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SAN HEMP  
(CROTOLARIA JUNCEA).

TA'G (Mara'thi).

BY

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SAN HEMP  
(CROTALARIA JUNCEA).

TA'G (Maráthi).

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INTRODUCTORY.

A practical cultivator will bear me out if I say that it is impossible to give specific directions regarding the best method of sowing *tág* (*Crotalaria juncea*) in India, or even in the Bombay Presidency. The soils in the Presidency differ in their composition and depth ; and the rainfall varies in its intensity and distribution. With these changing factors working implements, rotations and seasons of sowing vary. I therefore propose to give general hints regarding *tag* culture and to describe its cultivation where it is grown with advantage and success. Amongst the several methods described each man must select the one best suited to his circumstances and to his requirements.

The various uses of the crop are described. Each one gives an independent value. The crop is one which could and should be cultivated more widely than is at present done.

SAN HEMP  
(CROTALARIA JUNCEA).

TA'G (Marathi).

*I.—Botanical description.*

The annual stem is straight, smooth, striated, from four to eight feet high, branching towards the top, but more so when the plant stands single. Leaves scattered, short petioled, lanceolate, obtuse with a small bristle-like point, from two to six inches long, both sides covered with soft, silver-coloured hairs. Stipules subulate, small. Flowers in terminal racemes, papilionaceous, of a beautiful bright colour, each supported by an oval bract. Calix two lipped; the upper lip two-cleft, the under one two-parted in the middle. Of the yellow petals, the banner is obtuse, erect; the two wings oblong, obtuse; the keel much pointed, slightly twisted at the apex, and closely shut. Filaments ten, their lower half limited into one body, with a fissure down the upper side, which has a circular gape at the base; extremities free, and the alternate ones shorter than the others. Anthers on these linear; on the larger filaments ovate and two lobed. Legumes sessile, club shaped turgid, from one to two inches long, seeds numerous kidney shaped." (Roxburgh Flora India.)

*II.—Its uses.*

(a) *Tág* produces a good fibre which finds a ready market in Poona or Bombay and is the best to which the farmer can look for his ropes, the shepherd for his hurdles, and the fisherman for his nets. Its value as fibre will be considered more fully when discussing various systems of retting.

(b) It serves as a useful fuel and is commonly grown as such in regions where fuel is scarce and is in demand for *gúl* making.

(c) As a green manuring *tág* is very useful. The advantages of green manures are well known. *Tág* has many desirable qualities for this purpose. It is leguminous, sheds its leaves on the ground, is a deep feeder, a heavy yielder and of a hardy nature,

(d) As a *biwad* crop it occupies the first place amongst the crops in the Presidency. The term *biwad* is used in Maráthi of rotation crops. But it denotes more than mere rotation, and comprises all crops whose presence tends to improve the land by enriching it or by cleaning it. Thus leguminous crops are called *biwad*, and so is niger. Tobacco too is a *biwad* by virtue of the good cultivation and heavy manuring which it requires for itself, and the advantages of which it passes on to the succeeding crop. There is a proverb among Deccan cultivators that “tag and niger will help the falling cultivator”; since they thrive in almost all soils, require very small outlay or attention, and so cost little for the return which they make, while they leave the land richer than before.

(e) It provides seed for sowing and a *bhusa* which makes a useful feed for cattle.

In spite of this in many parts prejudices exist against its cultivation amongst high caste cultivators, who state that it is below their dignity to work out the fibre. Others consider it to be an unlucky crop. Its value will be more readily appreciated when it is remembered that it is only in the most advanced tracts that a systematic rotation, based on correct principles, is followed. As examples of the latter the following rotations practised may be mentioned.

*Krishna Valley* (in better class villages) for tobacco land :—

(A) Between Karád and Peit—

- 1 *Tág* for fuel or fibre.
- 2 Sugarcane.
- 3 Tobacco or *jowari*. (Andropogon Sorghum.)

(B) For lands on wells devoted to sugarcane—

- 1 *Tág* ploughed in and followed by tobacco.
- 2 Sugarcane.

*Násik District* :—

(A) *Násik* and *Sinnar* *tálukas* in *bagait* lands—

- 1 *Tág* ploughed in and followed by garlic.
- 2 Sugarcane or again *tag* (for ploughing in followed by rice, garlic or onions).

