



Ethnobotanical potential of *eulophia* species for their Possible biological activity

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ABSTRACT

The Genus *Eulophia* includes mostly terrestrial species and distributed worldwide In various states of India, rural and tribal communities such as Bhill, Garasia, Gujjar, Kathodi, Korkus, Koyas, Meena, Oriya, Paliyan, Pardhi, Pawara, Tadvi and Wanjari etc. use ethno-botanical potential of different *Eulophia* species for various ailments especially fertility, aphrodisiac, skin protective, vermifuge, antiscrofulous, anti-bellyache, anti-rheumatic antifitigue, wound healing and antitumour activity. The aim of this review is to survey ethno-botanical potential of different *Eulophia* species as per their vernacular name, part used, active ingredients and possible therapeutic remedies. About 30 species occur in India including *Eulophia herbacea*, *Eulophia nuda*, *Eulophia ochreatea* and *Eulophia ramentacea* found in Khandesh region of Maharashtra state. Mostly tubers are used as medicine. The tuberous roots or rhizomes of 11 *Eulophia* species are rich in bioactive substances like Eullophiol, Nudol, β -Sitosterol, β -Sitosterolglucoside, Ephemeranphol, Fimbriol, Lusianthridin. These constituents would be used as phytosomes to have better efficacy as therapeutic drugs. The present review also emphasizes that such folk claims need proper formulation, investigation and its validation by experimentation especially with respect to fertility and aphrodisiac activities.

Keywords: Aphrodisiac, Ethnobotany, *Eulophia* species, Fertility, Khandesh region, Phytosomes.

INTRODUCTION

Plants, animals and minerals are used in medicines by man since prehistoric time. Plants provide a variety of potent drugs, to prevent and cure diseases where the synthetic drugs fail.¹ India has great variety of herbal wealth due to its ecological and climatic diversity. Art of herbal healing is deep rooted in Indian culture and folklore. Even today in most of the rural and urban areas also, people depend on local traditional healing system for their primary healthcare. Especially the tribals of remote areas of India are mostly dependent on herbs for their healthcare. In China also orchids are used to improve appetite, to stimulate gastric secretion and to promote general health.²

Orchids are the most beautiful flowers and comprise a unique group of plants. The family Orchidaceae to which orchids belongs is the largest family among monocotyledons containing 600 - 800 genera. Orchids include terrestrial, epiphytic and saprophytic forms. Most of the terrestrial forms are having valuable medicinal properties. The Genus *Eulophia* comprises perennial terrestrial orchids with fleshy tubers, rarely pseudobulbs. The Genus *Eulophia* includes about 230 species mostly terrestrial and distributed worldwide, many of them are attractive (Figure 1) and showy.³ The plants have green leaves which are not always visible at flowering. Ethnobotanical studies are carried out in ethnically different groups of Andhra Pradesh, Himachal Pradesh, Kerala, Madhya Pradesh, Maharashtra, Orissa, Rajasthan, Tamil Nadu, Uttarakhand, Utter Pradesh, West Bengal, Zharkhand states of India and out of India also. This has resulted in the documentation of 18 *Eulophia* species for

their ethno-botanical uses by various ethnic groups throughout India viz. Bhil, Garasia, Gujjar, Kathodi, Korkus, Koyas, Meena, Oriya, Paliyan, Pardhi, Pawara, Tadvi and Wanjari.

Bhattacharjee⁴ reported 22 species of *Eulophia* in India. Today there are 30 Indian *Eulophias* found. These 30 Indian *Eulophias* are listed region-wise in Table-1. Out of 30 Indian *Eulophias*, 4 are reported in Maharashtra viz. *E. herbacea*, *E. nuda*, *E. ochreatea* and *E. ramentacea*. Occurrence of *E. ochreatea* and *E. herbacea*, are reported in Toranmal, Nandurbar District (Khandesh, region) Maharashtra and *E. nuda* is reported in Nagziri, Jalgaon District (Khandesh region) Maharashtra. The rural and tribal communities such as Bhillas, Pardhi, Pawara, Tadvi and Wanjari etc. inhabiting here. The tribal as well as rural people have distinct traditions, beliefs, dialects, way of life and knowledge of local flora. They are intimately associated with the forests. These people depend on plants for their routine requirement. Pawara tribals of Toranmal region, Nandurbar, Maharashtra eat raw tubers of *E. ochreatea* for rejuvenating and aphrodisiac properties and tuber sap is also applied externally for curing rheumatism.⁵ Korkus of Melghats and Gujjars of Uttarpradesh use tubers of *E. ramentacea* in treating impotency.^{6,7} Tuber juice of *E. campestris* is taken orally 2-3 times as appetizer⁸ while rhizome is used as a tonic, effective in curing stomach problems, cough, paralysis and also used as aphrodisiac by tribal people of Sikkim, Himalaya.⁹ The *Eulophia* species are recommended for conservation and pharmacological studies. The present study reports that tubers/rhizome part of *Eulophia* species are commonly used to cure human (except 1 veterinary) diseases.



