped area in Balasore is underestimated owing to collusion between amins and proprietors, but it is a fact that there is far less *biali* or *rabi* grown than in the other districts partly owing to the difference in the soil, and partly to the greater laziness of the inhabitants.

I now proceed to give some account of the cultivation of the principal crops mentioned in the preceding paragraphs.

128. The staple crop of Orissa is rice (*oryza sativa*) called in Uriya *dhan*. It is grown on 87 per cent. of the total cultivated area viz, on 85 per cent. in Cuttack, on 92 per cent. in Balasore, and on 88 per cent. in Puri, and the distribution within each of these districts may be seen from maps Nos. VI to VIII. In very few villages is less than half of the arable land under rice and it is common to find more than nine-tenths growing this cereal in some form.

The varieties of paddy are very numerous, but they all fall under one of three heads according to the season at which they are sown and reaped.

Biali or autumn rice is the earliest crop and is reaped in August and September.

Sarad or winter rice is sown in June-July and harvested between October and January.

Dahua or spring rice is sown after the floods have subsided and harvested in March-April.

The winter rice is subdivided according to the amount of water it requires into *guru* or heavy and *laghu* or light varieties and the latter again into small, medium and large*. The following table will show the principle heads of the classification.

Dhan ...	<i>Biali.</i>	...	{ <i>Satika</i> ...	...	...	A large number of varieties known by various names as <i>champa</i> , <i>kantakuli</i> , <i>nudia</i> etc., etc., see Appendix H. to Mr. Kingsford's report on Balasore.
			{ <i>Bara.</i>			
	{ <i>Sarad†</i>	...	{ <i>Laghu.</i> ...	{ <i>Chota laghu.</i>		
	{ <i>Dahua.</i>		{ <i>Guru.</i>	{ <i>Majhla laghu.</i>	{ <i>Bara laghu.</i>	

129. The earliest of all the rices is the *satika* variety of the *biali* said to ripen within sixty days of its sowing, while the heavier qualities take a month longer.

These kinds of paddy are always grown on the higher lands of the village and for preference in a light loamy soil, the best yield being from crops raised on the *kala* lands and in favourable years on the *pal* lands also.

The land is ploughed several times as early as possible after February, and then is harrowed and left to mellow in the sun, and with the first rain in June the seed is sown broadcast at the rate of about 30 seers to a maund per acre, manure having been previously spread over the field. Three days later the seed is ploughed in and the land harrowed; a second harrowing is given a fortnight later and the plants are thinned out.

After this the crop requires weeding two or three times, and in August or September is ready to be cut. The reaping is done by men and women with a sickle, and only a few inches of stubble are left on the ground.

Biali rice if on high land may be followed by pulses, generally *kulthi* or *birhi*, and on alluvial or homestead lands by mustard, linseed, or *harar*. In rich and irrigated soil or in very favourable seasons *laghu* paddy is also transplanted into the fields from which the *biali* has been cut. The total area shown in the crop statements under *biali* is 166,900 acres, viz, Cuttack, 128,000; Balasore, 9,200; Puri 29,700.

It is more precarious than the *sarad* crop, being injuriously affected by drought in June and July, but on the other hand, where the *sarad* is spoiled by want of rain in September and October, there may be a bumper crop of *biali*.

It is curious how much more popular this crop is with the cultivators of Cuttack and Puri sadder than in Khurda or Balasore, more than three-fourths of the total *biali* area lying in Cuttack.

130. While the autumn rice is always sown broadcast, the winter varieties may be either transplanted or sown at once where they are to grow. As the latter is by far the more popular method I shall describe it first.

The lightest of the *laghu* varieties differ but little from *biali*, while the *bara laghu* pass with no very marked line of division into *guru*, but as a rule the *laghu* paddy is grown in moderately low lands, which are wet, or under six inches to a foot of water, pretty continuously from June to October, and likes a fairly stiff soil (*matal*). The crop having been harvested in December the land will either grow a crop of *mung* or millet, or lie fallow until April or May, when it is ploughed as often as the weather and the resources of the cultivator permit, and manure consisting of little heaps of cowdung and refuse is spread over the surface. The number of ploughings depends on the quality of the soil and its elevation, high lands requiring more ploughing than low. Something depends also on the quality of the rice to be grown, the finer varieties needing more careful preparation of the soil. The seed, about 30 to 40 seers to the acre, is sown in the end of May or beginning of June if the weather is favourable, and germinates within fifteen days. Ordinarily it is sown dry, but if the sowing is delayed or there is a superabundance of water, it is first steeped so as to induce partial germination and to prevent it from floating. About a month after sowing, if there is sufficient water in the

* *Chota laghu*, *majhla laghu* and *Bara laghu*.

† In Balasore the best known divisions of *Sarad* are *esu*, *nabakanda* and *guru*.

field, the plough is passed over it so as to thin out the seedlings, now six inches to a foot high. Those that are uprooted and left floating in the water are replaced by hand and grow again readily. This operation, known as "*biushan*" is considered to be of great importance, and it is thought most unfortunate if for want of water it has to be delayed until August.

As soon as the young plants have re-established themselves after this violent disturbance, the harrow is passed over them so as to press them into the mud. This is called the *kala mahi*. A week or ten days later weeding begins, and at the same time any irregularity in the interspacing of the plants is corrected.

Sometimes only one weeding suffices, but good cultivators prefer to have a second weeding a fortnight later. The plants flower in October or November and the wild paddy (*balunga*) left over from the dropped grains of previous harvests is picked out.

