

Wilderness And Biodiversity Of Gingers In The Valley District, Manipur

N. B. Devi, P. K. Singh, A. K. Das

Abstract: Zingiberaceae, one of the ten largest monocotyledonous families in India consisting of aromatic perennial herbs with creeping horizontal and tuberous rhizomes, comprising about 52 genera and more than 1300 species distributed throughout tropical Africa, Asia and America. It is also an important natural resources that provides many useful products for food, spices, medicines, dyes, perfumes and aesthetics to man. The gingers are well-known for their medicinal and economic significance. The plants either have or believed to possess certain spiritual or magical effect. In the context of climate variation, anthropogenic factors affect the climate. 27 species of 7 genera have been used extensively by the different communities inhabiting in the valley districts of Manipur.

Index Terms: Anthropogenic factors, natural resources, valley districts, Zingiberaceae.

1 INTRODUCTION

Manipur, a state of north eastern India is known for its ecologically distinctive and rich biodiversity having many endemic flora and fauna and rich cultural diversity (Singh et al., 2012). Manipur mainly comprises of hilly terrain surrounding a centrally located saucer shaped valley of 1856Km². A number of workers have investigated the utility of certain plant species of Zingiberaceae in the treatment of diseases. It is an important natural resources that provide useful products for food, spices and condiments, medicines, dyes, perfumes and aesthetics to man. This plant is cultivated for its rhizome in tropical areas of South and East India (Bhunja et al., 2012). Family Zingiberaceae consists of a large number of medicinal plants and is well known for its ethnomedicine (Tushar et al., 2010). Few Zinger varieties such as *Zingiber cassumunar* Roxb. and *Zingiber zerumbet* (L.) Sm. are used in indigenous folk medicines. Many species is also consumed and is also a source for income generation. *Curcuma caesia* Roxb. *Curcuma augustifolia* Roxb. *Hedychium spicatum* Buch-Ham., *Hedychium coronarium* Koenig. are the crops of wild species of Manipur which have great potential. The tribal and rural people of valley districts of Manipur are highly dependent on this plants species for food as well as medicinal value for meeting their health care needs. Conflicts between authorities and indigenous population over resource sharing has been observed and reported for decades (M.H.Devi et al 2014). This may be a cause for the loss of biodiversity.Utilization of wild edible plants as food is a global phenomenon and has been reported from many countries.

(A.D.Livingston et al. 1996)Plant collection pattern is associated with the perception and relative importance of useful plants which depends on cultural factors.(G.Pelto et al, 1989) The important genera under Zingiberaceae are *Alpinia*, *Amomum*, *Curcuma*, *Elettaria*, *Hedychium*, *Kaempferia* and *Zingiber* which has been exploited in the wild and some of them are domesticated.

Materials and Method:

Extensive field surveys, recognition, collection and documentation of Zingiberaceous plants was conducted in different parts of valley district of Manipur. During the field trips local medicine men, village elders, old women etc. were interviewed. Herbarium of the plant specimens were prepared by following the standard methods (Jain and Rao, 1977). The authentic identification of the plants were done with the help of the available floristic literature such as *Flora of British India* vol.1-7 (Hooker, 1872 – 1897); *Flora India*, vol. 12 & 13 (Hajra et al., 1995); *Flora of Assam*, vol. 1-4, (Kanjilal et al., 1934 – 1940); and vol. – 5 (Bor, 1940); *Flora of Jowai* vol. I & II (Balakrishnan, 1981 & 1983); *Forest Flora of Meghalaya*, vol. 1 & 2 (Haridasan & Rao,1985 & 1987); *Flora of India*, vol. 12 – 13 (Hajra et al., 1995). The voucher specimen has been deposited in the Department of Ecology and Environmental Science, Assam University, Silchar for further reference. The International Plant Names Index (www.ipni.org) and The Plant Lists (www.plantlist.org) was referred for correct nomenclature and author citations.

RESULTS:

27 species under 7 genera are recovered during the field survey.

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Table1: Distribution of Zingiberaceae in the valley districts of Manipur.