Table-1 indicates the occurrence of Indian *Eulophia* species in varied regions viz. Andhra Pradesh, Himachal Pradesh, Kerala, Madhya Pradesh, Maharashtra, Orissa, Rajasthan, Tamil Nadu, Uttarakhand, Uttar Pradesh, West

Bengal, Zharkhand states of India. It is also evident that 40 % species of Indian *Eulophia* are found in Uttarakhand while 23 % species are found in Orissa and Kerala states each.

Table 1: A list of Regional occurrence of Indian *Eulophia* species

<i>Eulophia</i> Species	Occurrence	Ref.
<i>E. andamanensis</i> Rchb. f.	Andaman Is	10
<i>E. bicallosa</i> (D. Don) P.F. Hunt & Summerh.	Uttarakhand	11
<i>E. bracteosa</i> Lindl.	Assam	12
<i>E. campanulata</i> Duthei.	Uttarakhand, Western Himalaya	12
<i>E. campbellii</i> Prain.	East India	12
<i>E. campestris</i> Wall.	Andaman Is, Sikkim, Uttarakhand, Himalaya	8, 10, 13
<i>E. candida</i> (Lindl.) Hook. F.	NE-India	14
<i>E. cullenii</i> (Wight) Blume.	Jharkhand, Kerala , Tamil Nadu	15, 16, 17
<i>E. dabia</i> (D. Don) Hochr.	Himalaya, Orissa, Uttarakhand	11
<i>E. densiflora</i> Lindl.	East Himalaya	18,19
<i>E. emiliana</i> . C. J. Saldenha.	Southwest India	12
<i>E. epidendraea</i> (J. Konig ex. Retz.)C. E. C. Fisch.	Andhra Pradesh, Kerala, Orissa, Tamil Nadu	17, 20, 21
<i>E. explanata</i> Lindl.	Andhra Pradesh, Orissa, Uttarakhand, Jharkhand	11, 22
<i>E. flava</i> (Lindl.)Hook f.	Uttarakhand, S. India	11
<i>E. graminea</i> Lindl.	Andhra Pradesh, Kerala, NE India, Tamil Nadu, Uttarakhand	11, 17, 20, 21, 23
<i>E. herbacea</i> Lindl.	Chhattisgarh, Madhya Pradesh, Maharashtra, Orissa, Uttarakhand	11
<i>E. hormusji</i> Duthie	Uttarakhand	11
<i>E. kamarupa</i> . Sud Chowdhury.	Assam	12
<i>E. mackinnonii</i> Duthie.	Uttarakhand, East Himalaya	12
<i>E. mannii</i> (Rchb. f.) Hook f. .	Assam, NE India, Sikkim	9, 14, 24, 25
<i>E. nicobarica</i> N. P. Kalakr and N. G. Nair.	Nicobar Islands	12
<i>E. nuda</i> Lindl.	Andhra Pradesh, Arunachal Pradesh, Himalaya, Maharashtra, Orissa, Tamilnadu, Uttarakhand, Visakhapatnam, W. Bengal	26-30
<i>E. obtusa</i> (Lindl.) Hook f.	Uttarakhand, North India	11
<i>E. ochreatea</i> Lindl.	Andhra Pradesh, Maharashtra, Orissa, Rajasthan	5, 31-34
<i>E. pratensis</i> Lindl.	Tamil Nadu, Kerala	13,17
<i>E. promensis</i> Lindl.	NE India, Darjiling	13
<i>E. pulchra</i> (Thouars) Lindl.	Kerala, Tamil Nadu	17
<i>E. ramentacea</i> Lindl. Ex. Wight	Jharkhand, Maharashtra, Uttarpradesh	7, 15, 35
<i>E. spectabilis</i> (Dennst) Suresh.	Kerala, Orissa	17, 22, 36
<i>E. zollingeri</i> (Rchb. F.) J. J. Sm.	Kerala, Andaman, Nikobar Is, Assam	17, 37

From the literature survey it is evident that *Eulophia* species are found throughout the tropics in Africa, Asia and the Americas but well distributed in Africa. About 33% of Indian *Eulophia* species occur worldwide while about 2.4 % worldwide occurring *Eulophia* species are reported in India. Some of these species have been

studied for the presence of different active phytoconstituents (Table 2).

Some of the *Eulophia* species are medicinally used. This has resulted in the documentation of 18 *Eulophia* species for their ethnomedicinal uses (Table 3). Few Indian

Eulophia species are reported for their phyto constituents. Lee³⁸ reported lusianthridin in *E. petersii*, for cytotoxic activity.³⁹ α -Sitosterol, α -sitosterolglucoside, β -amyrin and lupeol from the tuber and four flavonoids of apigenin, luteolin, kaempferol and quercetin from the leaves of *E. epidendraea* are reported, showing profound biological effects in a number of experimental animal models.¹⁹ These include inter alias, reduction in carcinogen induced colon cancer, anti-inflammatory⁴⁰ and anti-complement activity.⁴¹ Bouic et al⁴² reported that these phytosterols stimulate the proliferation of human peripheral blood lymphocytes and they can be used as

immuno-modulatory agents. Donald et al.⁴³ reported that α -sitosterol and its glucoside are used in the treatment of pulmonary tuberculosis.

