

K U T .

(Saussurea Lappa - Compositae ).

Native of Kashmir, grows at altitudes from 9,000 to 12,000 ft. Valuable economic plant. Used both in India and China. China absorbs most of the crops. Parts used - root.

No exact figures for export are available at present, but they are larger than the old records available, when about 7,000 maunds (1 maund - 80 lbs) were exported annually.

This root is supposed to be the "costus" of the ancients and we have found sufficient data to believe that this is correct. At present it is used in perfumery, medicine, insecticides, etc.etc. Its uses have been restricted owing to the very closed character of the trade, the monopoly being held by Kashmir, no individual trader was allowed to export any part of the plant from Kashmir. However lately some cultivation has been started in Lahul, Kangra District, Punjab and it met with considerable success. From experiments here we believe that Kut can be successfully in the middle States of the U.S. The cultivation is extremely easy and the crop gathered every three years. We believe that the third year, as marking the first flowering season, is regarded as the period of full maturity. As already mentioned the extreme narrow bounds in which the kut trade is held has not contributed much to its improvement and development. No seeds are obtainable and no roots can be exported for propagation by means of cuttings. However quite lately some seeds occasionally found their way into the adjacent localities (Lahul, for instance) and cultivation on a small scale began. It is plausible to think that once the cultivation could be conducted scientifically and the quality improved as well as guaranteed for export the root will find a much wider application. Local kut has been largely



adulterated and while selling for Rupees 210/- to Rs:250/-/- per maund on the open market, better prices would be fetched by a high grade quality. To this effect dealers have repeatedly testified. The present price of Rupees 240/- was almost double in the pre-depression days, that is up to 1929 or even 1930. The present economic conditions of China have affected the price. An experimental plantation has been started at Urusvati with very encouraging results. Kut very often associates with birches and would do well in any place where birches grow. It stands frost well, is very hardy and provided the soil was suitable, needs very little attention.

The fact that the plant has not been really cultivated so far, and the high price it fetches, make it a very interesting plant to introduce for economic purposes into the U.S.

There has been gathered all the necessary data pertaining to the cultivation of kut and further research is being conducted .



Saussurea Lappa (N.O. Compositae)

The Costus

Vern.- Sans.- Kushtha, Kashmirja; Hind.- Kut, Kust; Beng.- Pachak, Kur; Bomb.- Ouplate; Tam.- Goshtam; Arab. & Pers.- Kust.

Indigenous Drugs of India

R. N. Chopra

Pages 377-385 inc.

Saussurea lappa is a tall, stout herb having an annual stem and perennial roots. Many species of Saussurea grow in the Himalayas at an altitude ranging from 2,000 feet to 13,000 feet above the sea level. The only species which has been used for its medicinal properties is S. lappa which grows in the north-western portion of the Himalayas, especially on the moist slopes of the mountains round the valley of Kashmir. The plant is well-known both in the Ayurvedic and Tibbi medicine. For a long time a good deal of confusion existed as to which one of the large number of species of Costus was used for its medicinal properties by the ancients, but Guibourt first suggested the correct botanical source and Falconer, who visited Kashmir, proved beyond doubt that the root of Aucklandia costus- now known as Saussurea lappa- was the species. The plant grows as a very stout herb with large heart-shaped leaves, and thick perennial roots which are dug up in the autumn and are exported to Calcutta and Bombay in large quantities. From there the root is shipped to China in large quantities and to the Red Sea ports, and is used as a spice, as an incense and medicinally. The uses of this



root have been summarised by Baden Powell in his 'Punjab Products' in the following terms:-

"1. Dried and powdered as the principal ingredient in an astringent stimulant ointment, applied to severe ulcerations.

2. Dried and powdered as a hair wash.

3. As a stimulant in cholera; an infusion made of cardamoms 1 dr., fresh kut 3 drachms, water 4 ounces. One ounce every half hour. It is doubtless a powerful aromatic stimulant, and would be serviceable in any spasmodic disease.

4. It is universally employed by shawl merchants as a protector of Kashmir fabrics from the attacks of moth and other vermins.

5. The dried root is an agreeable fumigatory and yields excellent pastilles which burn fairly well.

6. It is exported in enormous quantities to China, where it is used as an incense. In every Hong it is found; no mandarin will give audience until the 'patchak' incense smokes before him; in every Joss-house it smoulders before the Tri-budh deity; in every floating junk in the Chinese rivers, the only home of countless hordes- Budh's image is found, and the smoke of the 'patchak' religiously wends its way heavenwards..... It is said to have the power of turning grey hair black. Carminative, stimulant, anti-septic, prophylactic, astringent, sedative, and insecticidal properties are ascribed to this remedy. The Chinese apply it with musk to aching teeth."

