

January 1934]

Identification of sex in Ganja—2 FEB 2009 3

collected in the Bombay Presidency, but not in the other provinces. The inclusion of the suggested statistics and figures of these will be helpful to the Indian manufacturers of these articles, in that they will enable them to gauge the extent of the present as well as the possible future market for these in agriculture—the greatest industry in the country.

We trust that Madras will do likewise and give an impetus to indigenous agricultural engineering in the manufacture of improved implements.

IDENTIFICATION OF SEX IN GANJA (*CANNABIS INDICA* LAMK) BY BOTANICAL CHARACTERS

By P. SATYANARAYANA, M.Sc., B.Sc. (Ag.)

Assistant to Agricultural Chemist, Coimbatore.

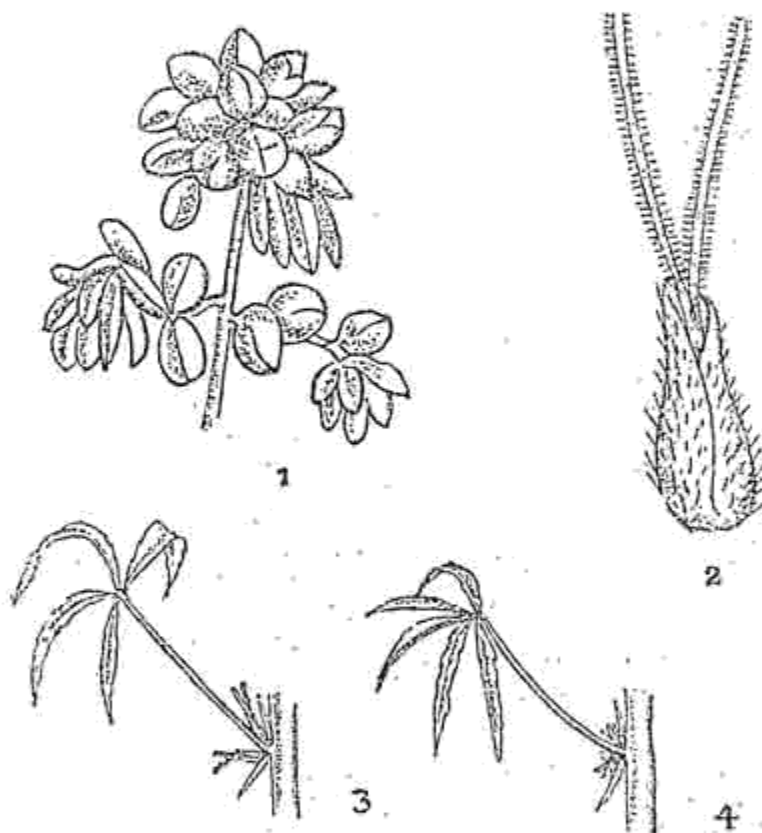
This piece of investigation which was undertaken as a subsidiary one during the course of the main investigation on "the causes into the deterioration of Ganja, and the best means of storing it", had given some useful indications which are likely to be of immense practical value in the identification of sex during the earlier stages of growth.

Ganja is essentially a dioecious plant, but it is not uncommon to see monoecious ones also on the field. Any number of variations in the floral parts such as the appearance of stamens in the pistillate flowers, the presence of a few male flowers in the midst of a female spike etc., were observed during the growth of the crop, and all these would have crept in under the continued methods of cultivation and other environmental changes.

The plants can easily be made out as either males or females when once the flowers open and show themselves out, but the problem was to identify the same during the earlier stages of growth, if possible by some differences in vegetative characters between the two sexes. This was necessitated by the fact that ganja (used as a drug and for smoking purposes) which is the inflorescence of the female plants, owes its intoxicating property to a resin contained in the floral tracts and smaller leaves, and its efficacy is supposed to be lost when once the females get fertilised, as the resin material is transformed into the seed material. This necessity for the identification of sex does not loom large in colder countries where ganja is grown solely for the sake of fibre, and the production of resin either never takes place, or even if formed, is practically nil. Though very many views have been expressed about the effect of fertilization on the resin content of the drug, the last word has not yet been said. Nevertheless, the identification and elimination of males seems imperative owing to the following reasons.

- (1) the male plants which do not form spikes like females and produce resin, are useless from the view point of ganja.
 - (2) by remaining on the field along with the females, (nearly 50% are males) they unnecessarily deplete the soil, and rob the other useful plants of their plant food.
- and (3) the plants being absolutely useless, if not detrimental to the other sex, involve the necessity of elimination at the time of harvest which means more labour and waste of time.