For the first year or two this self-sown paddy is reaped with the rest, but it soon deteriorates and becomes known as '*rashi*', the grain of which is liable to drop from the ear before harvesting, and the degeneration continues until the plant resembles wild paddy. It has therefore to be separated every two years, and this is often possible by sowing red after white varieties, as they are readily distinguished by the colour of the lower part of the stem and of the girule (*kanta*). Sometimes, too, transplanting is resorted to finally eradicate the *balunga*.

When the ears are full and ripened and before the grain begins to get dry and drop the harvesting begins. Sometimes the standing paddy is first laid low with a bamboo to prevent the grain being scattered by the wind; then the reapers come and with the *dao* or sickle cut off the stalks close to the ground. The cut paddy lies for a few days and then is gathered into larger sheaves which are carried to the homestead by cart or *bunghi* and there stacked.

The cultivation of the *Guru* varieties is almost the same, but as they are grown in the heavy clay lands that retain two to four feet of water, less careful ploughing is necessary and manure is more sparingly given, if at all. In very low lands (*jalapat*) no refinements of cultivation are possible, and the seed once sown is, if the land is still dry, ploughed over and harrowed, and if the rains have begun, only pressed in with the harrow and then left, the depth of water being regulated so far as possible by means of the *oils* of the field. The harvesting is done a month later than that of the *laghu* varieties, *i. e.*, in January, and as a rule only the ears are cut, the straw being too sodden to be of value.

131. Transplantation is an unpopular system of cultivation, as it involves more labour and the transplanted seedlings are very delicate for the first month and liable to injury by flood and still more by drought; and a very careful enquiry made by Mr. Arnott, Executive Engineer of the Mahanadi Division, showed only 4 per cent. of the cultivated area to grow transplanted rice. It is, however, admitted that, when successful, transplantation gives a larger yield, and it is resorted to for fields (especially when irrigated) that grow a *sarad* after the *biali* crop, to get rid of the wild paddy, to avoid the risk of loss by early floods, and to replace the loss of the broadcasted crop, if such occurs before the end of July.

The nursery is generally a field near the village well manured and fenced in to keep off jackals and other animals. The seeds may be sown either dry or wet. If the former method be adopted, the field is ploughed while dry as often as possible—not less than five or six times—and the soil carefully pulverised and weeded. Before sowing a little sand is sprinkled on it and the seed scattered and ploughed in. It is then carefully watered until the plants come up.

In the wet method the land must be flooded and then ploughed up until it is of the consistency of a thick gruel. The seeds are soaked for twelve hours in an earthen jar or *handi* and then partially dried in a basket covered with straw, and in this condition are sown broadcast on the sticky surface of the field. In four or five days the plants show themselves and water is then gradually admitted.

When a month old the seedlings are ready to be transplanted into the rice field which has been prepared by ploughing and manuring as for broadcasted paddy, and is once again ploughed and harrowed before the young plants are ready. The seedlings, 6 inches to 18 inches high, are arranged in bunches of three to four and six to nine inches are left between each bunch. The roots are

carefully imbedded to the depth of a couple of inches; they are then left and require no further attention beyond a good weeding and a copious supply of water.

The earlier the transplanting is done the better the results, and the middle of June to the middle of July is considered the proper time; but the operation often goes on for a month later.

132. *Dalua* is a coarse variety of paddy grown on lands too heavily inundated to yield *sarad*, and especially in the shallow water round the edges of *jhils* and water-courses. The soil is generally clayey and often saline, for it is a peculiarity of this crop that it is but little affected by the superabundance of saltpetre.

A nursery is selected in a corner of a tank or a drain, and the depth of water is regulated by means of little walls of mud. It is ploughed once or twice and levelled; the seed having been previously steeped for twenty-four hours in an earthen vessel, is placed in a basket and covered with straw for two or three days until it begins to germinate: it is then sown very thickly in the seed bed. The land is prepared to receive it by ploughing in the water until the whole becomes one pulpy mass with an inch or two of water over it. In this the seedlings, when about a foot high, are imbedded, and require to be plentifully supplied with water until they flower. In March or April the crop ripens and is harvested.

Only 36,000 acres are shown in the *khassras* as growing *dalua*, but of recent years there has been a tendency to extent its cultivation in inundated areas with the aid of water supplied by the Irrigation Officers through canalised channels. There is but little *dalua* in Balasore or in Khurda subdivision, and it is only in the low lying lands of north eastern Cuttack and in the heavily-flooded Parganas of Purbaduai and Oldhar in Puri that it forms a staple crop. After the Brahmini floods of 1894 a large area was sown with *dalua* rice in the Bayang Pargana of Balasore, and it is likely to come into favour in the south of the District.

133. Two methods of threshing the paddy are followed, the former generally for *biali* and *laghu* paddy, the latter for *sarad* and for *dalua*.

The rice is, in the former case, cut three to six inches from the ground and carried to the threshing floor (*khala*), where it is stacked. A plank is then fixed so as to form an inclined plane about three feet high at the upper end. The thresher stands at the head of this plank, and holding a bundle of paddy with the ears away from him strikes it on the plank until the grain falls out on the threshing floor, from which it is afterwards collected.

In the other method, the paddy which has been cut with only a few inches of stalk is spread on the threshing floor and trodden by bullocks yoked to the pole in the centre.

