



ORCHID SPECIES DIVERSITY OF EAST NIMAR, MADHYA PRADESH, INDIA

S. Mujaffar^{a1}, Shakun Mishra^b, V.S. Deoda^b, S. Moinuddin^b & S. Mustakim^b

^{a1}Department of Botany, Govt. U.G. College, Bhikangaon, District-Khanrgaon-451331, M.P.

^bDepartment of Botany, S.N. Govt. P.G. College, Khandwa-450001, M.P.

*Email : shaikhmujaffar@gmail.com

ABSTRACT : Botanical explorations in East Nimar were conducted during 2010-2012. A total of 18 orchids species belonging to 11 genera (including cultivated species) have been recorded from the region. Of them, 13 species with 7 genera are terrestrial, 5 species with 4 genera are epiphytes and single genera with single species are semi saprophytes.

Key words: Orchid Species Diversity; East Nimar; Madhya Pradesh; India.

INTRODUCTION

Orchidaceae, is regarded as second largest family of flowering plants. It includes 25,000-35,000 species with 800-1,000 genera [2]. About 1300 species with 140 genera of orchid species are found in India with temperate Himalayas as their natural home [11]. From Madhya Pradesh 89 species of orchids under 34 genera were reported [9]. Orchidaceae, includes herbaceous monocots and display unique feature like, mycorrhizal relationship, bractaceous or petaloid, 3-sepals, irregular 3-petals, pollinia, distinct mechanism of pollination, numerous small seeds. [3] This orchids are facing a great threat from the anthropogenic factors and change in environmental conditions, and hence their conservation is necessary [4].

MATERIALS AND METHODS

Study area : East Nimar region comprises of two districts namely Khandwa and Burhanpur. It is situated between 21° 5' – 22° 25' N and 75° 57' - 77° 13' E. The external feature of land appears roughly like a crown with its apex in the east and base in the west. It is bounded on east by Betul, Hoshangabad (Harda) districts and Amaravati district (Maharashtra) district. On the south by Jalgaon, Buldhana and Amaravati (Maharashtra), on west by West Nimar district and in north by Dewas district. East Nimar lies most part on upland between the Narmada and Tapti rivers which flow parallel to each other from east to west. The maximum and minimum heights of this region above MSL is 905.05 m and 180.0 m respectively. The average annual rainfall is 701.76 mm and highest rainfall occurs in the months of June-July. The minimum and maximum temperature ranges in summer 10.59 °C to 40.37 °C. The forest type is mainly Tropical dry deciduous teak forest [1].[5-8].

Data collection: The present report is the outcome of several field trips encompassing all the season carried out throughout East Nimar of Madhya Pradesh during 2010-2012. The specimens were collected into flowering and fruiting stages and were processed into dried and mounted herbarium specimens following Jain and Rao, 1977. All specimens are deposited in Gujarati College, Indore, Madhya Pradesh.

Enumeration of species: The enumeration is alphabetically arranged, followed by artificial key, botanical name, synonyms, local name, short botanical description, flowering month, host plant species, status, occurrence Khandwa & Burhanpur district, herbarium Number (H.No.) and photographs are provided here (Plate 1).

Key to the Orchidaceae of East Nimar

1a. Willd orchids :

2a. Plants epiphytic :

3a. Aerial roots absent :

4a. Flowers rosy or pinkish white, spur hook like, capsule 3-ribbed.....

.....2. *Aerides*

- 4b. Flowers violet or white with purple spot, spur not hook like, capsule 6-ribbed.....**8. *Rhynchostylis***
- 3b. Aerial roots present :
- 5a. Flower side lobes of lip large, capsule fusiform.....**9. *Vanda***
- 5b. Flower side lobes of lip small, capsule cylindrical.....**1. *Acampe***
- 2b. Plants terrestrial :
- 6a. Stem pseudobulbous :
- 7a. Tubers jointed yellowish coloured; leaves upto 2 or 3; oblong-lanceolate; flowers whitish; capsules straight.....**4. *Geodorum***
- 7b. Tubers not jointed greenish coloured; leaves more than 2; linear-lanceolate; flowers greenish-pinkish; capsules pendulous....**3. *Eulophia***
- 6b. Stem not pseudobulbous :
- 8a. Leaves more than 2; petioles shorter than leaves; capsules turgid or straight :
- 9a. Leaves linear-lanceolate upto 3 cm long.....**10. *Zeuxine***
- 9b. Leaves elliptic-lanceolate; more than 5 cm long :
- 10a. Bracts not foliaceous; flower 2-3 cm across...**5. *Habenaria***
- 10b. Bracts foliaceous; flowers 5 cm across....**7. *Plantanthera***
- 8b. Leaves one only; petioles longer than leaves; capsules pendulous.....
-**6. *Nervilia***
- 1b. Ornamental orchid.....**11. **Spathoglottis***

1. ACAMPE Lindley

Fol. Orchid. 4:1.1835.