Recently, Kshirsagar⁵ established an evidence for the usage of *E. ochreatea* as an antioxidant and two active molecules responsible for it since the tubers of *E. ochreatea* have been used in folk medicine of Satpuda mountain ranges for rejuvenating, aphrodisiac and antirheumatic properties. Sriram²¹ reported phenanthrene derivative 9,10-Dihydro-2,5-dimethoxy phenanthrene-1,7-diol as an active molecule in *E. nuda* tubers responsible for anti proliferative activity against human breast cancer.

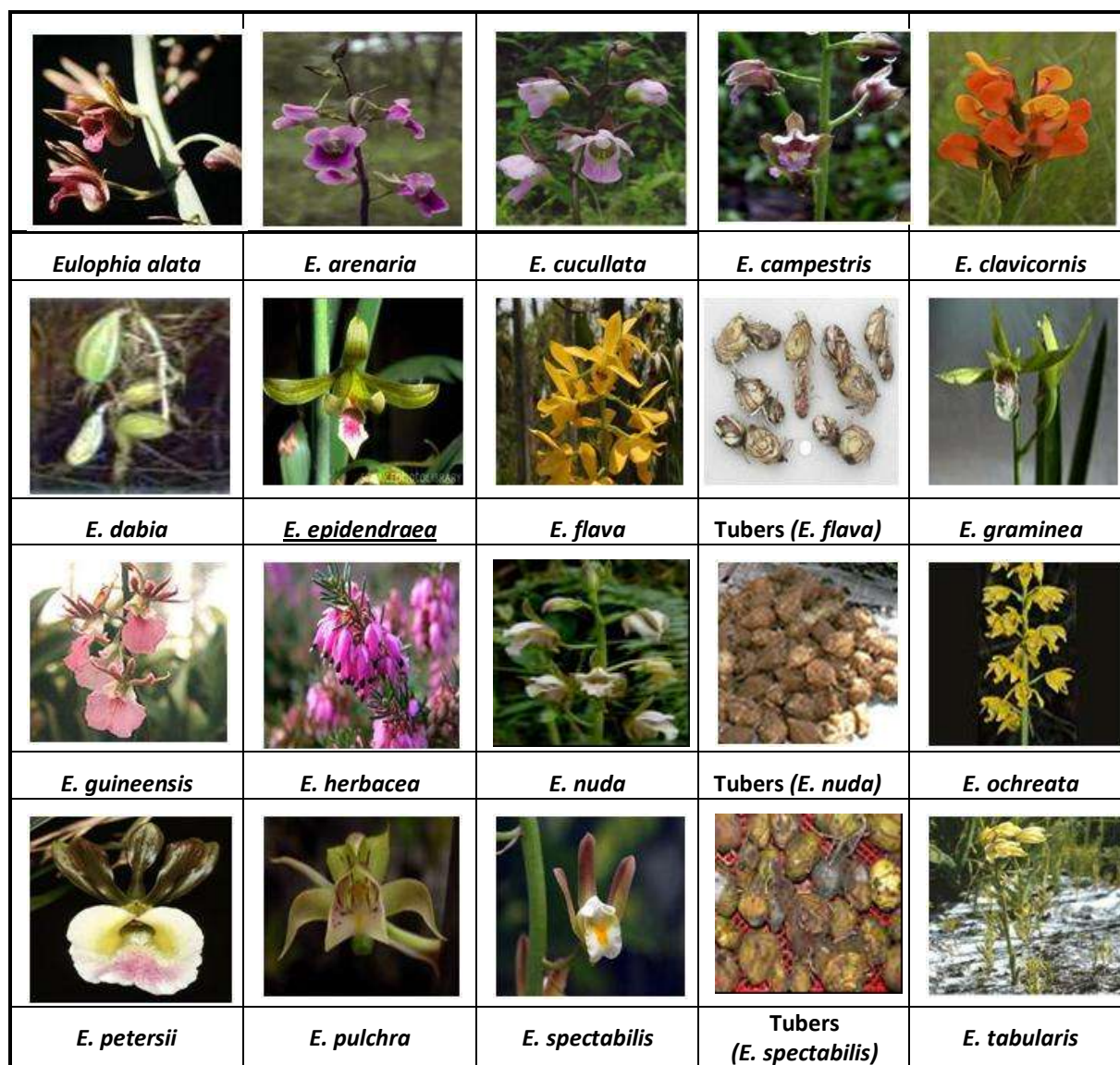


Figure 1: Photoplate of some *Eulophia* species (Images downloaded from www.google.com⁴⁴)