134. The winnowing is done by means of a flat basket (*kula*) in which the grain is placed. The basket is lifted by the operator with both hands above his head and shaken from right to left and left to right with a slight vertical motion, so that as the man steps backwards the light and worthless refuse (*achara*) is left suspended in the air and blown away by the breeze. After this has been done for a few minutes the grain is well fanned to blow away the remaining dust and then placed on the top of the heap of paddy ready to be stored.

135. Paddy is generally stored in bamboo baskets (*doli*) plastered over with mud and dung. Often also in pits dug in the yard of the house. Mahajans use small storehouses of mud and wood raised two or three feet from the ground and capable of holding 500 to 1,000 maunds.

Clean rice.

136. Rice is prepared from paddy in two ways, viz. :—

- (a) By drying the paddy in the sun, and then crushing it in the *dhenki*. This is known as *atap* rice;
- (b) By boiling the paddy, and then drying it in the sun and crushing it in the *dhenki*. This is what is generally eaten, being known as *sidha* rice.

The outer husk of the paddy which is thus removed is called *tunsa* and is used for fuel, whereas the fragments of husks and the outer shell covering the

grains of rice go by the name of *kunda*, and form a favourite fodder with cattle. Three seers of paddy would yield about quarter seer of *tunsa* and the same quantity of *kunda*.

The work is usually done by women on contract, and 10 *gaunis* of clean dry rice are returned for every 25 *gaunis* of paddy, or sometimes of every 22. This, however, leaves a large margin of profit to the operator, even allowing for the difference in the specific gravity of rice and paddy; and in the returns of the Public Works Department the ratio rice to dry paddy is taken at two-thirds. This result has been verified by experiments made by Mr. Maude and Babu Jamini Mohan Das, but is perhaps rather high, and for the purpose of the calculations in this report, I have taken the proportion of rice to paddy as 5 to 8, the accepted ratio of the Agricultural Department.

137. Mr. N. N. Banerjei takes the average outturn per acre as 15 to 20 maunds of paddy, which closely corresponds to popular estimate. Roughly, the people classify rice lands as first, second, and third class, according as they are capable of producing 3, 2, or 1 *bharan* of paddy. Now a *bharan* is generally about 8 Cuttack maunds, and the area of first class land is certainly no less than that of third class so we may take the popular average at 2 *bharans* or 16 maunds, equal to 10 maunds, (Cuttack weight) of rice; which is approximately correct.

The results of the last ten years' experiments by officers of the Public Works Department give an average outturn of 19.72 maunds of paddy on irrigated and 15.59 maunds on unirrigated land. The results of crop experiments of 1895-98 by officers of the Settlement and district staffs gave an average for irrigated land of 1,996 lbs. and for unirrigated of 2,003 lbs. per acre.

Comparing these with the provisional estimate in 1891,§ we get the following :—

						WEIGHT OF CLEAN RICE IN LBS. PER ACRE.	
						Irrigated.	Unirrigated.
						Mds.	Mds.
Irrigation Department, 1885-96	....	....	....	....	....	1,014	802
Estimate submitted to Government of India by Director of the Department of Land Records and Agriculture	....	....	....	....	....	1,045	902
Settlement and District experiments of 1895-98	....	....	....	....	....	1,247	1,252
Average	....	....	....	....	....	1,102	985

This is equivalent to about 13½ standard maunds per acre for irrigated and 12 maunds per acre for unirrigated lands †.

An examination of the returns does not discover satisfactory evidence of any superiority in the yield of transplanted rice over that of broadcast. The outturn of straw varies from 20 to 50 maunds, and may be taken on an average at 25 maunds.

Biali is generally estimated to yield two-thirds of the weight of grain obtained from winter rice, or say 8 maunds of cleaned rice to the acre and about 18 maunds of straw.

Dalua was found by the Inundation Committee to give the largest yield of all, but so much of the field is taken up by the mud walls for regulating the water that I take the outturn per acre as equal to that of *biali*.

The bye products obtained in the threshing and husking of paddy are the outer husks or *tunsa* used for fuel and the bran or *kunda* which is a good cattle food.

138. *Mandia*, the *marua* of Bihar, is an upland cereal with a small reddish grain, like a mustard seed. It is grown on high, light, and inferior soils on which *biali* rice would hardly succeed.

Mandia. ‡

* See also paragraph 109.

§ Department of Land Records and Agriculture to Government, No. 356A, dated 3rd March, 1898.

† Standard maunds of 822 lbs.

‡ *Eleusine corocana*.

Sometimes it is sown broadcast in May; more often it is first sown in seed beds and transplanted in June when the seedlings are six inches to a foot high. The transplanting requires to be rapidly done, as the plants cannot be left out of the ground long. The crop ripens in August-September and yields about 6 to 8 maunds of seed to the acre. This is ground into flour and eaten in cakes or with rice by lower classes. It is said to have the merit of producing such a feeling of satiety that after one full meal a man does not feel inclined to eat again for twenty-four hours.

It requires good rain in June and July, and is liable to be damaged by caterpillars.

This is, perhaps, the commonest cereal after rice in Puri and in Cuttack, in which districts it is grown on some 58,000 acres, and is generally followed by a crop of *kultha*. In Balasore it is rare. Another variety, known as *kakari mandia*, so called because it is supposed to derive sufficient moisture from the dew, is grown as a *rabi* crop on riverside lands, but is less common. It is a late crop, being sown in February and reaped in April, and if the rain is deficient, requires artificial irrigation.