Acampe praemorsa (Roxb.) Blatter & Mc Cann, J. Bombay Nat. Hist. Soc. 35:495. 1932. *Epidendrum praemorsum* Roxb., Pl. Corom. 34. t. 43. 1795.

Epiphytes, herbs. Leaves alternate, oblong, 8-15 x 1.5-2 cm; apex unequally deeply cleft at apex, entire. Flowers yellow with pinkish stripes, in corymbose panicles. Capsules longitudinally ribbed. Seeds many brownish.

Occurrence: Mahlu, Bhagpura, Khandwa district. H.No.-3310

2. AERIDES Lour.

Fl. Cochinch. 525. 1790.

Aerides maculosum Lindl. in Edw. Bot. Reg. 31: t. 58. 1845.

Epiphytes, herbs, roots thick, many succulent on host; Leaves alternate, linear-oblong, 5.5-20 x 0.5-3 cm; entire, apex unequally 2-lobed. Racemes axillary. Sepals obovate-elliptic. Capsules obovoid, seeds many, brownish.

Occurrence: Bhagpura, Chandgarh, Khandwa district. H.No.-1836

3. EULOPHIA R. Br. ex Lindley

Bot. Reg. 7: t. 573. 1821. nom.cons.

Eulophia graminea Lindl., Gen. Sp. Orchid. Pl.: 182. 1833.

Pseudobulbs, ovate-conical. Leaves alternate, sheathing at base, linear-lanceolate, 20-35 x 0.5-2 cm. Inflorescence upto 50 cm long, many-flowered. Flowers greenish, tinged with maroon. Capsules ellipsoid-oblong, drooping.

Occurrence: Chandani, Burhanpur district. H.No.-036

4. GEODORUM Jackson

Bot. Repos. 10: t. 626. 1811.

Geodorum densiflorum (Lam.) Schltr., Repert. Spec. Nov. Regni Veg., Beih. 4:259. 1919. *Limodorum densiflorum* Lam., Encycl. 3:576. 1792. "Malakand"

Pseudobulbs present, tubers, ovoid-conical, greenish-brown, bands transverse, circular. Leaves alternate, sessile, sheathing at base, oblong-lanceolate 15-20 x 3-5 cm, acuminate. Flowers yellowish-white, 10-12-flowered decurved racemes. Capsules pendulous, fusiform seeds minute, rounded, brownish.

Occurrence: Kalibhit, Jaibai, Khalwa, Khandwa district. H.No.- 1706

5. HABENARIA Willd.

Sp. Pl. 4:44. 1805.

Key to species

- 1a. Plants less than 25 cm high; leaves rosette, flowers pure white or yellow :
- 2a. Leaves ovate-suborbicular; capsules strongly ribbed, straight.....
-**4. *H. Grandifloriformis***

- 2b. Leaves oblong-lanceolate or oblong-elliptic; capsules not strongly ribbed, fusiform, turgid :
 - 3a. Leaves oblong-lanceolate; flowers white; petals as long as sepals.....
.....**6. *H. plantaginea***
 - 3b. Leaves oblong-elliptic; flowers yellow; petals smaller than sepals.....
.....**5. *H. marginata***



Plate 1.: 1. *Rhynchosstylis retusa* (L.) Blume 2. *Vanda tessellata* (Roxb.) Hook. 3. *Aerides maculosum* Lindl. 4. *Nervilia aragoana* Gaud. 5. *Habenaria furcifera* Lindl. 6. *Zeuxine strateumatica* (L.) Schltr. 7. *Habenaria digitata* Lindl. 8. *Eulophia graminea* Lindl. 9. *Habenaria plantaginea* Lindl. (all photographs by S. Moinuddin).