Some species of *Eulophia* are medicinal not only in India, but also in other continents. In China, orchids are used to improve appetite, to stimulate gastric secretion and to promote general health. *E. nuda* tuber extracts are used for blood purification.² In Singapore, tubers of *E. campestris* and *E. herbacea* are used to make salep.⁴⁵ Salep is a drink prepared from the tubers of orchids. According to the folklore 'Salep' is used as an aphrodisiac drug. In South-West ethno-ecological region of Cameroon

decoction of stem bark of *E. horsfalli* is used on bleeding piles.⁴⁶ In Malawi, *E. sp* is used on anemia⁴⁷, the root of *E. sp* is pounded to make lather and mixed with water to wash the head of a malarial patient.⁴⁸ In Africa, *E. cucullata* is used to prevent epilepsy.⁴⁹

Sometimes the crude extracts of medicinal plants are used as active contents however isolation and identification of active principles and elucidation of

mechanism of drug is of paramount importance. The *Eulophia* species are reported to contain eullopiol, nudol^{26,50,51}, β -sitosterol²¹, ephemeranhol, fimbriol²⁶ etc. as active phyto-constituents (Table 2). It is possible to synthesize a natural product chemically after elucidating its prototype. However, it is difficult to isolate, purify and characterize active ingredient and secondly possibly for losing biological activity as they act synergistically. Hence, the scientific study of traditional medicine, derivation of drugs through bio-prospecting and systematic conservation of the concerned medicinal

plants are of great importance.²⁷ Because of fast disappearing traditional knowledge in India, there is an urgent need for inventorying and recording all ethnobotanical information among the diverse ethnic communities. In the literature, there is no review traced on ethanomedicinal uses of *Eulophia* and hence this is the first kind of attempt to make it. In this paper ethnobotanical potential of some *Eulophia* species is presented for their promising therapeutic formulations and active principles also (Table 2). This may also be helpful for sustainable management of resources.

Table 2: Structure of known bioactive substances found in *Eulophia* species

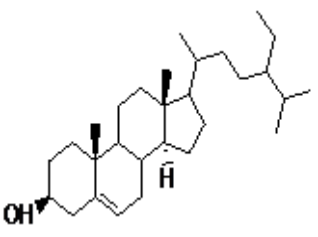
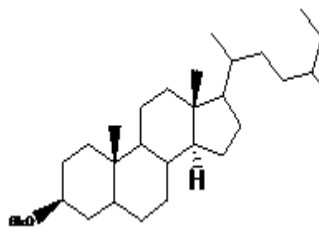
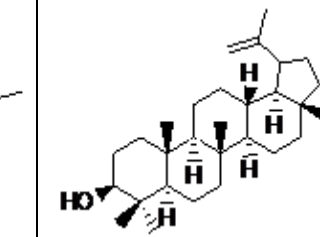
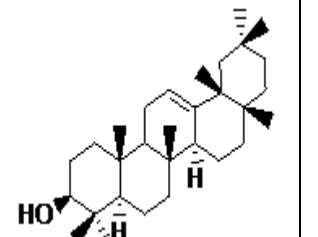
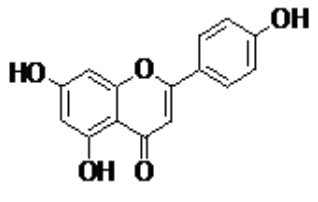
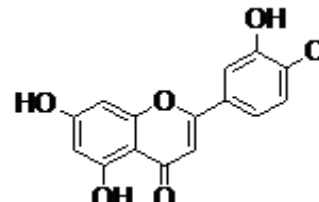
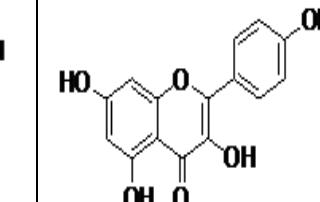
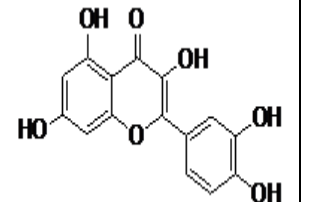
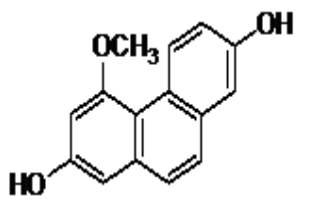
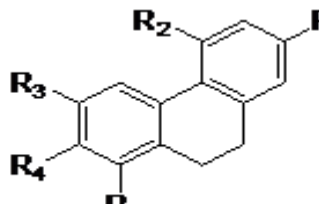
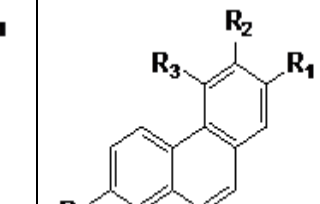
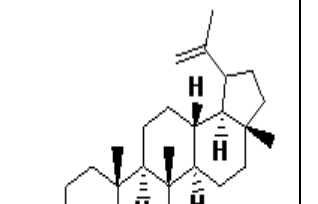
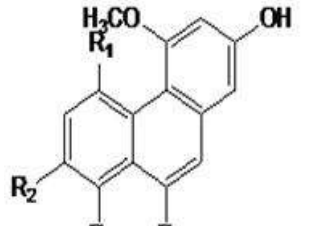
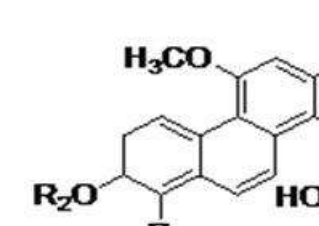
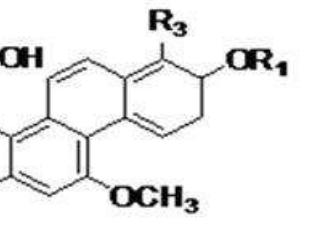
Phytochemical constituents from <i>Eulophia epidendraea</i>			
 Sitosterol	 Sitosterolglucoside	 Lupeol	 Amyrin
 Apigenin	 Luteolin	 Kaempferol	 Quercetin
Phytochemical constituents from <i>Eulophia nuda</i>			
 Coelonin (9,10-Dihydrophenanthrene derivative)	 Where, R ₁ = -OCH ₃ , R ₂ = -OH, R ₃ = -H, R ₄ = -OCH ₃ , R ₅ = -OH Eulophiol and R ₁ = -OH, R ₂ = -OCH ₃ , R ₃ = -H, R ₄ = -OCH ₃ , R ₅ = -OH	 Where, R ₁ = -OH, R ₂ = -OCH ₃ , R ₃ = -OCH ₃ , R ₄ = -OH; Nudol and R ₁ = -OCH ₃ , R ₂ = -OH, R ₃ = -OCH ₃ , R ₄ = -OH	 Lupeol
 R ₁ = -H, R ₂ = -OH, R ₃ = -OCH ₃ , R ₄ = -H and R ₁ = -H, R ₂ = -OCH ₃ , R ₃ = -OH, R ₄ = -H,	 R ₁ = -H, R ₂ = -H, R ₃ = -OCH ₃	 R ₁ = -OCH ₃ , R ₂ = -OH, R ₃ = -OCH ₃ , R ₄ = -OH, R ₅ = -OCH ₃ ; Denthyrsinin	