139. *China* is a millet grown as a *rabi* crop on *biali* and *laghu* lands. It is a delicate plant requiring a good rich loam and abundant water. The field selected is generally near a watercourse, and, as soon as the previous crop has been harvested, is ploughed and harrowed three or four times. The *china* is mixed with sand and sown broadcast, and in eight or nine days the plants spring up. Should rain fail, it requires constant irrigation. In three months it is ready to cut, and in a good season may produce 8 maunds per acre; but the crop is very uncertain, and Mr. N. N. Banerjei puts the average at only 3 maunds. It is eaten like rice, and also cooked with milk, but is not common enough to be of great value as a food-grain. The *milan khasra* only shows some 500 acres, but this must be below the mark.

140. Wheat, locally known as *gahama*, is grown to a very small extent on upland fields after rice, and generally on loamy or silt-covered soil. It is sown broadcast in October-November, and reaped in April; and is as a rule left to grow up in the meantime as best it may.

Probably 500 acres, chiefly in the Jaipur Subdivision of Cuttack, are sown with this cereal, but only some 300 acres are recorded in the *khasra*.

141. Barley, or *jaba*, is grown on light sandy lands especially in areas exposed to inundation. It is sown broadcast about the 1st of November and is reaped in March. The grain is boiled and eaten whole or made into flour and is said to be very 'cooling'.

Over 500 acres are shown in the *milan khasra* as under barley, and the figure may be taken as approximately correct.

142. *Kultha* is at once the commonest and the least valued of the pulses. It is grown on poor lands after *mandia* or autumn rice or on yet higher and more sandy lands which produce no other crop.

The land requires to be ploughed three to six times and harrowed. The seed is then sown broadcast and the *mahi* again passed over it. In February or March the plants are plucked by hand and carried to the threshing floor, where the grain is trodden out by cattle.

Mr. Nathan put the average outturn at 25 to 40 *gownis* or 2½ to 4 maunds, and Mr. N. N. Banerjei at 3½ maunds per acre; but the actual cuttings made (25) give an average of over 10 maunds. We may safely put it at 8 maunds on an average, which is not far off Mr. Arnott's estimate of 100 *gaunis*. It sells at 20 to 30 Cuttack seers per rupee. It is an excellent food for cattle and horses, and in times of scarcity it is boiled and eaten, with or without rice, by the poorer classes, and in 1896-97 it formed the only food of the people in some villages. Its distribution is very general throughout the Province, and I estimate that it is grown on about 80,000 acres.

143. *Birhi* is a more valuable crop than *kulthi* and is grown by preference after *biali* rice where the land is rich enough. The difference is very marked, for while *biali-birhi* lands are rented at about Rs. 3-2 to Rs. 4-12 per acre, *biali-kulthu* lands rarely pay more than Rs. 2-8 and *mandia kulthu* not more than Rs. 1-9 per acre.

The cultivation is much the same as for *kultha* which in external habit it resembles, but it grows more luxuriantly and is less affected by weeds, drought, etc.; it requires a good light loamy soil and a fair amount of rain up to the time of flowering in November; after that it wants fine weather. It is plucked in January and the grain is trodden out by cattle.

The yield is about 8 maunds of small round seed in a good year. This is the average of the experiments made. Mr. Arnott's estimate is 6 maunds; Mr. N. N. Banerji's, 3 maunds. It is given to cattle and eaten as a pulse (*dal*) and sells at 18 to 24 seers to the rupee. It is found chiefly in the inundated tracts in Cuttack and Puri, and is liable to be eaten up by insects if the weather in November be wet and cloudy. Probably there are some 40,000 acres under this crop.

144. *Muga* or *mung* is the commonest *rabi* crop grown on *sarad* lands. *Muga* (*Phaseolus mungo*). There are three main varieties, the *dhara* or *sauri muga* having a light yellow grain, *kara muga* with a dark grain, and *jhai muga* with a whitish grain. The first two are the more valuable, and are sown on *light laghu* or good *biali* land and sometimes mixed with *birhi*. *Jhai muga* is grown on clayey soils after *sarad* rice.

After the preceding crop has been reaped the land is ploughed two or three times and the seeds sown broadcast. It is ready by February or April, according to the time of sowing, and is either plucked or cut with a sickle and taken to the threshing floor. It is trodden out by cattle, and yields 5 to 8 maunds. This is the pulse most largely consumed by the better classes in Orissa; it is not so general in its distribution as *birhi* and *kultha*, being found chiefly in the inundated area and is commonest in south Cuttack and Puri. It may be grown on 20,000 to 30,000 acres in favourable years.

145. *Harar* is a pulse of which two varieties are found in Orissa, the *chaita harar*, also called *pala*, which is sown in *Assin* and harvested in *Chaitra*, and the *deo* or *nali harar* sown in *Jaistha* and harvested in *Magh* or *Pous*. The first variety is the more common, and is grown generally on riverside lands after *biali* paddy. It is sown broadcast or in drills, and is often mixed with *birhi* or *kultha*, which are plucked before the *harar* has attained its full growth. Oftener, however, it is sown by itself, the yield of *kultha* and *birhi* when thus grown being very poor. It flowers in February when the plant is 2 feet to 4 feet high. In April the plant is cut down and the seed beaten out like paddy. The stems are afterwards used for cattle fodder and fuel. The yield is, in a good year, from 8 to 15 maunds* of grain. It is eaten as a pulse, but is said to be very heating. *Deo* or *nali harar* is a variety with a red grain sown on homestead lands in June-July and harvested in December. Its cultivation is the same as that of the *chaita harar*. *Chaita harar* is most largely grown in the Brahmini basin where in the scarcity of 1896-97 it was in many village the only crop that stood between the people and starvation, and is common on the borderland of Cuttack and Puri. The autumn variety is found in western and central Cuttack and in the Puri district. I think that not less than 60,000 acres is annually planted with *harar*.