- 1b. Plants more than 35 cm high; leaves cauline, flowers greenish white :
 - 4a. Petals 2 partite.....**2. *H. foliosa* var. *foetida***
 - 4b. Petals entire :
 - 5a. Leaves broadly ovate to suborbicular.....**7. *H. roxburghii***
 - 5b. Leaves obovate-ob lanceolate or ovate-oblong :
 - 6a. Leaves obovate-ob lanceolate; bracts ovate- lanceolate; capsules decurved.....**3. *H. frucifera***
 - 6b. Leaves ovate-oblong; bracts lenceolate; capsules straight.....
.....**1. *H. digitata***

Habenaria digitata Lindl., Gen. Spec. Orchid. Pl. 307.1835.

Herbs, 30-50 cm tall; tubers 1-2; ovate underground, stem terete slender closely sheathed. Leaves alternate, entire, acute, glabrous, lateral sepals ovate acute, falcate, dorsal sepal elliptic. Petals 2-partite, upper lobes linear, falcate labellum 3-lobed, green, spur green, colum oblong. Capsules ribbed, brownish; seeds many, minute, brownish, glabrous.

Occurrence: Kalibhit, Sunderdev, Chandgarh, Khandwa district. H.No.-1780

Habenaria foliosa A. Rich. var. *foetida* (Blatt. & McC.) Benner. in J. Econ. Tax. Bot. 5:452. 1984. *Habenaria gibsonii* var. *foetida* Blatt. & McC. in J. Bombay nat. Hist. Soc. 36:16. 1932.

Herbs. Leaves ovate-lanceolate, apex acute or acuminate, narrowed at base. Racemes 6-8-flowered; dorsal sepal broader than long, c 0.7 X 0.8 cm; lateral sepal c 0.9 x 0.6 cm; lower segment of petals 0.5-0.7 x 0.5 cm.

Occurrence: Dhama, West kalibhit, Khandwa district. H.No.-421

Habenaria furcifera Lindl., Gen. Spec. Orchid. Pl. 319. 1835.

Herbs, 35-60 cm tall; tubers ovate-ellipsoid. Leaves clustered on ground, simple, oblanceolate-obovate, 13-17 x 3-5 cm, entire, sheathing at base, acute, glabrous. Flowers in terminal lax racemes. Capsules fusiform, turgid, decurved with strong ribs. Seeds many, brownish, glabrous.

Occurrence: Kalighodi Shiv mandir (Kalibhit), Khandwa district. H.No.-690

Habenaria grandifloriformis Blatt. & Mc C. in J. Bombay nat. Hist. Soc. 36:17. 1932.

Herbs, 10-15 cm tall; tubers 1-2, globose. Leaves 1-2, ovate to ellipsoid. Flowers white. Capsules strongly ribbed.

Occurrence: Sunderdev, West Kalibhit, Khandwa district. H.No.-2541

Habenaria marginata Colebr., in Hooker, Exot. Fl. 2: ad t. 136. 1824.

Herbs, 15-25 cm tall. Leaves 5.5-8 x 1.3-2.5 cm, entire, acute. Flowers in terminal lax spikes, peduncles long. Sepal green unequal, dorsal sepal green, ovate, lateral sepals falcate. Capsules fusiform tursid. Seeds many brownish.

Occurrence: Kalibhit, Khandwa district. H.No.-1305

Habenaria plantaginea Lindl., Gen. Spec. Orchid. Pl. 323. 1835.

Herbs, 20-50 cm tall, tuber 2, unequal. Lamina 4-8 x 1.5-2 cm. entire. Scape 20-25 cm long many flowerd. Flowers white lax-racemes. Capsules turgid, fusiform, beak short, slender, seeds many minute, roundish.

Occurrence: Kalipahar, Bhagpura, Khandwa district. H.No.-809

Habenaria roxburghii Nicols. in Sald. & Nicols. Fl. Hassan Dt. 834.1976.

Herbs; roots tuberous. Leaves fleshy, broadly ovate to suborbicular, apex acute. Flowers white. Capsules strongly ribbed, beaked.

Occurrence: Golai, West Kalibhit, Khnadwa district. H.No.-654

6. NERVILIA Comm. ex Gaudich.

Voy. Uranie 422.1829.

Nervilia aragoana Gaud. in Freye. Voy. Bot. 422. t. 35. 1829.