The root is smoked in parts of India and in China as a substitute for opium.



The Kashmir State authorities have found such a large demand for this root that they have started nurseries and cultivate the plant in suitable places for purposes of export. The value of the root may be judged from the fact that its market price in Calcutta at the present time is over Rs. 300/- per maund, i.e., about five rupees or seven shillings per pound. For this reason the root offered for sale is frequently adulterated with the root of *Salvia lanata* or *Ligularia* and one of the aconites.

The root only is used in medicine. It is dug up during the months of September and October and is collected in small pieces 2 to 6 inches long. It has a pungent taste, a peculiar fragrant aromatic odour resembling that of the orris root. In the Hindu medicine the root has been used from the earliest ages. It has been described in the 'Nighantu' as a stimulant, useful in cough, fever, dyspepsia, skin diseases and as an aphrodisiac. It is said to be particularly useful in the disease arising from deranged air and phlegm and asthma. The Mohammedan physicians describe it as a diuretic and anthelmintic and use it in the treatment of quartan malaria, leprosy, persistent hiccough and rheumatism. The dried powder is the principal ingredient in a stimulating ointment used for application to ulcers. It also forms part of a stimulating mixture used against cholera asiatica.

Chemical Composition:- This drug was analysed many years ago (1892) by Schimmel & Co., was found to contain about 1.0 per cent of an essential oil with a strong fragrant odour. The root



forms a very valuable raw material for producing a perfume which closely resembles the violet perfume, and is at present very highly priced. Later, Semmler and Feldstein thoroughly studied the oil and found that it had the following approximate composition:-

Camphene 0.04 per cent; phellandrene 0.4 per cent; terpene alcohol 0.2 per cent; A-costene 6.0 per cent; B-costene 6.0 per cent; aplotaxene 20.0 per cent; costol 7.0 per cent; di-hydrocostus lactone 15.0 per cent; costus lactone 10.0 per cent; costic acid 14.0 per cent.

Little or no attention was paid to the other constituents of the root although Hooper referred to the presence of small quantities of a body of alkaloidal nature. Later, Ghosh and his collaborators (1929) reinvestigated the root and succeeded in isolating an alkaloid. The following constituents were separated by them from the root:- (1) An essential oil 1.5 per cent; (2) an alkaloid for which the name saussurine has been suggested 0.05 per cent; (3) resin about 6.0 per cent; (4) traces of a bitter substance; (5) small quantities of tannins; (6) inulin about 18.0 per cent; (7) fixed oil; (8) potassium nitrate, sugars, etc. The leaves of *S. lappa* have also been analysed. They do not contain the essential oil but 0.025 per cent of the same alkaloid as is contained in the root.

Pharmacological Action:-Essential Oil.- In such dilutions as 1 in 10,000 the essential oil kills *Paramecium caudatum* in 10 minutes. It has strong antiseptic and disinfectant properties especially against the streptococcus and staphylococcus. Internally, the oil has a pungent, bitter taste and gives rise to a feeling of



warmth in the stomach when taken in small quantities. When the extract made from the root is given by the mouth in such large doses as 10 to 20 c.c., it gives rise to a certain amount of irritation and a feeling of discomfort in the abdomen which may last for several hours, the patient at the same time feeling somewhat drowsy. The essential oil has marked carminative properties. On the isolated intestines of the rabbit even in such high dilutions as 1 in 120,000 it has the effect of inhibiting the peristaltic movements and producing relaxation of the gut. Vaso-dilatation is produced in the splanchnic area after intravenous injection of the essential oil. On the circulation the essential oil produces a definite stimulant action. A saturated solution of the oil given intravenously in experimental animals, produced a small but persistent rise of blood pressure; the isolated heart of the rabbit showed a distinct acceleration of both the amplitude and the rhythm. On the lungs, intravenous injections of the essential oil had a bronchodilator action. It is absorbed from the gastro-intestinal tract and is partly excreted by the lungs producing an expectorant action and partly by the kidney producing diuresis. On the central nervous system the effect of the essential oil resembles that of other volatile oils. Large doses of the extract produce giddiness, headache and drowsiness which cannot be attributed to any of the other active principles. Inhalation of smoke of the powdered root produces a marked depression of the central nervous system and for that reason it was smoked as a substitute for opium.