146. Of the oilseeds, one of the most important is the castor-oil bean, *gaba* or *jara*, grown on about 2,600 acres. Oilseeds-caster.

It is of two varieties, *bai jara*, sown in May and gathered in February or March, and *chuijara*, sown in October and gathered in March. It is a peculiarity of this plant that it will grow on land deeply covered with sand, and it is usually to be found in sandy fields along the banks of rivers, or on homestead lands. If grown in a loamy soil it is sown in drills, but if in deep sand, holes must be made with a dibble until moisture is reached, when the seed is placed at the bottom. It is a prolific bearer, yielding from 100 to 200 *gaunis*, but is liable to be destroyed by caterpillars and insects. The oil is expressed in the common Indian oil mill worked by man or bullock, and the weight of oil obtained is about one-fourth of that of the beans, or from 1 to 2 maunds per acre. It is used by the poorer classes for cooking and for the anointing of their bodies.

147. Mustard (*sarishu*) is one of the most valued of the *rabi* crops and is grown on rich loamy soils after *biali* rice. It is commonest in South Cuttack, and the area under Mustard and Rape.

* Mr. N. N. Banerji gives 4 maunds; Mr. Arnott 100 to 160 *gaunis*. The latter is nearer the mark.

it is probably over 2,000 acres. For this crop the soil requires to be carefully prepared, and in October the seed is sown broadcast at about 5 or 6 seers per acre. It requires careful weeding and a fairly dry season, and will yield 6 to 8 maunds of seed, worth about Rs. 30. The oil is used for anointing the body and by the well-to-do for cooking.

148. Linseed (*pisi* or *tisi*), is grown after *biali* on light loamy soils. It is recorded as cultivated in about 3,500 acres, but is often found mixed with *kulthi* or *dhania* (coriander seed).

Linseed.

149. *Til*, locally known as *khasa* or *rasi*, is grown on fairly stiff soils sometimes as a *rabi* but more often as a *biali* crop. The total area recorded under it is only 1,100 acres.

Til

150. Sugarcane, or *akhu*, is grown generally on lands near the village and within easy reach of canal irrigation. Mr. Arnott states that it cannot be grown on ordinary rice land, but requires a loamy (*dorosha*) soil.

Sugarcane.

The field is prepared by manuring at the rate of 500 basketfuls to the acre and ploughing some thirty times in January and February. Cuttings, known as *dhangira*, are then planted in furrows about 10 inches apart and covered over with earth. When the cuttings have been planted and covered over, the field is irrigated, and the irrigation repeated every two days until the shoots sprout, which takes from fifteen to twenty days. The soil is then loosened and oilcake and mustard oil applied to the roots; the process is repeated after a fortnight and twice more at intervals of a month, the land being irrigated so as to keep it continually moist, sometimes even every two days in the hot weather.

After the fourth application of oilcake, which takes place in May or June, the soil is loosened by pulling a plough through and the land thoroughly weeded. The stems are then wrapped in sugarcane leaves, and ten days later are tied up in a form known as *paholia* from its supposed likeness to a fishing basket. In August another thorough weeding is necessary, and after this the leaves are bound together and the plants tied together in fours to give them more power of resisting a storm. In December the canes are cut down and the juice is extracted. The mills in use are very primitive the commonest being the *kolhua* which is like the oil mill. The *khai* is a better mill, in which the canes are pressed between rollers, horizontal or vertical, turned by hand or by bullocks. The use of the Behea presses is rare. The juice is boiled down in little pans over an ordinary fire in a *chula* and poured off into jars. Sometimes it is refined by the addition of the lime or ashes.

Mr. Arnott takes the cost of cultivation at Rs. 218 per acre, Mr. N. N. Banerjei at Rs. 80 to Rs. 160, while in Balasore Mr. Kingsford estimates the cost (excluding the raiyat's own labour, manure, etc.) at Rs. 67 per acre. The estimates of outturn are equally variable, Mr. Arnott giving the value of the yield at Rs. 300 to Rs. 350 and Mr. N. N. Banerjei at Rs. 80 to Rs. 200. Experiments give an average yield of some 50 maunds of molasses, worth about Rs. 250 per acre.

151. *Kapa*, or cotton, is a crop that is said to be less largely cultivated than in former years, and is now shown in our records as occupying 2,300 acres or $\frac{1}{1000}$ of the cropped area. It is grown generally on homestead lands (*kala*) irrigable from a tank or canal or on rich alluvial soil by the riverside (*pal*).

Cotton.

The soil is carefully ploughed and harrowed in September and kept moist with the help, if necessary, of irrigation until the middle of October, when the seeds are sown in drills and covered over lightly with earth. Before being sown the seed is steeped in water and mixed with cowdung so as to start germination.

The land requires to be kept moist but not wet, and the plant should flower in February and the pods should be ready to gather in April or May.

The outturn is taken at about a maund of cleaned cotton per acre * worth about Rs. 20.

152. The cultivation of *nalita* or jute is at present confined almost entirely to the irrigated area in Central Cuttack and Jajpur and to a few Parganas on the Mahanadi. Mr. N. N. Banerjei states that the area under this crop is decreasing, but this does

Jute.