Previous workers (Prain. *Report on the cultivation and use of ganja*), stated that the males may show a tendency to have the lower leaves opposite, but such differences were not found to be of much use in the course of identification.



Two things should be borne in mind before the males can be considered harmful and they are, (i) the male flowers should fully mature, and (ii) they must shed their pollen. Even if some differences could be found either in the shape, size, or position of the respective floral parts in the earlier stages, they should be of immense use in the identification of sex. As far as vegetative characters were concerned, it was found to be almost impossible to detect any differences whatsoever between the two sexes. An examination of the floral parts has shown that the flowering generally commences from top. The male flowers are short, round or ovoid in shape, and occur in clusters. (Fig. 1). The female flowers are linear or spear-shaped and also occur

in clusters (spikes) excepting those that are seen in the leaf axils on the main stem. The female flowers even in very young stages sometimes show the presence of the two feathery stigmas (Fig 2). This difference in shape and size is so very characteristic and distinct that it can be made out as early as 30 to 40 days from the date of sowing. But, it is not worth while worrying about the identification at such an early age as that, as at that age the males are very immature and therefore quite harmless. Flowering on a pronounced scale takes place between 50 to 60 days after sowing, and it will be exceedingly easy to identify and eliminate at this age, and possibilities of committing any mistakes are few. A number of plants were examined with the differences noted above as the basis of identification, and a few of the results are seen in table I.

Table I.

Season.	Number of plants kept under experiment, and age.	Number of plants turning out male.	Number of plants turning out female.	Number of plants turning out monoecious	Percentage correct.
1927-28	50 (60 days)	47	2	1	94
1928-29	50 (33 days)	35	13	2	70
	50 (47 days)	46	2	2	92

The method of experimenting was as follows. The plants taken for the experiment were labelled and the probable sexes (in this case attempt was made to eliminate all males) noted. As the plants grew up and revealed their true nature, they were checked against the observations previously made and verified. As the results show, when identification is done at 50 days, 90-95% correct results are obtained. With a little more care and practice it may be easy to obtain 100% correct results.

Again, another interesting difference between the two sexes was noticed, and this was not so much in the floral parts. As was already indicated, the female plants besides the female flowers seen in spikes on the branches, have individual female flowers in the axils of leaves (one on either side of the leaf) on the main stem, and these are quite distinct and large, being linear or spear-shaped as the other females are. (Fig. 3). In many cases these will be the first to form seed. In the case of males, besides the male flowers occurring at the top in clusters, some leaf-like vegetative growths are seen in the axils of leaves (on either side) on the main stem, and the position of these corresponds to the individual female flowers seen in the case of the female plants. (Fig. 4). The place of these vegetative growths might as well be taken up by clusters of male flowers also. These out-growths are quite distinct and cannot be mistaken for the female flowers, as the females are always

single with a single tip (though they sometimes show the two feathery stigmas), whereas these (out-growths) generally have more than two tips. In a few cases, these out-growths appear like small branches also. In many of the plants observed, the appearance of these vegetative buds preceded flowering. For the results noted in table 2, only plants which had these vegetative growths were taken for the experiment and their sexes verified later. No trace of any flower was seen in any of the cases at the time of labelling for the experiment. The results of two seasons' test are seen in table 2.

Table 2.

Identification of males on the basis of leaf buds in the leaf axils on the main stem.

Season.	Total number of plants tested and a. e.	Number of plants turning out males.	Number of plants turning out females.	Number of plants turning out monoecious.	Missing.	Percentage correct.
1927—28	50 (60 days)	42	6	—	2	84.0
1928—29	50	44	3	1	2	90.0

The results being self explanatory need little comment. This shows that plants which show no trace of any flower on them, but only show such vegetative growths in the leaf axils on the main stem, can in ninety cases out of hundred be definitely put down as males and therefore eliminated. As the above results show, some females also appear to have such out-growths, but their percentage is very low.

Coming then to the practical aspect of the point, it was already pointed out that elimination and identification are easy after 45 to 50 days from the date of sowing. An examination of every plant sown does not appear necessary. The distance generally allowed between two plants in a row is 2½ to 3 feet, and when elimination is done it is easy to pitch upon two positive female plants at that distance and pull out all the intervening plants. This is easier, more time-saving and economical.

Summary.

(1) Male and female flowers can be identified by their shape, size and appearance in very early stages, the males are short, ovoid or round, and appear in clusters; the females are linear or spear-shaped, and occur in spikes, excepting the individual female flowers seen in the axils of leaves on the main stem.

(2) In case where no trace of flower is seen on the plant, the presence of small vegetative buds in the axils of leaves on the main stem is almost a sure indication of its being a male, if not a perfect male it will at least be a monoecious one which is equally bad.