(B) Especially towards *Bez*, *Patane-Dabhadi* and *Thángaon-Pádali* in *Bagayat* lands—

- 1 *Tág* trampled in for rice (*Kamod*).
- 2 Sugarcane.

*Konkan* :—

- (A) (Thána District) in *Firayat* lands—  
 1 Rice followed by *tág* for fibre.
- (B) (Khed) in *Firayat* lands—  
 1 Rice followed by *tág* for fibre.  
 2 Rice do. *Múg*.
- (C) *Mal.* lands.  
 1 *Nagli.* (Eleusine coracana.)  
 2 *Tág* for fibre.  
 3 *Nagli.*  
 4 *Tág* or *múg.* (Phascolus mungo.)

### III.—*Its cultivation.*

The cultivation of tag varies with the object with which the crop is sown, and the climatic conditions of the locality.

*A.—Cultivation for fibre and for its beneficial effect on the soil.*

#### *Details of cultivation.*

In the western part of the Sátára District and the Kolhápur State, with a rainfall of about 40 inches, the preparatory tillage consists of one or two harrowings in the hot weather. Sowing takes place in August when the heaviest rain is over. The seed is drilled in lines 9 inches apart with a rate of 50 to 70 lbs. per acre. It germinates readily and from the third day from sowing the green rows appear. Within a fortnight it covers the ground. No further cultivation or weeding is required, for the rapid growth of the crop suppresses all weeds.

The seed ripens in about  $4\frac{1}{4}$  months but the crop is left over for five months till the leaves drop and the pods begin to rattle. It is harvested by pulling the stalks up by the roots, and allowed to lie on the ground for a few days, when it is bundled. Before threshing, the tops are sometimes cut off; but sometimes the seed is trodden out by men without cutting off the tops. The bundles of stocks are then stacked till the hot weather, when they are retted at leisure.

In Nasik, Khandesh and Surat, it is cut before it forms seed and retted at once. In the Southern Maratha Country, the crop is usually sold standing to Mahars and others who make a regular business of extracting the fibre. The exact period of harvesting and retting is mainly regulated by the availability of labour at

different seasons. In Gujarát the crop when intended for fibre is broadcasted in June, but when seed is the object, it is sown in November after rice has been harvested. In the Thána and Ratná-giri Districts *tag* grown for fibre is sown in the autumn after the rice harvest in such fields as still retain moisture.

The seed rate varies greatly according to local conditions. In rich soils in the Deccan with a moderate rainfall of about 30 inches the seed rate is as low as 25 to 35 lbs. per acre; but in other parts of the Deccan it varies from 50 to 80 lbs. In the heavy rainfall of the Konkan it amounts to as much as 90 lbs. per acre.

*Outturn in fairly good soil.*

Four hundred to seven hundred bundles of stalks (weight of bundle varies from 6 to 9 lbs. each), producing per acre 325 to 650 lbs. of fibre and 400 to 600 lbs. of seed.

Value of fibre 8 to 16 lbs. per rupee.

Value of seed 25 to 35 lbs. per rupee.

The accounts of an acre of *tag* grown for fibre roughly balance as follows, excluding the cost of fibre extraction:—

Outturn.			Cost.		
		Rs.			Rs.
500 lbs. of fibre	...	42	Two harrowings and sowing	...	3
500 lbs. of seed	...	16	Seed	...	2
Bhusa or chaff	...	3	Harvesting, threshing and retting, etc.	...	15
Stalk refuse	...	3			
		64			20

In places where wheat is taken after *tag* grown for fibre the *tag* has to be harvested before it forms seed. In such cases the value of the seed must be deducted from the above estimate. In such cases the fibre is softer and whiter and fetches a better price. It is also easier to extract.

B.—*Cultivation for fuel and its beneficial effect on the soil.*

*Tág* is commonly cultivated for fuel in the south of the Satara District and in the Kolhapur, Sangli and Miraj States. The furnace used for *gúl* making in these parts consumes much fuel, and the supply of fuel is scanty. The people depend much on *tag* to supplement their fuel supply and burn the stalks sometimes after

extracting the fibre, but often entire stalks and all; and occasionally without removing even the seed. Cultivation of *tág* works in very well with the sugarcane cultivation of this tract and it is common to see a patch of sugarcane and a patch of *tág* alongside of each well. The *tág* provides fuel for boiling down the juice of the ripe sugarcane, and at the same time provides a good seed bed for the new crop of cane which is planted as soon as the old one is removed. It improves the physical texture of heavy soil and its leaves add to the soil humus while the roots with the nitrogen forming nodules are always left in the soil in such cases. The cultivation is similar to that previously mentioned. The crop ripens in about 121 days, but is usually allowed to stand 150 days when it is cut and threshed.