* Mr. N. N. Banerjei's report, page 88.

not appear to be the general opinion, and I think that jute is likely to supplant cotton in many places. The present area under jute is shown in our returns as 900 acres. It is most commonly grown on homestead land, but sometimes also on riverside (*pal*) land, where an extra rent has generally to be paid for permission to cultivate it. The seed is sown about May and in June or July the plants have to be thinned out, and later again when the plants are about three feet high the leaves are plucked off, leaving a few at the very top.

In October the plants are ready to cut and are afterwards steeped in water for ten or twelve days until fermentation sets in. The fibres are then drawn out, or the pith beaten out against a platform.

153. The tobacco plant, commonly called *dhuanpatra* or 'smoke leaf' is one of the most valuable crops grown in the Province. It is shown in the crop statements as grown on 3,400 acres, but in favourable seasons the area planted with it is much larger, and it is on this crop that many villages in southern Cuttack, especially in the Parganas of Saibir, Deogaon, and Sailo, depend for the payment of the rent.

It requires both a rich loamy soil and a plentiful supply of water, and is only raised on the rich silt-covered lands, on the banks of rivers and in the depressions of the big flooded *pats*. A mixture of sand and silt is not unfavourable to its growth, but the finest leaves are obtained on a sandy subsoil with a covering of nearly a couple of inches of pure silt.

The seed is sown in beds about the middle of September, and when about six inches high the seedlings are transplanted. The field to receive them has been carefully prepared by repeated ploughings until the soil is of the consistency of fine powder, slightly moist. In this holes are made and the seedlings carefully planted one in each hole, and have to be watered daily for the next three days and three times more on alternate days in the next week. After this, all withered or spoiled plants have to be removed, and the field is watered about once a week for the next month. When the flower-bearing shoot appears it is broken off and a week later the plant reaches maturity. It is cut off at the root and left for a couple of days in the field; the plants are then dried by alternate exposure to the sun and compression in heaps under a mat.

When dry the plants are tied into bundles and placed on dry straw.

The following account of the cost and profits of tobacco cultivation is taken from the report of Babu Jotindra Mohan Sinha who settled rents in the chief tobacco growing area in Cuttack.

				No. of Plants,
Cultivation in this Pargana—				
The produce of one <i>gunt</i> (.04 acre) tobacco land	....	....	....	4,096*
Deduct wastage	....	....	....	512
Net produce				3,584

These would make upon an average 100 *mentas* † or bundles, the unit of calculation.

2 <i>Mentas</i>	=	1 <i>Joda</i> (couple)
100 <i>Jodas</i>	=	1 <i>Balad</i> or bullock load

The wholesale price of one *balad* varies from Rs. 20 to Rs. 10. The retail price of *menta* varies from one to two annas; so the retail minimum price of 100 *mentas*=100 annas=Rs. 6-4. The wholesale price of 100 *mentas*=50 *joras*=Rs. 6 nearly.

So the price of 100 *mentas*, the produce of one *gunt*, may be taken to be Rs. 6, and that of one *man*=6X25=Rs. 150. But the price of the produce of one *man* first class *sarad* land taking it to be on an average of 4 *bharans* paddy (at the rate of 16 *gownis* in the rupee)=Rs. 5X4=Rs. 20 only.

* As a rule 16 plants cover one *Padika*. The number covering a *gunt*=(16X4)X(16X4)=4,096. Two plants per *padika* are generally deducted for wastage, which therefore amounts to (2X4) (16X4)=512.

† *Menta*=a thin piece of dry bamboo one cubit long, on which the tobacco plants are stuck. The number of plants required to make up a *Menta* depends up on the size of plants, Generally 30 to 40 plants to make up a *menta*. Here 36 plants are taken as a convenient mean.

The cost of cultivation of one *gunt* of tobacco land amounts to Rs. 2
 The rate of rent varies from Rs. 1-8 to As. 4 per *gunt* let us take Rs. 1.
 So the total cost per *gunt* = Rs. 2+1 = Rs. 3.
 The nett profit per *gunt* = Rs. 6 - Rs. 3 = Rs. 3.
 The nett profit per *man* = Rs. 3 × 25 = Rs. 75.

It is, however, not possible for one man to cultivate more than 6 *gunts* at a time. People having larger areas fit for tobacco sub-let them to neighbours or to the people of other villages in the Pargana.

154. *Pan*, piper betel, is the climbing vine, the leaves of which are used to wrap up the *supari* or areaca-nut chewed by natives of all ranks and castes.

It is an extremely valuable crop, requiring most careful cultivation, and for the most part is grown only by the Barajis, the Baruis of Bengal, who have immigrated in comparatively recent times. In some Parganas, however, I have found *Khandaits*, and indeed all castes but Brahmins, cultivating *pan*. The finest *pan* is raised at Barkud in the Kujang Estate; but there are also valuable gardens in Kodinda close to Cuttack, in Sungra, in Parganas Jajpur and Tisania in Lembai, close to Puri town; also in Sunhaut, Dhamnagar, Bisalkhand, and Bhograï of Balasore.

The total area covered by the gardens is recorded in our papers as 500 acres, but this excludes the permanently-settled estates.

The *pan* garden or *baraj* is formed by heaping up a mound of earth and carefully levelling it. Then the garden is enclosed in trellis work cage about five or six feet high to shield it from the direct rays of the sun. The plants are propagated by cuttings from the tops of old vines which are planted in rows about three feet apart, leaving a couple of inches between each cutting. They are covered with damp straw until they take root, and as soon as they begin to climb a reed called *inkar* is planted beside each and the vine trained to it by ties of *jana* grass.

