

# **CURCULIGO ORCHIOIDES: A PLANT FOR HEALTH CARE**

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## **Introduction**

One of the highly useful plants in the indigenous system of medicine is *Black musale* (*Curculigo orchioides*). It was a common plant in the backyard of every house in Kerala, but has almost disappeared from the face of our surroundings. *Nilappana*, as is known in Malayalam, is a small, geophilous herb, the tuberous rootstock of which is used as a rejuvenating and aphrodisiac drug. It cures morbid *vata* and *pitta*, improves complexion and is useful in general debility, deafness cough, asthma, piles, skin diseases, impotence, jaundice, urinary disorders, leucorrhoea and menorrhagia. Rootstock is the officinal part and it enters into the Ayurvedic formulations like *vidaryadighrta*, *vidaryadi lehya*, *marmagulika* and *musalyadi churna*.

## **Nomenclature**

*Curculigo orchioides* Gaertn. of Amaryllidaceae is known as Golden eye grass or Black Musale in English, Talamuli in Sanskrit, Kalimusli in Hindi, Nilappana in Malayalam and Nilapanai in Tamil.

## **Ecology**

It is believed to have originated in the shady forests of Asia. The plant is distributed in plains and shows prostrate growth on moist fertile soil. It is found in all parts of India from near sea level to 2300m altitude, especially in rock crevices and laterite soil. It has been recorded to occur in the subtropical Himalayas from Kumaon eastwards ascending to 1800m, the Khasia hills, Bengal, Assam, Konkan, Kanara, the western peninsula and Tamil Nadu extending south as far as Cape Comerin. It is also distributed in Sri Lanka, Japan, Malaysia and Australia. The demand of the raw materials and derivatives of the plant for the indigenous drug industries is satisfied mainly from the wild source, depleting the natural population. In the CAMP workshop at IIFM (June 1999) *Curculigo orchioides* was included in the IUCN category of "LOWER RISK near threatened".

## **Botany**

*Curculigo orchioides* Gaertn. syn. *C. malabarica* Wight, *C. brevifolia* Dryand belongs to the family Amaryllidaceae. Some botanists designate it as *Hypoxis dulcis* Stand under the family Hypoxidaceae. It is a small herbaceous plant with an elongated tuberous rootstock and lateral roots; Root stock elongate, 5-25cm, vertical; Leaves (5-20 x 0.8-1.5cm), very much variable, narrowly linear to lanceolate, acute, plicate or flat, crowded on the short stem with sheathing leaf bases; Petiole short to 3cm, often absent; Flowers throughout the year, light yellow, bisexual, sessile, regular, 1.2cm. Perianth six lobed, lobes yellow (0.6-1 x 0.2-0.3cm), stamens-6, filaments 2mm, filiform, anthers 2mm, ovary 3celled, oblong to 4mm. Ovules numerous per cell, style 2mm, stigma-

3, lobes elongate; Fruit oblong, 1.5-2cm long 8mm broad; Seeds 8, globose, 1-2mm, black, beaked, deeply grooved in wavy lines.

### Part Used

Rootstock/rhizome, leaf, root or whole plant.

### Pharmacognosy

The quantity and kind of starch grains, the type of bundles of calcium oxalate crystals and of mucilage cavities in the periphery of the rootstock are very characteristic and the pharmacognosy of *C.orchioides* has been discussed by Aiyer and Kolammal (1963) and Raghunathan and Mitra (1982). Thin slices of the rhizome without root hairs are employed in drug formulations.

### Phytochemistry and Secondary Metabolites

Rao and Beri (1951) have identified glucose, mannose, xylose and glucuronic acid from the rootstock of *C.orchioides*. The rootstock is also reported to contain glycoside, polysaccharides (hemicellulose and other polysaccharides), starch, resin, tannin, mucilage, fat and calcium oxalate. The hexane extract contains an alkaloid-lycorine, sterols including  $\beta$ -sitosterols and sapogenin identified as yuccagenin. The flavone glycoside from the rootstock has been identified as 5,7-dimethoxy glucopyranoside. Mehta *et al* (1980) have isolated a number of fatty acids from *C.orchioides* root oil by GLC techniques. They are palmitic, oleic, linolenic linoleic, arachidic and behenic acid. Kubo *et al* (1983) isolated a phenolic glycoside, namely, curculigoside from the rhizomes and its structure has been elucidated as 5-hydroxy-2-O- $\beta$ -D-glucopyranosyl benzyl 1,2,6-dimethoxy benzoate. Yamasaki *et al* (1994) developed HPLC method for estimating the curculigoside content in *Curculigo* rhizome.