Sl. No.	Scientific name	IE	IW	T	B
1.	<i>Alpinia galanga</i> (L.) Willd.	+	+	+	+
2	<i>Alpinia nigra</i> (Gaertn) Burt.	+	-	+	+
3	<i>Alpinia officinarum</i> Hance.	+	-	-	+
4	<i>Amomum aromaticum</i> Roxb.	+	-	-	
5	<i>Amomum subulatum</i> Roxb.	+	-	-	-
6	<i>Curcuma amada</i> Roxb.	+	-	+	-
7	<i>Curcuma angustifolia</i> Roxb.	+	-	-	+
8	<i>Curcuma aromatica</i> Salisb.	+	-	-	-
9	<i>Curcuma caesia</i> Roxb.	+	+	+	
10	<i>Curcuma domestica</i> Valet.	+	+	+	+
11	<i>Curcuma leucorrhiza</i> Roxb.	+	-	-	-
12	<i>Curcuma montana</i> Roxb.	-	+	-	-
13	<i>Elettaria cardamomum</i> Maton	+	-	-	-
14	<i>Hedychium coronarium</i> J. Koenig.	+	+	+	+
15	<i>Hedychium coccineum</i> Buch.-Ham. ex Sm.	+	-	-	-
16	<i>Hedychium flavum</i> Roxb.	-	-	-	-
17	<i>Hedychium flavescens</i> Carey ex Roscoe	+	-	-	-
18	<i>Hedychium marginatum</i> C.B. Clarke.	+	+	+	-
19	<i>Hedychium spicatum</i> Sm. Cycl.	-	-	+	-
20	<i>Hedychium stenopetalum</i> Lodd.	+	-	-	-
21	<i>Kaempferia galanga</i> L.	+	+	+	+
22	<i>Kaempferia parviflora</i> Wall.	+	-	-	-
23	<i>Kaempferia rotunda</i> L.	+	+	-	+
24	<i>Zingiber cassumunar</i> Roxb.	+	-	-	-
25	<i>Zingiber montanum</i> (J.König) Link ex A.Dietr.	+	-	+	-
26	<i>Zingiber officinale</i> Roscoe.	+	+	+	+
27	<i>Zingiber zerumbet</i> (L) Rosc.ex Sm.	-	+	-	-
	Total	23	10	11	9

IE=Imphal East, IW=Imphal West, T=Thoubal, B=Bishnupur

Enumeration of the species.

- Alpinia galanga* (L.) Willd. Sp. Pl.1:12 1797; Rosc. In Trans.Linn.Soc. 8: 345 1807; Baker in Hook. f. Fl. Brit.Ind. 6: 253 1892; Haines, Bot. Bih. Or. 1147. 1924; Fischer in Rec. Bot. Surv. India 12(2):143 1938. Habitat- Common in wet shaded area, found in swampy area and understorey of forest. Distribution- Throughout India, from the foot of the Himalayas to Sri Lanka and Malaysia. Description- Herbs erect, root perennial, rhizomes tuberous as in ginger, Pseudostem, 1-2m high. , 30-60X 10-15 cm, oblong- lanceolate, acuminate, glabrous glossy, ligule short, rounded, ciliate; petiole short, flowers small in conspicuous branched, 15-30 cm long, dense panicles; rachis densely pubescent; bracts small, ovate, concave; calyx greenish white; corolla segments linear-oblong greenish white; lip obovate, clawed, emarginate, white; veins lilac; red glands at the base of the claw; stamens arcuate, shorter than the lip; ovary glabrous; ovules 1-2 in each. Fl. and Fr. - April to November.
- Alpinia officinarum* Hance, J. Linn. Soc., Bot.13:6. 1873. Habitat- Occurs in marshy slopes between hillocks. Distribution- Native to China, growing mainly on the south-eastern coast, and it grows in Hainan, Japan and Thailand. Description- rhizome elongate, terete, pseudostems 40-110cm; leaves sessile; ligule lanceolate, entire, 2-3cm, membranous; leaf blade linear,20-30X 1.2-2.5cm, glabrous, base attenuate, raceme erect, 6-10cm; rachis tomentose; bracteoles very small, less than 1cm; pedicel 1-2mm; calyx puberulent, 8-10cm, apex 3 toothed; corolla tube shorter than calyx, lobes oblong, labellum white with red streaks, ovate, 1.5-2cm, filament 0.7-1cm; anther 6mm; ovary tomentose, capsule red, globose.Fl & Fr. – April to November.
- Alpinia nigra* (Gaertn) Burt. Notes Roy. Bot. Gard. Edinburgh 35: 213, 1977. Habitat- Common in swampy area and wetland. Distribution- Endemic to South-east Asia including Bhutan, China, India, Thailand, Bangladesh, Burma and Sri Lanka. Description- Herb, Pseudostem, 1.5- 3m; leaves sessile, ligule orbicular, 4-6 mm, glabrous; leaf blade lanceolate, 25-40X 6-8cm, glabrous, base acute, panicle erect, 25-30cm, branches tomentose, usually lax with remote cincinni; bracts ovate; bracteoles funnelform, tomentose, persistent; pedicel 3-5 mm; calyx tubular, 1.2-1.5 cm, abaxially pubescent; apex cucullate; lateral staminodes subulate; labellum obovate, base clawed, apex 2- cleft; stamen 1.5cm; filament linear, 1cm; anther curved; ovary densely pubescent.Fl. & Fr. - July to August.
- Amomum aromaticum* Roxb. Fl. Ind. 1:44 1820; Baker in Hook. F. Fl. Brit. India 6: 241; Rao & Verma in Bull. Bot. Surv. India 14: 135 1972; Kumar & Raju in J. Hill. Res. 2: 105 1989. Habitat-On the Hill slope Distribution-In Bangladesh in the hilly areas of Chittagong, Rangamati, Maulvibazar, Sylhet and Rangpur district Description- Rhizomes white, faintly aromatic; leafy stem 30-120cm high; leaves subsessile, 15-30x 2-7.5 cm, linear-lanceolate, glabrous, aromatic, caudate-acuminate; ligules 2-5mm, bilobed, purplish; spikes clavate, 4-6 x 0.8-1.2cm, oblong, pale-brown; flowers white, calyx 3-4 cm long, villous, pinkish; corolla- tube slender; lobes lanceolate, 2-5-3 x 1-1.5 cm; lip 4-4.5x 2.5-3 cm, obovate, margins crumpled; anther 12mm; filament 5mm long, capsule trigonous, smooth, fleshy.Fl. &Fr. – August to June