In six months to a year the plants yield the first crop of leaves, and thereafter about two pairs of leaves every year; the leaves are plucked from the bottom, and every year a further layer of earth is placed over the roots until the plant withers or gets too old, which is at the end of about six years when, it is removed and a fresh cutting planted. In fifteen to twenty years the garden has grown to an unmanageable height and is abandoned, and after lying fallow for a couple of years the earth is used for building other gardens.

The plant requires watering daily in the hot weather, and every two or three days in the cold weather. It is said to suffer from too much rain, and is easily damaged by storms. It is sometimes attacked by the *dauli*, a small white larva, and a black larva, the *kalamukhi* also by insects, such as the *ankulia pokha*.

To the cultivation of *pan* two accessories needed are water and *inkar*. The former is generally to be found in the pond formed by the excavation of earth for the garden. The *inkar* reed is generally grown close by.

The size of a *pan* garden is generally 1,2 or 3 *gunts* and the rent from As. 8 to Rs. 2 per *gunt*; I have found it as high even as Rs. 3 per *gunt*. It is sometimes held on a lease for a fixed period, requiring the rent to be paid, whether *pan* is grown or not, and such are the terms on which *thani* raiyats held under their last settlement *pattas*. More often the lease is for the term of the garden, and the rent is fixed at so much a *gunt* as ascertained by measurement. *Inkar* land is sometimes paid for separately at Rs. 3-2 to Rs. 6-4 per acre but is often allowed rent-free with the garden.

† The details are as follows :—

	Rs.	P.	A.
Ploughing harrowing six times, man with one plough half day each, time As. 6 + As. 3...	0	9	0
Transplantation, watering, &c, two men one day ...	0	4	0
Watering twice after transplantation, one man one day ...	0	2	0
Purning &c. ...	0	6	0
Cutting, sewing &c, two men one day ...	0	4	0
Price of seeding ...	0	2	0
Curing, &c. ...	0	5	0
Total ...	2	0	0

The following account of the expenses and profits of *pan* cultivation in Balasore is taken from a note by Mr. Kingsford and shows the expense incurred during the first year, and incidentally the nature and sequence of the processes undertaken :—

The figures given are for 1 *gunt* or .08 acres of land.

January to February (<i>Magh</i>).				Rs. A. P.	
Materials—					
Purchase of bamboos	....	....	....	5	5 0
Ditto of <i>inkar</i> reeds	....	....	....	6	12 0
Ditto of <i>bona</i> (thatch)	....	....	....	2	8 0
Ditto of <i>nai</i> (twine)	....	....	....	1	0 0
Ditto of thatch	....	....	....	1	0 0
Ditto of 2½ maunds of manure	....	....	....	2	8 0
Labour—					
For raising ground	....	....	....	3	0 0
Cost of labour for erecting					
<i>tatti</i> , thatch, and supports	....	....	....	9	6 0
For making ridges	....	....	....	1	2 0
				Rs. A. P.	
				32 9 0	

February to March (*Phalgun*).

Labour—					
Cutting grafts	....	....	....	0	6 0
Transplanting grafts	....	....	....	1	2 0
Covering grafts with straw	....	....	....	0	2 0
Watering twice a day for the month	....	....	....	3	12 0
				5 6 0	
				37 15 0	

March and April (*Chait*).

Labour—					
Watering once a day	....	....	....	1	14 0
Removing straw and putting earth to roots	....	....	....	0	6 0
				2 4 0	
				40 3 0	

April and May (*Baisakh*).

Materials—					
Forty bundles <i>inkar</i>	....	....	....	10	0 0
One load <i>jana</i> (a kind of grass used for tying the plants to the <i>inkar</i> reeds)	....	....	....	1	0 0
Manure (applied twice)	....	....	....	0	12 0
				11 12 0	
Labour—				51 15 0	
Watering once every four days	....	....	....	0	12 0
Coolies labour for tying up the plants	....	....	....	3	2 0
				3 14 0	
				55 13 0	

May to June (*Jaista*).

Labour—					
Coolies for bringing earth and water				0	14 0
				0 14 0	
				56 11 0	

June to October (*Asar* to *Kartik*).

Material—					
Manure (twice a month), 12½ <i>ma'ns</i>	....	....	....	12	8 0
				12 8 0	
Labour—				69 3 0	
Coolies for applying earth and manure twice a month	....	....	....	3	8 0
Coolies for reparing ridges	....	....	....	1	8 0
Do. for tending plants	....	....	....	3	12 0
				8 12 0	
Carried over				77 15 0	

		Rs. A. P.	Rs. A. P.
	Brought Forward October to January.		77 15 0
Coolie's labour	....	2 9 0	<u>2 9 0</u>
			80 8 0
Rent	....	1 8 0	<u>1 8 0</u>
			82 0 0
Material—			
Baskets and pots for one year	....	3 0 0	<u>3 0 0</u>
Total cost for first year is, therefore	....		85 0 0

Of this amount, Rs. 47-13 is the cost of material and rent, and the remainder (Rs. 37-3) is the cost of labour. The subsequent yearly expenditure amounts to Rs. 50, of which Rs. 25 represents cost of manuring, rent, and repairs and Rs. 25 cost of labour. Assuming the cultivator to own an *inkar* plantation, the cost will be considerably reduced. The total expenditure during the life of a garden will accordingly be as follows:—

Cost during the first year	....	Rs. 85
Cost during the subsequent 17 years, viz., $17 \times \text{Rs. } 50$	....	850
Total	Rs.	<u>935</u>

To turn to the income, in the first place there are 25 rows of plants per *gunt*. The number of plants in each row is 240, and there are, therefore, 6,000 plants per *gunt*. The plant is a creeper with a single stem, from which leaves are thrown out in pairs and at regular intervals. It is therefore easy to gauge the number of leaves fit for plucking every month, and this number may be taken as four. The annual outturn of leaves per *gunt* is therefore $6,000 \times 4 \times 12 = 2,88,000$.