Statement of value and cost for one acre of *tág* grown for fuel:—

Outturn.			Cost.		
		Rs. a. p.			Rs.
1,000 bundles of stalk	...	25 0 0	Harrowing and sowing	...	3
500 lbs. of seed	...	12 8 0	Seed	...	1
250 lbs. of chaff	...	2 8 0	Cutting and thrashing	...	6
		40 0 0			10

If the seed is not threshed the value of the seed and chaff must be omitted from the calculation. In this case however this material is more valuable for fuel.

It is true that the extensive use of this material for fuel is chiefly due to the use, in parts of the Deccan, of an ineffective furnace for boiling down sugarcane juice. A more effective furnace of the Poona pattern is now being introduced, and this will allow cultivators to devote the *tág* now grown for fuel to purposes of fibre extraction or green manuring.

#### C.—Cultivation for green manure.

The object of green manuring is to add organic matter to the soil, and so enrich it with nitrates, and also to improve the physical condition of the soil. The crop used for the purpose should be deep rooted, hardy and adaptable to varying conditions of the soil and weather. As it is intended to be ploughed in, it should grow fast and produce a large amount of green matter which will decay easily when turned in. The seed must be readily available and the



crop should be, if possible, leguminous. From all these points of view *tág* is a good crop. It produces a weight of 18,000 to 28,000 lbs. per acre when cut green just before flowering. It is hardy and has deep roots well covered with nitrogen forming nodules. A sample cut at the flowering stage and analysed by the Agricultural Chemist, Poona, gave the following analysis, *viz.* :—

Nitrogen 0·345 per cent.

Phosphoric acid 0·189 per cent.

Potash 0·407 per cent.

Moisture 80·5 per cent.

It will thus be seen that the crop, when turned under, gives to the soil per acre the following quantities of essential plant foods :—

Nitrogen 62 to 97 lbs.

Phosphoric acid 34 to 53 lbs.

Potash 73 to 114 lbs.

If we consider the case of a crop for which potash is the most important manurial constituent, as in the case of tobacco and compare *tág* with farm yard manure costing Rs. 3 to 4 per cart-load (1,200 lbs.), debiting the cost of the farm yard manure to the potash alone, we find that the *tág* crop is worth about Rs. 29 per acre as green manure. If we consider the case of a crop like sugarcane, where nitrogen is the most important manurial constituent, and compare *tág* with castor cake, debiting the cost of the castor cake to nitrogen alone, we find that *tág* is worth about Rs. 45 per acre as green manure.

Calculating the manurial value of *tág* in a more practical way, it may be stated that as an alternative to green manure, sheep are sometimes folded on land in preparation for tobacco. The charge for this sheep folding is Rs. 54 to 60 per acre ; and this gives a very fair estimate of the manurial value of the *tág* at current rates for manure. In parts of the Nira valley green manuring with *tág* saves as much as 40 cart loads of farm yard manure per acre, worth about Rs. 100, and produces superior results.

When *tág* is sown as a green manure for tobacco, *rabi-jowari* and rice there is no loss of the use of land, which would otherwise be fallow during the time that the *tag* is growing. In the case of rice the *tág* is sown with the first rains in the fields at the same time that the rice is sown in the seed beds, and is ploughed in quite young before the rice is transplanted. In this case there is no lack of water and it soon rots.

In the case of dry crops like tobacco and *rabi-jowari*, grown in retentive black soil, it is necessary that the ground should be fairly dry before the *tag* is ploughed in, otherwise the soil gets puddled. On the other hand, it is essential that the *tag* when ploughed should be properly buried and that rain should subsequently fall, otherwise it will not rot properly, nor will the ground become sufficiently compact. When conditions are favourable, the *tag* soon rots and the field is ready for the new crop in about a fortnight. It will be realised that the time for turning in the crop has to be chosen with care and discrimination with reference to the state of the soil and the prospect of subsequent rain. *Tag* sown as green manure for tobacco is in the Satara District generally turned in during August and the tobacco seedlings are planted early in September. If sown as manure for *rabi-jowari* it is usually turned in in September, and the jowari sown in October. Where there is fear of the late rain failing it would be wise to turn it in earlier. Its most important use as a green manure is perhaps for sugarcane. For this purpose it is sown in June, 40 or 50 lbs. to the acre. When it is about 5 feet in height and just about to flower it is cut close to the ground and the land is ploughed. The *tag* is laid in the furrow behind the plough buried by the earth turned over by subsequent furrows. Since the season for planting sugarcane will not then have arrived, in some cases *tag* seed is again broadcasted on the same land, and the crop is subsequently turned in. In the case of sugarcane the use of the land for *tag* prevents any other crop being grown, but a saving of from 25 to 40 cart loads of manure is effected and good results are obtained.