5. *Amomum subulatum* Roxb. Fl. Ind. 1:43 1820. Habitat- Cool forest area, near mountain streams and in damp forest floors. Distribution- China, Bangladesh, Bhutan, India- Assam, Sikkim, West Bengal, Nepal, Myanmar. Description- Roots tubular, stem erect, 35-40cm; leaves lanceolar, smooth; sheath smooth, margins colored and rising above the mouth into an emarginate ligule; spikes radical, compact, subulate, pale yellow; flower large, yellow; calyx superior, three cleft, much longer than the corolla tube; corolla exterior; lip oblong, emarginate; margin a little curled, deeper than the exterior segment; anther bilobed. Fl. & Fr. - June – November
6. *Curcuma amada* Roxb. Asiat. Res. 11:341 1810; Baker in Hook. f. Fl. Brit. Ind. 6: 213 1890; Haines, Bot. Bih. Or. 1135 1924. Habitat- Scrub jungles and wasteland, occasionally cultivated Distribution- Endemic to Southern western Ghats and Kerala. Description- Herb rhizomatous, leafy tuft 2-3 ft; rhizome pale yellow; fibrous roots ending in tubers; leaves 40-60 x 12.5- 17.5 cm, oblong, ending in a short fine twisted cusp and with a hyaline margin, glabrous; spike 7.5- 14cm, bracts white flowers 4.5cm; calyx puberulous; corolla tubular, ventricose, posterior lobe hooded; lip exceeding the corolla, deep yellow at centre and throat; stamen perfect; filament short, broad, anther reclinate with 2 long declinate spurs; ovary villous.
7. *Curcuma angustifolia* Roxb. Asiat. Res. 11: 338 1810; Baker in Hook f. Fl. Brit. Ind. 6: 120 1890; Rao and Verma in Bull. Bot. Surv. Ind. 14:121 1972; Kumar in J. Econ. Tax. Bot. 15:723 1991. Habitat- wet, swampy area and hillocks Distribution- India, especially in Northeast and western coastal plains and hills. It is also found in Burma, Nepal, Laos and Pakistan. Description- Rhizome small, globose, pale yellow, aromatic; tubers 3 x 1.5cm; Pseudostem 30-50cm high; sheath cuspidate; leaves 8-30 x 3-8cm, oblong- lanceolate, glabrous; petiole sheaths purplish green; spikes 8-15 x 6cm, pedunculate, 10cm long; bracts 3-4 x 1cm, purplish; flowers 2.5-4cm; calyx 1-1.5cm; corolla tube 2 cm long, lobes yellow, 2.5cm; staminodes and lip bright yellow, lip 2.5 x 1.5cm, emarginate; anther 4mm long; ovary villous. Fl. & Fr. – May to September.
8. *Curcuma aromatica* Salisb. Parad. Lond. t. 96 1808; Habitat- Shady places of the hills. Distribution- Found in the south Asian region, predominantly in eastern Himalayas and in the warm forests of the Western Ghats. Description- Rhizome tuberous, 2.5cm in diameter, yellow, aromatic; Pseudostem 1m high; leaves petiolate, 10-60cm long; leaf blades oblong, pubescent, 30-80 x 10-30cm; spikes 20 x 6cm; pedunculate, 15-25cm; bracts pinkish colour, 4-5cm long; flowers 3.5-4cm long; ovate, pale green, corolla tube 2-2.5cm long, lobes pink; staminodes obtuse, orbicular, yellow, obscurely 3-lobed. Fl. & Fr. – May to June.
9. *Curcuma caesia* Roxb. Asiat. Res. 11: 334 1810; Baker in Hook. f. Fl. Brit. Ind. 6: 1890; Kumar in J. Econ. Tax. Bot. 15: 722 1991. Habitat- moist shady places. Distribution- Native to India. Description- Root stocks ovoid, large; tubers sessile, longer, pale grey inside; pseudostems about 1m; leaves oblong with a broad purple-brown band in the middle, glabrous; spikes 12-15 x 6-7.5 cm; densely flowered; bracts of coma longer, red; flower bracts 3.5cm, ovate obtuse, green; flowers shorter than bracts, pale yellow; lip 1.2cm broad, obscurely 3 lobed with middle lobe emarginate. Fl. & Fr. July-August.