Small tuberous herbs. Tubers 2 cm in diam., subglobose, white. Leaf single, appearing after flowering, cordate, dark green above, pale green below, nerve up to 18, glabrous. Petioles 10-20 cm long, light green with purple lines. Scape ca 15 cm tall, 2 sheathed, green above, light purple below. Flowers ca 2 cm long, drooping, yellowish-green, shortly stalked in lax racemes. Capsules pendulous.

Occurrence: Kalighodi Shiv mandir (Kalibhit), Khandwa district. H.No.-1775

Note: Flowers racemose, leaf blade not laying flat on the ground. This species is often found in forest near bushes at high altitudes.

7. PLATANThERA Rich.

De Orchid. Eur. 35. 181

Platanthera susannae (L.) Lindl., Gen. Sp. Orchid. Pl. 295. 1835. *Orchis susannae* L., Sp. Pl. 939. 1753.

Erect, globrous, 30-60 cm high. Leaves alternate simple, passing into large leafy bracts, sessile lanceolate, elliptic-lanceolate, 5.9-8 x 2-3 cm, entire, glabrous, acute at apex.

Occurrence: Battu, Khandwa district. H.No.-1759

8. RHYNCHOSTYLIS Blume

Bijdr. 285. 1825.

Rhynchostylis retusa (L.) Blume, Bijdr. 286. 1825. *Epidendrum retusum* L., Sp. Pl. 2: 953.1753.

Epiphytes; root long, thick. Leaves alternate, simple, linear, strap-shaped, 8-25 x 1.6-3 cm, recurved, unequally 2-lobed at apex, sheathing at base. Flowers in axillary, dense, drooping, racemes. Capsules obovate, ellipsoid. Seeds many, brownish.

Occurrence: Bhagpura, Khandwa district. H.No.-655

9. SATHOGLOTTIS Blume

Bijdr. 400. 1825.

**Spathoglottis plicata* Blume, Bijdr.:401. 1825.

Terrestrial herbs. Pseudobulbs conical, inconspicuous and largely enclosed by the leaves; rhizome short, stout. Leaves lanceolate-oblong. Flowers purple or pink, lip reddish violet. Capsules ellipsoid, glabrous.

Occurrence: This is a common garden plant in Khandwa district. H.No.-2154



Plate 2. Selected colour varieties of *Vanda tessellata* (Roxb.) Hook. ex G. Don (all Photographs by S. Moinuddin).

10. VANDA W. Jones ex R. Br.

Bot. Reg. 6:t.506.1820.

Key to species

- 1a. Flowers yellow; labellum without ridges; spur vermiform at tip; capsules up to 3 cm long.....2. *V. Testacea*

- 1b. Flowers greenish-blue; labellum with ridges; spur not vermiform at tip; capsules more than 3 cm long.....1. *V. tessellata*

Vanda tessellata (Roxb.) Hook. ex G. Don in J.C. Loudon, Hort. Brit.: 372. 1832. *Epidendrum tessellatum* Roxb., Pl. Corom. 1:34. t. 42. 1795. "Rasna"

Epiphytes, glabrous, 20-45 cm high. Leaves linear-lanceolate, 15-20 x 1.5-2 cm, entire. Racemes axillary, 10-15 cm long. Capsules elliptic-oblong, ribbed. Seeds minute, numerous, brown.

Occurrence: Kalibhit, Chandgarh, Khandwa district & Jambupani, Burhanpur district. H.No.-1351/107/114

Vanda testacea (Lindl.) Rchb. f., in Gard. Chron., n.s., 8:166. 1877. *Aerides testacea* Lindl., Gen. Sp. Orch. Pl. 238. 1833. "Amdi"

Epiphytes, glabrous herbs; roots large, pendulous, thick, vermiform. Lamina linear or linear-oblong, 10-15 x 1-2 cm, entire, 3-toothed at apex. Racemes axillary, 3-15 cm long. Capsules fusiform, elliptic-oblong, ribbed.

Occurrence: Bhagpura, Khandwa district. H.No.-696

11. *ZEUXINE* Lindley

Coll. Bot., App.:1.1826.

Zeuxine strateumatica (L.) Schltr., Bot. Jahrb. Syst. 45:394. 1911. *Orchis strateumatica* L., Sp. Pl. 943. 1753.

Semi saprophytes, Erect, herbs, upto 30 cm tall. Lamina 1-8 x 0.2-03 cm, acute. Racemes spicate, in terminal. Flowers white. Capsules ovoid, ribbed, without beak.