Table 2: Structure of known bioactive substances found in *Eulophia* species (Continued.....)

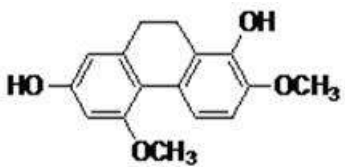
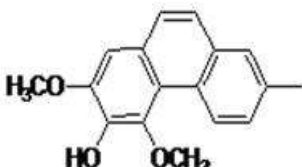
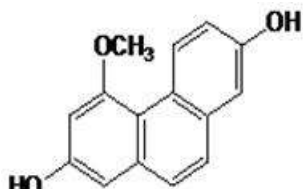
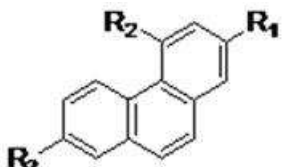
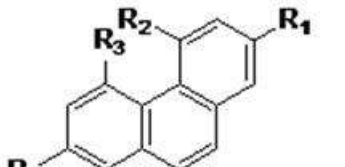
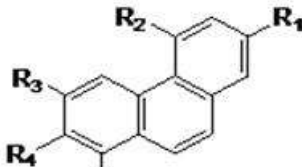
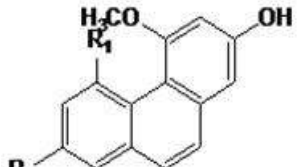
Phytochemical constituents from <i>Eulophia ochreatea</i>			
			
9,10-Dihydro-2,5-dimethoxyphenanthrene-1,7-diol	5,7-Dimethoxyphenanthrene-2,6-diol	Coelonin (9,10-dihydro-phenanthrene derivative)	Where, R ₁ = -OCH ₃ , R ₂ = -OH, R ₃ =-OH, lusiathrin
			
Where, R ₁ =-OCH ₃ , R ₂ = -OH, R ₃ =-H, R ₄ = -OCH ₃ , lusiathrin	Where, R ₁ = -OCH ₃ , R ₂ = -OH, R ₃ = -H, R ₄ = -OCH ₃ , R ₅ = -OH, Eulophiol	Where, R ₁ = -H, R ₂ = -OH, R ₃ =-OCH ₃ , R ₄ =-H	