10. *Curcuma domestica* Valetton syn. *Curcuma longa* L. Bull. Jard. Bot. Buitenzorg II, 27: 31 1918; Baker in L. Hook. f. Fl. Brit. Ind. 6:214 1890; Prain, Beng. Pl. 1042 1903; Heinig. Enum. 1289 1907; Haines, Bot. Bih. Or.1135. 1924. Habitat- mostly cultivated. Distribution- Occurs on the Torres Strait Islands and the northern part of Cape York Peninsula Description- Herbs rhizomatous, bearing scape from the centre of the leafy tuft, rhizomes with sessile cylindrical tubers, orange yellow; leaves oblong – lanceolate, tapering to the base, glabrous; petiole shorter than the blade; spikes exerted, 5-7.5cm; flower 3-4 in each pouch; corolla tube 3.5cm long, lobes white, 1.2-1.5 x 1.2 cm; staminodes 1.2-1.5 cm x 0.9 cm, white, lip 1.8 x 1.5 cm, emarginate, creamy-white with deep yellow band, anther spurred; filament 4.5mm long; ovary villous. Fl. & Fr. - June to November
11. *Curcuma leucorrhiza* Roxb. Asiat. Res.11:337 1810; Wil. Roxb. in Fl. Ind. 1:30 1975; J.D. Hook. in Fl. Brit. Ind. 6:212 1978. Habitat- Shady hill slopes Distribution- Tropical and subtropical Asia to North Australia. Description- Rootstock large, ovoid; tubers sessile, cylindrical; leafy tuft glabrous 50-55 x 15-17cm; spike vernal; coma nearly as long as the fertile portion; flower-bracts green, obtuse, 10-12cm; bracts of coma longer, more oblong; flowers pale yellow, shorter than the bracts; central lobe of the lip distinctly emarginated. Fl. & Fr. - August to November
12. *Curcuma montana* Rosc. Pl. Coromandel ii. 28. Habitat- Shady hill slopes Distribution- Concan and th Circars. Description- Rootstock ovoid, perennial, leaves pale green, narrowed at the base, petiole green, deeply channeled, as along as the blade, flowers as long as the bracts, corolla segments sub-equal, lip angular and deflexed. Fl. & Fr. July-August
13. *Elettaria cardamomum* Maton Trans. Linn. Soc. London 10(2): 254-1811. Habitat- Shady places of hills. Distribution- Malabar, Western Ghats. Description- Rootstock thick, perennial, leafy stem long, leaves oblong lanceolate, flowers shortly pedicelled, bracteolate, calyx cylindrical, membranous, shortly lobed, corolla tube cylindrical, lateral staminodes minute, lip obovate- cuneate, filament very long, anther cells contiguous, ovary 3-celled, seeds small, angled by pressure. Fl. & Fr. July- November
14. *Hedychium coronarium* J. Koenig. Observ. Bot. 3: 73 1783; Baker in Hook. f. Fl. Brit. Ind. 6: 225 1892; Rao Verma in Bull. Bot. Surv. India 11:121 1971. Habitat- Marshy wetland area. Distribution- Native to the Himalayas and southern China, now with a pantropical distribution, cultivated and sometimes naturalized, also in Southern Africa and South America. Description- Stem 1-2 m high; leaves oblong-lanceolate, appressed hairy beneath; spikes 8-18cm long, densely flowered, cone-like; bracts obtuse, 4-8 x 2.5-6 cm, 3-9 flowered; flowers fragrant, white; calyx 3.5cm long; corolla tube 7-9 cm long, lobes 3.5-6 x 0.3-0.5 cm; staminodes obliquely spatulate, entire, 4.5-5 x 1.5- 3cm; lip suborbicular with 0.5-1cm long claw, base long and broad, 4-6 cm, apex bifid; stamen shorter than lip, filament white; anther 1.2-2cm long; capsule subglobose. Fl. & Fr. - June to October.
15. *Hedychium coccineum* Buch-Ham. ex Sm. Cycl. 17:5 1811 Habitat- grows on edges of forests. Distribution- China,