Occurrence: Neapanagar, Burhanpur district. H.No.-1867/035

RESULTS AND DISCUSSION

During recent field studies in the East Nimar, 11 genera with 18 orchid species diversity and distribution have been recorded from the regions. Out of them, 12 species with 7 genera are terrestrial, 5 species with 4 genera are epiphytes and single species with single genera are semi saprophytes. The total number of recorded terrestrial species of each genus are 7 *Habenaria spp.*, *Eulophia graminea*, *Geodorum densiflorum*, *Nervilia aragoana*, *Plantanthera susanna*, *Spathoglottis plicata* & *Zeuxine strateumatica* possess single species distribution in the region.[10]. Among the epiphytes *Vanda* highest number with 2 species and *Acampe praemorsa*, *Aerides maculosum* are represented by single species each (Table 1). An analysis of life form (Fig.1) shows that terrestrial orchid species (66.66%) exhibit maximum diversity followed by epiphytic (27.77%), semi saprophytic (5.55%). The relatively higher percentage of terrestrial may be due to predominant epiphytes orchids as well as low percentage of semi-saprophytic. It may be interesting to mention a variation in colour of the flowers of *Vanda tessellata* (Roxb.) Hook. ex G. Don noted during of the study (Plate 2). Based on rarity Index of species, orchid are categorised in four groups, endangered, rare, vulnerable and common. Results shows that 27.77% of orchid species are endangered, 33.33% are rare, 22.22% vulnerable and 16.66% are common in East Nimar (Fig. 4). For conservation of orchids, three orchid conservation areas are identified in Chandgarh range, West & East Kalibhit.

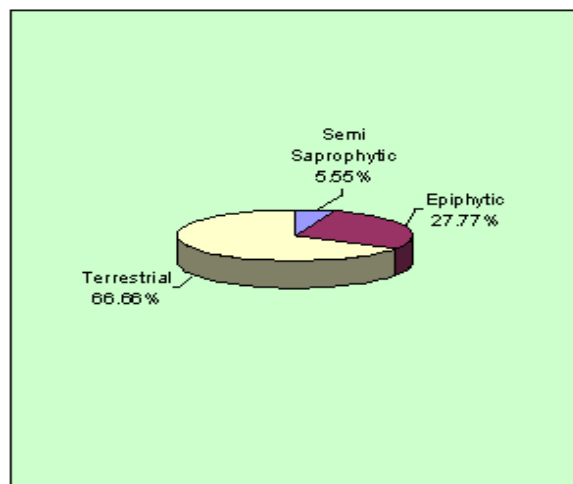


Figure 1. Orchid diversity of East Nimar

Table. 1. List of orchid species of East Nimar with preferred Host plant species, Habitat, Status, Flowering month.

Sl.no.	Orchid species	Hosts										Status	Flowering month
		<i>Diospyros melanoxylon</i>	<i>Mangifera indica</i>	<i>Madhuca longifolia</i>	<i>Butea monosperma</i>	<i>Careya arborea</i>	<i>Acacia catachu</i>	<i>Tectona grandis</i>	<i>Stereospermum colais</i>	<i>Terminalia elliptica</i>			
1	<i>Acampe praemorsa</i>	+	-	-	-	-	-	+	-	-	Rare	Aug.-Oct.	
2	<i>Aerides maculosum</i>	+	+	-	-	-	-	-	-	-	Rare	May-Sep.	
3	<i>Rhynchostylis retusa</i>	+	+	+	-	-	-	+	+	-	Vulnerable	June-Nov.	
4	<i>Vanda tessellata</i>	+	+	+	+	+	+	+	+	+	Common	June-Oct.	
5	<i>Vanda testacea</i>	-	-	+	-	-	-	-	-	-	Rare	June-Oct.	
6	<i>Eulophia graminea</i>	Terrestrial										Endangered	Sep.-April
7	<i>Geodorum densiflorum</i>											Vulnerable	July-Oct.
8	<i>Habenaria digitata</i>											Common	July-Sep.
9	<i>Habenaria foliosa var. foetida</i>											Vulnerable	Aug.-Dec.
10	<i>Habenaria furcifera</i>											Endangered	July-Sep.
11	<i>Habenaria grandifloriformis</i>											Endangered	Aug.-Dec.
12	<i>Habenaria marginata</i>											Rare	July-Sep.
13	<i>Habenaria plantaginea</i>											Rare	July-Sep.
14	<i>Habenaria roxburghii</i>											Endangered	Aug.-Dec.
15	<i>Nervilia aragoana</i>											Endangered	June-July
16	<i>Plantanthera susannae</i>											Rare	Aug.-Oct.
17	<i>Spathoglottis plicata</i>											Common	Feb.-March
18	<i>Zeuxine strateumatica</i>	Semi Saprophytic										Vulnerable	Jan.-Dec.