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The Alkaloid Saussurine:-Chopra and De (1929) investigated the effect of saussurine tartrate on the involuntary muscle tissue generally and on the lungs and bronchi particularly. It was shown that in animals the alkaloid produced a definite relaxation of the bronchioles in the same way as adrenaline does. The action was not so powerful as that of adrenaline, takes longer to develop but persists for a much longer time. The alkaloid appears to act chiefly through the vagus centre in the medulla, though direct action on the involuntary muscle fibres of the bronchioles has also some part to play. Saussurine also has a general depressing action on the other involuntary muscle tissues in the body. It decreases the tone of the intestine and stops the peristaltic movements of the gut, if it is given intravenously in animals. The action is partly on the vagus but chiefly on the muscle fibres themselves. Intravenous injections of the alkaloid produce a slight rise of blood pressure in animals due to stimulation of the myocardium. The effect is much more marked on the ventricles than on the auricles. The administration of saussurine revives a failing heart, the beats becoming regular and forceful.

Therapeutic. Uses:- Following up the anti-spasmodic, broncho-dilator and expectorant actions of the drug, it was extensively tried in the treatment of bronchial asthma. The preparation used for administration was an alcoholic extract prepared from the root, which contains the essential oil as well as the alkaloid; this was given in 1/2 drachm doses. This is prepared in the



following manner:-

The powdered root (40 mesh) is percolated 6 to 8 times with 90 per cent alcohol in the cold till nearly exhausted. The major portion of the alcohol is distilled off and the residual extract is concentrated so that 1 c.c. of the extract corresponds to 1 gm. of the air-dried drug.

It has already been shown that saussurine has a depressant effect on the vagal tone. At the same time the essential oil during its excretion the bronchial mucosa not only relaxes the involuntary muscle fibres of the bronchioles but also liquefies the tenacious sputum and produces a well-marked expectorant action. In this way not only is the spasm relaxed but the congestion of the bronchial mucosa is also relieved. The respiratory passages are thus cleared and the attack is subdued. The author's experience, so far as asthmatics in this country are concerned, is that although they suffer from hyper-excitability of both the para-sympathetic and sympathetic systems, they show a greater degree of irritation of the vagus than that of the sympathetic. The action of the vagus is increased owing to certain causes not only producing spasm of the bronchial musculature but also vaso-dilatation of the bronchial mucosa. These effects can be relieved by atropine and to a much lesser degree by inhalation of fumes of stramonium, tobacco leaves, etc., which diminish the vagus action, or adrenaline, ephedrine, etc., which stimulate the antagonistic action of the sympathetic. In the vagal predominance adrenaline has only a slight and evanescent effect in overcoming attacks. Not uncommonly the



injection of a few minims of this drug may produce a high rise of blood pressure and irregular action of the heart. Neither adrenaline nor ephedrine are suitable in these patients and we have to look for something which will depress the vagal mechanism. The disadvantage of atropine and allied substances is that although they depress the terminations of the vagi they do not relieve the turgescence of the bronchial mucosa. In fact, on account of their tendency to decrease the secretion, they make the sputum more viscid and difficult to expectorate. This is the reason why they are often combined with such drugs as potassium iodide which render the sputum more fluid. This would also explain the beneficial effects produced by *S. lappa* in the vagotonic type of asthma. The drug fails in those patients in whom the causal factors are very potent. Such patients have a high degree of eosinophilia, which is an indication that strong toxic bases are being absorbed into the circulation from some focus, where such factors as a lesion in the nose, enlarged lymphatic glands in the chest, pathological change in the gastro-intestinal tract, etc., are present. Even in these patients the drug gives some relief though it may be temporary.

Besides the direct depressant action of the alkaloid on the vagal centre there is another important factor concerned in the anti-spasmodic effect of the drug and that is the reflex inhibition produced by the essential oil, which is an irritant and has a strong penetrating and persistent odour and taste when it enters the stomach. The depressant action of the drug on the algescic areas of the brain also further helps in relieving the spasm. All these factors undoubtedly account for the rapid effect of the drug in



cutting short the paroxysms and stopping further attacks when the extract is being given. The strong smell and the taste of the drug though advantageous in one way have disadvantages also. There are some patients, fortunately a small minority who cannot take the drug on this account and if it is forced on them they vomit it.

The extract is either given by itself in a little water or in the form of a mixture, e.g., pot. iodide or pot. bromide gr. v to x. tr. belladonna m. iii to v, tr. lobelia aetheris m.x., ext. Saussurea lappa liq. 1/2 to 1 dr., spt. chloroformi m. x., aqua ad one ounce.