Two aliphatic hydroxy ketones, 27-hydroxy tricontan-6-one (M.P. 84-85°C) and 23-hydroxy tricontan-2-one (M.P 109-110°C), were isolated from the rhizome (Misra *et al*, 1984a, b). They further isolated 21-hydroxy tetracontan-20-one and 4-methyl heptadecanoic acid from the rootstock. Porwal *et al* (1988) have isolated and identified three new compounds from the rhizome as N-acetyl-N-hydroxy-2-carbamic acid methyl ester, 3-acetyl-5-carbomethoxy-2H-3,4,5,6-tetrahydro-1,2,3,5,6-oxatetrazine and N, N, N', N'-tetra methyl succinamide. The rhizomes of *C.orchioides* yielded a phenolic glycoside (orchioside), characterised as orcinol-3- $\beta$ -D-xylopyranosyl-(1 $\rightarrow$ 6)-  $\beta$ -D-glucopyranoside and Hentriacontanol (Garg *et al*, 1989).

An aliphatic compound has been isolated from the rhizomes and characterised as 25-dihydroxy-33-methyl pentatricontan-one. Misra *et al* (1990) isolated a natural triterpene alcohol-curculigol characterised as 24-methyl cycloart-7-en-3- $\beta$ -20-diol. A novel pentacyclic triterpene has been isolated from the rhizomes of *C.orchioides* and characterised as 31-methyl-3-oxo-20-ursen-28-oic acid. Xu and Xu (1992) and Xu *et al* (1992a,b) have isolated 13 cycloartane types. Triterpene glycosides from *C.orchioides* rhizome were characterised as curculigo saponin A-M.

A glycoside 5, 7-dimethoxy myrcetin 3-O-L-xylo- pyranosyl 4-O-  $\beta$  -D glycopyranoside is present in the rhizomes. Free sugars, mucilage, hemicellulose and other polysaccharides are also

present.  $\beta$ -sitosterol and crystalline needles of sapogenin have been detected. The chloroform extract also indicated the presence of alkaloids.

### **Pharmacology**

The root stock is mucilaginous, sweet, cooling, bitter, emollient, diuretic, aphrodisiac, depurative, alternative, appetiser, carminative, virilogenic, antipyretic and tonic. Bhavamisra described it as generally strength-giving and aphrodisiac.

The plant extract of *C. orchoides* showed hypoglycaemic, spasmolytic and anticancer properties. The uterine stimulant activity of the flavone glycoside extracted from *C. orchoides* has been studied. Phagocytic activity and immunoadjuvant activity of phenolic glycosides, curculigoside isolated from the rhizome of the plant have been reported. Porwal and Mehta (1985) discussed the medicinal importance of the plant and its use in indigenous system of medicine as a tonic. Sharma *et al* (1991) reported the influence of MAK an ayurvedic food supplement constituting *C. orchoides* against dimethyl benz anthracene induced mammary tumours in rats. Samanta (1992) reported the modulation of male infertility by Ayurvedic drug constituted by *C. orchoides*. Immunostimulant activity of *C. orchoides* has been demonstrated by Saxena (1992). Immunological activities of *Curculigo* saponin G were assayed in mice and it promoted proliferation of spleen lymphocytes very significantly and increased the weight of the thymus *in vivo*.

Pharmacological studies in China, on the alcoholic extract obtained from the plant showed several active effects such as adaptogenic, anti-inflammatory, anticonvulsant, sedative, androgenic and immunopromoting activities. It helps to overcome erectile impotence by relaxing the smooth muscles of corpora cavernosa, the erectile tissue whereby more blood can be pumped into it. The plant yields a flavonone glycoside which is a powerful uterine stimulant in guinea pigs, rats and rabbits, notwithstanding the gravid or non-gravid state. Other aspects of its endocrine pharmacology need to be studied.

It is a stimulant to the kidneys. It is used to remove from the body any obstructions caused by a cold nature, for lack of sexual arousal in males and females and ease pain in the lower back, which might be kidney related, as well as pain in the joints caused by buildup of waste products. It delays ageing process and form health food ingredients in several Ayurvedic formulations.