'+' Present; '-' Absent

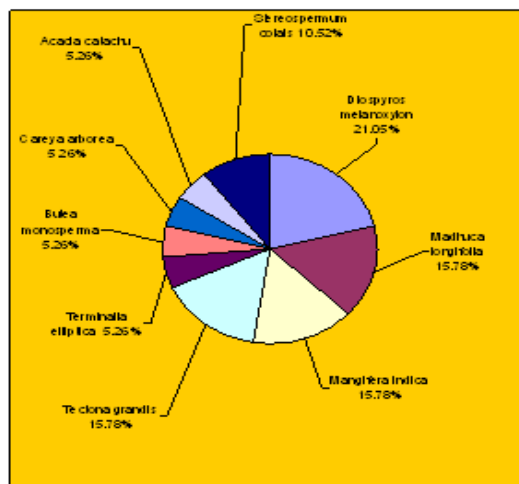


Figure 2. The preference host of the orchid species

In the present study 9 mostly preferable host plant were encountered, some of them are also the dominant tree species of the forest. Out of the total 5 epiphytic orchid species surveyed, the most preferable host plant of orchid species are *Diospyros melanoxylon* (21.05%), *Madhuca longifolia* (15.78%), *Mangifera indica* (15.78%), *Tectona grandis* (15.78%), *Terminalia elliptica* (5.26%), *Butea monosperma* (5.26%), *Careya arborea* (5.26%), *Acacia catachu* (5.26%) and *Stereospermum colais* (10.52%) (Fig.2). A comparison of orchids species of East Nimar with surrounding areas shows 2.69% of Hoshangabad, 1.62% of East Nimar, 1.04% of Amaravati (Melghat), 0.34% of Dewas and 0.27% of West Nimar are common (Fig.3). The orchid species of Hoshangabad shows highest influence in East Nimar.

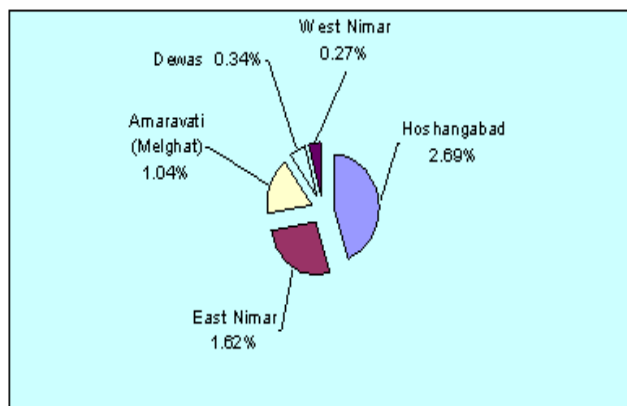


Figure 3. Comparison of orchid species of East Nimar with surrounding areas

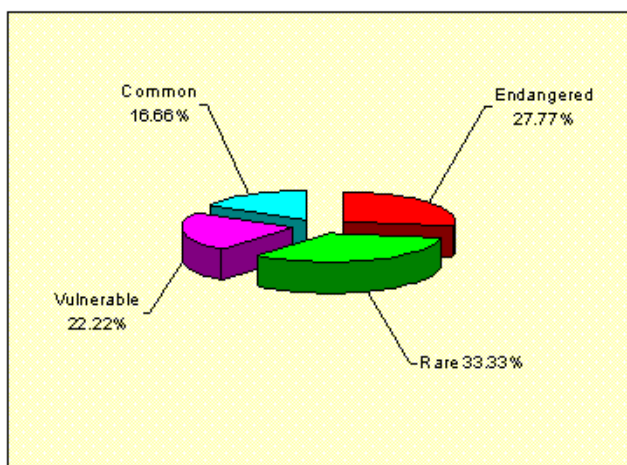


Figure 4. Status of orchids species in East Nimar

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