- Bhutan, Nepal, India and Myanmar. Description- Pseudostems 1.5-2m, leaves sessile; ligule 1.2-2.5cm; leaf blade narrowly linear, 25-50 x 3-5 cm, glabrous, base attenuate, apex caudate- acuminate, spikes cylindric, usually dense, sparsely villous; bracts oblong, 3-3.5cm, leathery, sparsely pubescent, 3- flowered, margin involutes, apex obtuse; flowers red, calyx 2.5cm, sparsely pubescent especially at 3-toothed apex, corolla tube slightly longer than calyx; lobes reflexed, linear, 3 cm, lateral staminodes lanceolate, 2.3cm, labellum orbicular, apex deeply 2- cleft, filament 4.5cm, capsule globose. Fl. & Fr. - June to October
16. *Hedychium flavum* Roxb. Fl. Ind. 1: 81 1820. Habitat- wetland and marshy area and tropical moist forest Distribution- Assam to south China, Tibet, Bangladesh, Myanmar. Description- Roots tuberous; stem erect, 1.5-2 m high; leaves lanceolar, glabrous 20-35cm long; sheaths smooth; spikes terminal, solitary, oblong, 35-40cm ; flowers fragrant, numerous, large, yellow; calyx superior, membranous, obliquely 2-3 toothed; corolla tube slender; filament linear and together with the two lobed anther about as long as the lip; stigma large, villous; capsule turbinate, yellow, 3- celled. Fl. & Fr. - October to December
17. *Hedychium flavescens* Carey ex Roscoe. Monandr. Pl. Scitam. t. 50 1824. Habitat- Moist swampy cool forest and forest margins. Distribution- Native to the eastern Himalayas, Nepal and north-eastern India including Assam, Meghalaya and Sikkim. Description- Pseudostems 1-2m, leaves sessile, leaves sheath slightly pubescent; ligule 3-5 cm, membranous; leaf blade elliptic-lanceolate, 20-50x 4-10cm, abaxially pubescent, base attenuate, margin membranous, apex caudate- acuminate, spikes oblong, 15-20 x 3-6 cm, bracts imbricate, oblong, 3-4.5 x 2-4 cm, concave, 4 – flowered, bracteoles tubular, membranous, flowers yellow, fragrant; calyx 3.5 – 4cm, split on 1 side, apical margin entire, Corolla tube 7-8.5 cm, slender; lobes linear 3-3.5 cm, lateral staminodes wider than corolla lobes, labellum erect, creamy yellow, apex 2 lobed, filament sub equaling labellum, ovary hairy, stigma funnelform, margin bearded. Fl. & Fr. - July – September
18. *Hedychium marginatum* C.B. Clarke. J.Linn. Soc. Bot. 25: 75 1889; Baker in Hook. f. Fl. Brit. Ind. 6:226 1892. Distribution- Assam to Myanmar Description- Herbs with rhizomatous stem; leaves 25- 30 x 3.8- 5 cm, oblong-lanceolate, pubescent beneath; spikes 7.5-10 cm, densely flowered; bracts oblong, imbricate, one flowered; flowers golden yellow; corolla tube twice as long as the calyx; staminodes linear; lip small, cuneate, bifid, clawed; fertile stamen rather longer than the lip. Fl. & Fr. - July to November