In Násik District *tag* is extensively used as a green manure for rice, onions, garlic and to some extent for sugarcane and wheat. Rice in the Sinnar and Dindori Talukas, onions in the Niphad Taluka and garlic near Sinnar are regularly manured in this way. In the tract between Malegaon and Nampur, however, the people are ignorant of the advantages of this practice, though the tract is well suited for it.

A few distinctive features of *tag* cultivation on the lands under irrigation in the Násik District deserve mention. The preliminary cultivation is much more thorough than in other parts consisting of two ploughings and one or two harrowings. After sowing, the seed is covered by a rake which consists of a seed drill with the tubes removed. For rice manuring the system of turning in the *tag* is to wait till the beginning of August, when it is four feet high, and then to level it with the body of an ordinary harrow (*kulav*) from which the blade has been removed. The *tag* is thus bent down into the water and

is then trampled under foot by a row of bullocks and mixed with the mud ; after which the rice seedlings are planted out. In the case of onions, garlic, etc., the plough used is a small one and the *tág* is not usually well covered. So the people flood the land after ploughing it in to assist it to rot. It is more satisfactory to cover the *tág* well ; and if this is done, no water is wasted.

In the Krishna valley the operation of ploughing in the *tág* is done with much care and thoroughness by means of the heavy wooden plough. For the plough itself 8 to 12 bullocks are used and 3 or 4 men ; and for handling the *tág* 8 additional men are necessary, 4 to cut the crop, three to lay it in the furrows, and one to cover up any stalks that may be left exposed. Though the result is very good, the labour is excessive. The iron turn wrest plough does the work better and requires only 4 bullocks and two men, while the labour required for cutting the *tág* and laying it in the furrow is the same. But it is probable that a still better plough for this purpose could be designed. In the Surat District a modification of green manuring with *tág* is practised. About 20 lbs. per acre of *tág* seed is broadcasted in the *suran* (*Amorphophallus campanulatus*) beds when the *surans* are planted in May. In six weeks time when the *tág* is about three feet high it is pulled up and broken into pieces and left lying in the *suran* fields to serve as manure.

#### IV.—Retting.

The method of retting adopted will depend on circumstances. Any shallow stream or pool about 5 feet deep will serve the purpose. In default of anything better the water trough attached to wells may be used ; a part of the water drawn from well may be diverted into the trough. In localities watered by canals or streams the *nallas* will be found to contain water and provide suitable pools for retting. Retting takes longer in cold weather than in warm weather, and longer in flowing water than in stagnant water. In shallow stagnant pools, the fermenting bacteria are not carried away by any flow of water and they do the work most rapidly. The operation takes from 3 to 7 days. It has already been stated that *tág* grown for fibre may be harvested at any time after it comes into flower. In the Nasik, Surat and Thana Districts the crop is harvested when it comes into flower and is retted green. In the Ratnagiri District though cut when in flower it is dried before retting. In the Southern Maratha Country the crop is left till dead ripe, and is dried in the sun before retting. The degree of maturity and the treatment of the crop after cutting affect the question of fibre

extraction. Early harvesting and green steeping render the work of separation easy. *Tag* retted green gives long lengths of fibre ; but when retted after drying the fibre breaks in the process of extraction. The fibre of young *tag* is soft and clean. That of mature and dried tag is rough and straw coloured, and has black marks on it. Consequently the former fetches better price. The fibre of the mature crop, however, is stronger than that of the immature crop. It will thus be seen that there are advantages on both sides. By harvesting early and retting green, a clean, long but somewhat weak fibre is obtained, which fetches better price in the market. By harvesting late and drying the stalks before retting, a shorter and dirtier fibre is obtained, but a stronger one, which may be more suitable for home use. By the latter process also seed for sowing and *bhusa* for cattle are obtained.