Table 3: A list of *Eulophia* species having ethno-botanical potential

Name of <i>Eulophia</i> species	Local Name	Habitat (State/Country)	Tribe	Part of use	Mode of Administration	Indication	Ref.
<i>E. arenaria</i>	Undwe Ndweni	South Africa	Zulu	Rt		Infertility	28
<i>E. campestris</i>	Salib-misri	Throughout India (plains)		Tu	chew the raw tuber	Stomatitis, cough, cold, scrofulous diseases, discrasia. Good substitute for Salep, health, cardiac and nervine tonic.	9,13
		Western Himalaya and Tibet region		Rh		Pitta suppressant, aphrodisiac, dysentery, impotence, weakness after pregnancy.	29,52
	Hattipalia	Sikkim		Tu	Juice-orally 2-3 times	Appetizer	8
	SalapPanjo				Banovit (ayurvedic formulation) 2 tabs with milk(3 months)	General tonic, rejuvenating, hyperaesthetic (sexual condition), aphrodisiac, to revive libido, antiageing	53,54
					Vysex Dragee (ayurvedic formulation) 2 tabs with milk	Sexual weakness, strengthens neuromuscular tone, corrects psychogenic impotency	55-57
Khamti	NE India, Nepal		Rh		Tonic, stomach problems, paralysis. Aphrodisiac	9	
<i>E. clavicornis</i>	Eluhlaza	S. Africa	Zulu	Tu		Infertility	58,28
		Malawi (Africa)		Rt		Epilepsy	49
<i>E. cucullata</i>	Undwendweni, Bell Orchid	S. Africa	Zulu	Rt		Infertility	28,58
						Infant's cough and cold,	59, 60
<i>E. dabia</i>	Mujaataka, Saalam-misri, Salip	Himalaya (India)	Raji	Tu		blood purifier, sexual disease, infertility.	61
<i>E. epidendraea</i>	Segadomma gaddalu	Andhra Pradesh (India)	Koyas	Bl	Paste crushed with pepper and garlic	Ethno- veterinary medicine for anthrax.	31
		Anantpur (AP India)		Tu	E.epidendraea+Withania somnifera+Cuculigo orchoides (2:1:1) crushed with pepper and garlic- extract-orally for 1 week	Anorexia	31
					E. epidendraea + fruits of Terminalia bellirica + T. chebula+Emblica officinalis(2:1:1:1)	Ethno- veterinary medicine for anthrax.	

					crushed with pepper-orally		
		Kambli Malaikovil (TN India)	Yadav	Tu		Tumour, abscess and wound healing, Diarrhoea	41
						Immunosuppressant Immuno-modulatory, anti-inflammatory, cancer (colon), treatment of pulmonary tuberculosis	19
<i>E. graminea</i>	Kattuvegaya	Sirumali hills (S.India)	Paliyan	Tu/Bl	Extract	Eardrop	36
<i>E. herbacea</i>	Salep	W.Himalaya, Bengal, W. Deccan Peninsular(India)		Tu	Juice	Substitute for salep	13
	Kukadkand	Nandurbar (MS India)	Pawara	Sd	Powder / consume	Weakness	37
		Dhule (MS India)	Bhilla	Rh	Paste	Pimples	62
	Bilarikand Vansingara (Madhya Pradesh)	Chitrakoot (MP India)	Kol, Gond, Mawasi	Bl	Powder fried in mustard oil (residue oil)	Rheumatism thrice a day	63
<i>E. horsfalli</i>	Akwo Ikwog	Cameroon	Bakossi	St bk	Decoction	Bleeding piles	46
<i>E. milsoni</i>		Nigeria		Rh		Aphrodisiac	59
<i>E. nuda</i>	Balakand; Goruma, Budhar Amarkand	Nepal to Assam, Kokan-Mumbai (MS India)	Bhil, Phardhi	Tu		Bronchitis, diseases - vitiated blood, tumors, scrofulous vermifuge.	13,52
	Mankand	W. ghat in (MS India)					
	Jhulukia	(MP India)	Kol, Gond, mawasi	Rt	Juice	Treatment of snakebite	6
	Tipoi, Tipui, Ote ludum ba	(WB India)	Santhali, Mundas, Oraon	Tu		Belly-ache	53
	Kukadkand	Nagaziri (MS India)	Bhil, Pardhi, Pawara, Tadvi, Wanjari	Tu	Eat raw tubers	Rheumatoid arthritis	57
	Amarkand	Himalaya, Burma, Assam, (India)		Pl	Extract	Antitumor, antihelminthic, vermifuge, blood purifier	64
				Oriya	Tu	Powder + black peppers in Chawaldhua' water, twice a day (7 days)	Spermatorrhoea Leucorrhoea, Nonmenstruation abdominal pain.
		Harishankar pathar				Paste + black peppers in cow milk (empty stomach 2-3 day)	Spermatorrhoea
		Bhimashankar Koyna(MS India)		Tu	E. nuda + Orchis latifolia (root powder) + Gum Acacia-water	Aphrodisiac,	66
	Zhulukia	Teesta valley (Sikkim, India)		Tu		Used as tonic, aphrodisiac, blood purifier	67
	Ambarkand	W. ghat (India)		Tu		Used as an appetizer and for treating tumors and bronchitis	30
		China		Tu		Blood purifier, improve appetite, stimulate gastric secretion, promote general health	2
<i>E. ochreatea</i>	Gorakhamudi	Sitamata (Rajasthan)	Bhil, Meena, Garasia, Kathodi	Rt	<i>Dioscorea pentaphylla</i> + <i>E.ochreatea</i> (1:1) orally twice a day for 15 days	Asthma, acute bronchitis, antidote in snake bite.	32, 33
	Salam-mishri	Rajasthan			<i>Costus speciosus</i> + <i>D.hispida</i> + <i>D. pentaphylla</i> + <i>E.ochreatea</i>	Chronic asthma, bronchitis	
				Bl	Orally-	Diarrhea	