It has been noted that the wholesale price, except in the rainy season, is 1,000 leaves per rupee. In the rains the price falls to 2,000. If the average monthly price be taken as 1,500 (our estimate is somewhat under the mark), the value of the yearly outturn of leaves will then amount to Rs. $\frac{288,000}{1,500} = \text{Rs. } 192$. This estimate takes into consideration liability to ordinary damage.

The outturn during the first year, i. e., for two-and-a-half months from November to January, will be $2\frac{1}{2} \times 6,000 \times 4 = 60,000$, value Rs. 40.

The income for the eighteen years is therefore—

First year	...	Rs. 40
Second to eighteenth year, $17 \times \text{Rs. } 192 =$	....	<u>3,264</u>
		3,304
Deduct—Total expenditure.	....	<u>935</u>
Total profit		<u>2,369</u>

Which represents an annual income of Rs. 131-10-0 for the eighteen years.

Moreover, this income represents the cost of management (or wages of the *entrepreneur*) only, since expenditure includes the wages of coolie labour. If, as usually happens, the labour is done by the cultivator himself with small occasional assistance from outside, his profit will be larger. Even if we assume that he simply undertakes the duty of management, his profits must be looked upon as extremely high. I have, however, considered this matter with a view of showing that the rent is quite disproportionate to the profit, and that the Baraji stands in a most favourable position compared with that of the ordinary cultivator of *sarad* lands.

The measures locally in use for *pan* gardens are —

26 muthas	=	1 aur.
4 aurs	=	1 ganda.
5 gandas	=	1 buri.
10 buris	=	1 gunt.
25 gunts	=	1 man.

The *gunt* = .08 of an acre, or twice the size of a standard *gunt* and the man = 2 acres.

155. The cultivation of the brinjal (*Solanum melongena*) locally known as *baigun*, is very general in Orissa, and it is the most important of the garden crops, though the varieties grown are said to be inferior. Seeds are sown in beds of good garden soil at about 11 seers to the acre in June or July, and are covered over with damp straw to promote germination. After eight days the straw is removed and the plants lightly sprinkled with water, and the watering is continued every fourth day for a month or six weeks. The plants are then 6 to 8 inches high and are transplanted. They are placed either in furrows or in small circular pits, the distance from plant to plant being $1\frac{1}{2}$ to 2 feet. After planting they have to be carefully watered until they take root, when the earth is loosened and weeds cleared away. Eight days later the plants are earthed up and left alone, they bear fruit from September to January and the later varieties, from December to March.

The cost of cultivation Mr. Arnott estimates at Rs. 27 per acre, and the selling value of the produce at Rs. 50.

They are liable to be damaged by red ants and by worms (*mandi pokha*). As a preventive ashes are used.

156. The *saru* or caladium (*colocaria antiquorum*) produces a tuber which is very largely eaten by the people. It is grown on rich loamy soils, and often on the banks of rivers. The seed requires to be first prepared by being placed on damp straw and manure. It is sown in furrows on well-manured land in March, and is then irrigated, and the watering continued thereafter every few days. The soil also requires to be periodically loosened and oilcake applied to the roots.

In June the furrows are filled up and a month later the plant comes to maturity.

An alternative and commoner method of propagation is from tubers which are planted in the furrows and watered as in the case of seedlings.

Other varieties of the *saru* are sown or planted as late as May and do not become mature until September.

Mr. Arnott estimates the cost of cultivation at Rs. 43 per acre and the produce at 43 maunds worth at Re. 1-15 per maund, Rs. 80.

157. Cucumbers (*kakuri*) of many kinds are grown all over the Province in homestead lands and may be seen climbing over the roofs of the houses in every well-to-do village. When grown as a field crop they generally follow potatoes, onions, or *saru*.

The seeds are wrapped in a peice of cloth and steeped in water for twelve hours; they are then placed in damp straw and covered over with ashes for two days, until they begin to germinate. They are then sown in little circular hollows (*manda*) about three feet apart, two seeds being placed in each *manda*.

They have to be watered regularly, and when the plants begin to grow and send out creepers the *mandas* are joined up by ridges, along which the fruit is produced.

Cucumbers may be grown both as a *biali* and as a *rabi* crop.

158. Several varieties of gourds (*lau*) are grown, and nearly every cultivator has a plant in his homestead, but on a larger scale they are raised for the market on sandy lands by the riverside.

Holes are dug in the sand two or three feet wide and of the same depth, and filled at the bottom with loose earth and cowdung ashes. In this, about October, the seed is sown. The plants germinate rapidly, and send out creepers over the surrounding sand: in November-December they flower, and the fruit is ready for consumption in December or January.

159. Some account of the value of the crops grown in Orrissa will be found in a later Chapter (Chapter VIII, paragraph 178) on the material condition of the people.