### **Indication**

It is useful in pruritus, skin diseases, asthma, bronchitis, jaundice, diarrhea, cuts and wounds, colic, vomiting, erectile impotence, spermatorrhoea, general weakness, burning, fatigue, piles and menorrhagia.

### **Contraindication**

In the recommended dose (5-15 grams of the powdered rootstock), no adverse reactions have been reported.

## Uses

It is used extensively in ayurvedic formulations like *Vidaryadighrta*, *Vidaryadi lehya*, *Marmagulika*, *Musalyadi churna* etc. for a wide variety of ailments, especially as a general tonic and as an aphrodisiac. In the Philippines, it is used for skin diseases. It is also used as an edible flour by many tribal people to increase the root energy. It tonifies kidney, adds warmth and serves as a general tonic, diuretic, demulcent and as an aphrodisiac. In the folklores it is used in lumbago, weak kidneys, neurasthenia, urinary retention, chronic nephritis, impotency, bedwetting; hypertension; chronic arthritis; weakening of the knees and lumbar regions; numbness of the four limbs and rheumatic arthritis. It is useful as a restorative, rejuvenating and aphrodisiac drug. It improves complexion and is useful in general debility, deafness, cough, asthma, piles, diarrhoea, gonorrhoea, skin diseases, impotence, jaundice and urinary disorders.

## Traditional prescriptions

It has been prescribed in various combinations and doses by tribals and traditional vaidyas for a number of ailments and disorders as acidity, blood cancer, diabetes, epilepsy, hernia, hemicrania / headache / vertigo, leucosis, loss of appetite, old age, paralysis, rheumatism, ring worm, spermatorrhoea, worm infection, wounds and for cooling of stomach, dizziness in cattle and poison removal.

## Commercial Formulations

Some of the commercial formulations containing *Curculigo orchoides* are kama sutra capsule (ALMA HEALTH CARE ), vigorous capsule (TAMPCOL), strong-nite capsule (MEDIMIX), meno-peace capsule (D'ARCY NATURAL), potency plus (CHINESE ), braincare 2000 (CHINESE ), vaipani kamon (VAIPANI) and sharmiotone syrup (SHARMILA) which are claimed to be rejuvenative, energizer or aphrodisiac.

## Crop Culture

The planting material is available from AMPRS, Odakkali. The crop prefers shade and grows best as intercrop. Soil should be sufficiently moist to get maximum tuber development. The plant is propagated through rhizomes with crown. New propagules also emerge from leaf tips especially during rainy season. Raised beds of convenient length and breadth are taken. FYM at 20t/ha is incorporated into the soil. The rhizomes are planted at a spacing of 10-20cm. The soil is mulched immediately after planting. The plant being very slow growing, two to three weeding followed by earthing up are essential to control weed competition and facilitate better rhizome development. The rhizomes are easily relished by rodents necessitating precautionary measures for effective rodent control for which intercropping with *Plumbago rosea* is suitable. The plant is harvested after 8 months as annual or after two years as biennial. Rhizome yield is 1-2 t/ha. The rhizomes are cleaned, sliced, dried and marketed.

## Quality variation in market samples

The quality variations in the market samples of *Curculigo orchoides* were studied at AMPRS, Odakkali by drawing samples from four districts of Kerala. The results indicated much variability in the quality of market crude drug samples (Table 1). Raw drugs come from different areas. There would be admixture of adulterants and allied plants, variation in maturity, difference in soil and climatic conditions, difference in storage and handling, etc. The variability in quality may further be due to the fact that non-discript materials are being collected as crude drugs from the wild. These indicate the non-uniformity of the crude drugs available in the market. This calls for evolving standards at raw drugs stage for maintaining quality in the final product. It also underlines the fact that medicinal plants need to be brought under cultivation if uniform quality raw drugs have to be made available in the market.

Table 1. Quality of *Curculigo orchoides* crude drug samples

Place of Collection	Ash (%)	Protein (%)	Starch (%)	Fibre (%)	N (%)	P (%)	K (%)	Ca (%)
Kottayam	2.92	4.90	15.17	19.97	0.784	0.101	0.479	1.521
Muvattupuzha	5.02	4.94	34.08	20.33	0.790	0.110	0.838	1.227
Ernakulam	4.90	4.73	17.41	22.08	0.756	0.076	0.903	1.668
Thrissur	3.93	5.36	23.49	23.62	0.857	0.180	0.725	1.129

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***Curculigo orchioides* plant**



**Rhizome**



**Market crude drug**