The patient is generally advised to take the mixture 3 to 4 times a day and keep a dose by his side when he goes to bed at night. This should be taken immediately when the premonitions of an attack are felt, the paroxysms is usually aborted and the patient goes to sleep again. The disturbance of sleep produced is comparatively much less than if an injection of adrenaline has to be taken or an asthma cigarette has to be smoked. The depressant action of the drug on the central nervous system further helps the patient to fall quickly to sleep. It is better to give the extract by itself, when the drug is being administered to cut short a paroxysm.

The author prefers to prescribe it in a mixture, specially when the administration has to be continued for some time to prevent further recurrence of the attacks while the causal factors are being investigated. The drug has no cumulative effect and, therefore, it can be continued for long periods without producing ill effects. No marked tolerance to the drug is observed so that there is no



necessity for the dose to be increased. It is preferable to give it for ten days or a fortnight and then to stop it to see if the attacks recur. In many patients in whom the paroxysms are merely due to irritation through some temporary and not a deep-seated cause, the extract combined with general treatment frees the patient for months or years from attacks and the paroxysms do not recur till these factors operate again. It should be understood, however, that the treatment of this symptom-complex is not so easy as would appear. The cause giving rise to the attacks should be discovered and remedied, but this often is not an easy matter and may take considerable time. Unless this is done, a permanent cure cannot be expected.

In the indigenous medicine in India the root of *S. lappa* is used as an aphrodisiac and as a tonic. It has already been pointed out that the essential oil is excreted in the urine and during its passage through the urethra it may produce a certain amount of irritation giving rise to aphrodisiac effects. In the old Sanskrit books the drug has been suggested as a remedy for malaria. It has been tried in a number of cases of different types of this disease with no benefit whatever. The Mohammedan physicians recommend it against rheumatism, as an anthelmintic and against persistent hiccup. While we have undoubtedly obtained beneficial results in the last-named condition, we are unable to attribute any anthelmintic properties to the drug. We have tried the powdered root as well as the alcoholic extract against hookworm, ascaris, trichuris and taenia infections with entirely negative



results. Experiments in vitro with a number of these entozoa also showed that the drug was entirely without effect even in very high concentrations. The root, because of the essential oil it contains, is undoubtedly an insecticide and for that reason is used as a protective of shawls and other woolen fabrics. The drug has also been extolled for its beneficial effect against leprosy, but Dr. Muir in charge of the Leprosy Research tested both the powdered root as well as the essential oil in a number of patients without any benefit.

SUMMARY:- Saussurea lappa or kut root grows on the moist slopes of the Northern Himalayas at a height of 8,000 to 13,000 feet above the sea level. The chief active constituents of the root are:-  
(i) An essential oil 1.5 per cent., (ii) an alkaloid which has been named saussurine 0.05 per cent., (iii) resin 6.0 per cent. Besides these, there occur a large amount of inulin, traces of a bitter substance, small quantities of tannins, potassium nitrate, sugars, etc. The leaves contain no essential oil but 0.025 per cent of the alkaloid saussurine. The essential oil has a strong aromatic penetrating and fragrant odour. It has antiseptic and disinfectant properties; it relaxes the involuntary muscle tissue and it is a cardiac stimulant, a carminative, an expectorant and a diuretic. The alkaloid saussurine has a depressant action on the vagus centre in the medulla as well as on the involuntary muscle fibres of the bronchioles and gastro-intestinal tract. It produces



a slight but persistent rise of blood pressure and increases the force of contraction and amplitude of the ventricles. The drug has a remarkable effect in controlling attacks of bronchial asthma, especially those of the vagotonic type. The paroxysms are cut short by the combined action of the essential oil and the alkaloid present in the root. The essential oil during its excretion in the lungs not only relaxes the bronchial muscle but has a marked expectorant action which relieves turgescence of the mucosa. It may be pointed out, however, that although the drug relieves asthmatic attacks, it does not produce a permanent cure unless the causal factors are investigated and removed. The drug is also useful in persistent hiccough. The drug has no anthelmintic action, nor has it any action against malaria, leprosy and rheumatism as has been claimed by writers of the indigenous systems in this country.

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Saussurea Lappa, Clarke

The Kuth Plant

Nat. Order Compositae. The Composite family Name.  
The generic name was given in honor of a celebrated  
botanist by the name of DeSaussure. The local name  
in Kashmir is "Kuth". The sanskrit name is "Kushta"  
or "Kashmirja", the latter name indicating Kashmir  
as the locality from whence the root of the plant  
was exported. In Calcutta the root is known as  
"pachak". It is supposed to be the Costus of the  
ancients, and the root is often referred to under  
the name of "Costus" root. One of its synonyms is  
"Aucklandia costus."

The above was copied verbatim from "Wild Flowers of  
Kashmir by B.O. Coventry London p.51.