				Bl	Decoction-orally twice a day(1month)	Leukemia	33, 69
	Mishri		Asurs, Bhils, Bhunji, Chenchus, Garos, Gonds, Hoes,	Pl		Fever constipation, ingestion, abdominal pain, dysentery. Skin diseases, wounds, tumors, boils, sunburn, cut, injury, carbuncle.	70
				Tu	<i>E.ochreatar+ Chlorophytum borivilianum</i> (1:1) with milk	Boost immunity rheumatism	71
				Tu	<i>E.ochreata + C. borivilianum + stem bark-Sterculia urens</i> (1:1:1) –in milk (twice a day- 15days)	Anaemia and general fatigue	
	Singadya-kand	Toranmal, (MS India)	Pawara	Tu	Eat raw	Rejuvenating, aphrodisiac, antioxidant.	5
				Tu	Applied externally	Rheumatism	
				Tu	Mixed with jiggery	Increase stamina	
	Wild coco	Behbahan (S. Iran)		Tu		Source of plant fibers, proteins, carbohydrates, Supplement for cereal-based diets	72
		Peninsular, Satpura (MS MP, AP, Orissa. India)	Pawara			Stomachache, astringent, antifatigue, aphrodisiac, anthelmintic, blood purifier, cough , cold, cardiac and general tonic, rejuvenating	73
				Tu	Hexane extract	Antibacterial activity	73
<i>E ovalis</i>	Iphamba	S. Africa	Zulu	Tu		Infertility	28
<i>E ramentacea</i>	Kukadkand	(Melghat MS India)	Bhilla	Tu	Lukewarm paste	Applied on boils	74
	Nargadde	(Kernataka, UP India)	Gujjar Korku	Bl		Impotence, gynecological problems, enhance sperm count	6
	Nargadde	Umarched (MS India)	Banjara, Bhil or Naikada, Kolam	Bl	<i>E. ohreata + Puraria tuberosa</i> (1:1) - (1 month)	Impotency	7
<i>E spetabilis</i>	Bongataini	Monda Niyam Raja(Orissa India)	Dongria Kandha	Lv	Decoction	Vermifuse	23
				Tu	<i>E. spectabilis+ Withania somnifera</i> (leaves) + <i>Cuculigo orchioides</i> (leaves) + black pepper (2:1:1:1) in water(20 days)	Aphrodisiac	
<i>E tenella</i>	Untongazibomvana	S. Africa	Zulu	Tu		Infertility	28
<i>Eulophia species</i> (Malawi)	Orchid	Malawi			Root +water(lather)- wash the head	Anemia	75
						Malaria	76
<i>Eulophia species</i> (Rwanda)		Rwanda		Rt		Wounds	77

Bl = Bulb; Bk = Bark; Lv = Leaves; Pl = Plant; Rh = Rhizome; Rt = Root; Sd = Seed; St = Stem and Tu = Tuber.

Many surveys pertaining to India the Ethanobotanical studies on tribal folk claims are available to know on *Eulophias* and occupy prominent place for moderate of biological activity. Table 3 shows illustration of 18 *Eulophia* species for their ethno-botanical uses by various ethnic groups throughout India.

While collecting the information from local tribe, we found their awareness about *Eulophia* regarding its local name, habitat, part of use, mode of administration and indications.

The *Eulophia* species are therapeutically effective mostly on reproductive organs whereas moderately on dermatological and lymphatic systems.

Figure 2 depicts *E. ochreata* has highest i.e. 47% while *E. campestris* and *E. nuda* have 32% score of activity in each case. *E. epidendreae* shows 16% activity and *E. dabia*, *E. harbacea*, *E. ramentacea* and *E. tenella* have half potential as compare to former plant. Other *Eulophia* species have ≤ 5% activity score.

Table 4: Summary of *Eulophia* species for different therapeutic activities

Body Systems	CNS							CVS			LS	DS							RS		RPS	ExS	MS			DmS	GP		GH		Other									
	Analgescic	Antipyretic	Immunomodulatory	Anti-inflammatory	Nervine Tonic	Antidote (Alex.)	Anti-epileptic	Cardioprotective	Lipid Lowering	Blood Purifier	Antianaemic	Anti-Scrofulous	Nutritional	Hepatoprotective	Anti-Diarrhoeal	Anti-Dysentry	Anti-Anorexic	Stomatitis	Belly-ache	Antitussive	Anti-Asthmatic	Anti-Bronchitis	Aphrodisiac	Anti-infertility	Nephroprotective	Anti-rheumatic	Antifugue	Relieving Paralysis	Skin Dis. Protective	Wound Healing	Vermifuse	Anti-bacterial	Anti-malarial	Anti-Tumor	Rejuinating	Health Tonic	Anti-piles	Eardrop		
<i>E. arenaria</i>	1	2	3	4	5	6	7	1	2	3	4	1	1	2	3	4	5	6	7	1	2	3	1	2	1	1	2	3	1	2	1	2	3	4	1	2	1	2		
<i>E. campestris</i>					+		+				+					+	+	+	+			+	+			+	+									+				
<i>E. clavicornis</i>																							+																	
<i>E. cucullata</i>							+																+																	
<i>E. dabia</i>									+											+			+																	
<i>E. epidendraea</i>			+	+											+														+	+			+							
<i>E. graminea</i>																																						+		
<i>E. herbacea</i>																									+	+		+												
<i>E. horsfalli</i>																																					+			
<i>E. millsoni</i>																						+																		
<i>E. nuda</i>				+		+			+		+							+			+	+			+	+		+	+		+		+	+		+				
<i>E. ochreata</i>		+	+			+				+		+		+	+						+	+			+	+		+	+		+	+	+	+						
<i>E. ovalis</i>																							+																	
<i>E. ramentacea</i>											+												+					+												
<i>E. spectabilis</i>																						+								+										
<i>E. tenella</i>																						+	+							+										
<i>E. species</i>											+																		+			+								

(+) indicates activity

CNS = Central Nervous System; CVS = Cardio Vascular System; LS = Lymphatic System; DS = Diges Syst; RS = Respiratory System; RPS = Reproductive system; ExS = Excretory System; MS = Muscular (Skeletal); DmS = Dermatological System(Skin); GP = Gen Pathology and GH = Gen. Health.



Table 4 and Figure 2, summarise % of different group of activities of *Eulophia* species: fertility activity 47%, aphrodisiac activity 35%, skin protective 24% and vermifuge activity 24%. Allied activities namely, antiscrofulous, anti-bellyache, anti-rheumatic antifutigue, wound healing and antitumour activity respectively are also considered (18%).

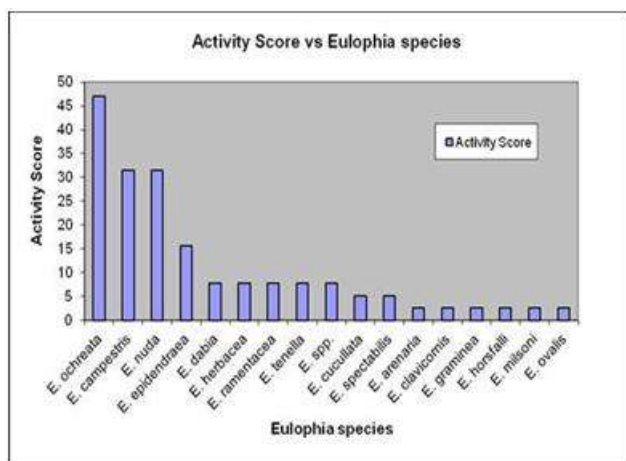


Figure 2: Score of biological activity in different *Eulophia* species.

From all the above literature studies, it is evident that *Eulophia* products, tubers, leaves are used as traditional medicine sometimes in the form of raw. The doses used by them are not rationale. Therefore control trials to assess their efficacy, side effects of these medicines are needed in experimental animal prior to human consumption. Hence today, it has become an essential part of the experimentation to assess toxicity, and subsequent randomized control trials. This article provides information of the folk medicinal uses of an orchid *Eulophia* in the Asia, particularly in India. Relevant information are gathered to highlight the usage in proper and scientific ways. Cultivation of potential *Eulophia* species, either gardening or farming is likely to provide as a source of income to native cultivators.

To summarize this article emphasis is given to:

- To prove the folk claim by tribals.
- To record all ethno-botanical information among the diverse ethnic communities.
- To documentation of ethno-botanical potential of 18 *Eulophia* species for their promising therapeutic formulations.

Search of active principles and preparation of phytosome (if possible) to better efficacy.

CONCLUSION

The highest activities of *Eulophia* species such as fertility and aphrodisiac activity (47 % and 35% respectively) are concern with reproductive biology. Hence, preferentially the work may be under taken on reproductive potential of *Eulophia* species and may be focused on preparations, phytosomes to give maximum effect on target tissues.

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