19. *Hedychium spicatum* Sm. Cycl. 17:8 1811; Baker in Hook. f. Fl. Brit. Ind. 6: 227 1892. Habitat- understory of forest Distribution- Native to tropical Asia and the Himalayas, common in Brazil. Description- Stem 50- 100cm high; leaves oblong- lanceolate, 15-35 x 4-10 cm, glabrous; spikes 10-25 cm long, dense flowered; bracts oblong, obtuse, green, flowers pale yellow; calyx 3-5 cm long; corolla tube 5-7.5cm long, lobes 2-3.5cm, linear; staminodes linear-lanceolate, 2.5cm long; lip 4-4.5 x 1.5-2cm, deeply bifid; stamen long 2.5-3cm; filament pale red 2-2.5cm, anther linear, 8mm; capsule glabrous, subglobose, 1cm in diameter. Fl. & Fr.- July- November
20. *Hedychium stenopetalum* Lodd. Bot. Cab. 20: t. 1902 1833. Habitat- Cool moist hill forest and marshy area. Distribution- Eastern Himalaya, North-east India, Western Ghats and Andaman. Description- Pseudostem 1.5-3m, leaves sessile; ligule 1.9-2.2cm, slightly brown or cream colour, glabrous, abaxial pubescent, narrowly linear, sheathing leaf blade 19cm, woolly at midrib and sparsely distributed at the marginal; leaf apex acuminate, leaf margin entire, spikes ellipsoidal, 30-46 cm, rachis pubescent, flowers fragrant, bracts obovate, green 5.2 x 3.2 cm, bracteoles tubular, flowers purely white, calyx 3, lobe tubular, apex acuminate; corolla tube 5 x 2 cm, slender, corolla 2+ 1, 2 lobed, lateral staminodes 3.5 cm, anther dorsifixed, 1.6 cm, ovary superior. Fl. & Fr. – August to November.
21. *Kaempferia galanga* L. Sp. Pl. 3 1753; Baker in Hook. f. Fl. Brit. Ind. 6:219 1890; Haines, Bot. Bih. Or. 1137 1924. Habitat- Moist open area in the lowlands or mountains. Distribution- Tropics and subtropics of Asia and Africa. Description- Herbs with tuberous root stock; leaves suborbicular, 7.5- 15cm; flowers fascicled on a very short central spike; calyx cylindric, 3 lobed; corolla white, tube 2.5cm ; staminodes white; lip with a purple spot each side; stamen short, slender, arcuate; anther crest quadrate with small rounded lobes. Fl. & Fr. April-July
22. *Kaempferia parviflora* Wall. Numer. List [Wallich] n. 6587. 1832 Habitat- Moist shady area and open grassland. Distribution- Bangladesh to Indo-China, Myanmar, Thailand Description- Herbs with slender root fibre, root often bearing small tubers, leaves thin, ovate, Inflorescence on separate shoots , leaves subsessile ovate, corolla segments short linear oblong, staminodes narrow, lip lilac, emarginated, anther crest entire, orbicular. Fl. & Fr.- June- September
23. *Kaempferia rotunda* L. Sp. Pl. 3 1753; Fl. Brit. Ind. Brit. 6:222 1890; Fl. Himach. Prad. 3: 695 1984; Fl. Ind. Enumer. Monocot. 297 1989; Bot. Surv. Ind. 12(2): 145 1938. Habitat- open grassland and forest. Distribution- Native to China, Taiwan, India, Indonesia, Malaysia, Myanmar, Sri Lanka and Thailand. Description- Herbs with tuberous root stocks; leaves erect, oblong, 25-30 x 7.5-10cm, tinged with purple beneath; flowers fragrant, in a crowded radical; spikes subsessile; bracts lanceolate, 2.0-3.5cm long, purplish white; corolla tube 5-7.5cm long; staminodes oblong , 4.5-5cm long; lip lilac, bifid; anther lobes lanceolate. Fl. & Fr. - March- May
24. *Zingiber cassumunar* Asiat. Res. 11: 347 1810; hort. Beng. 2; Fl. Ind. 1. 49. Habitat- woodland and scrub Distribution- Arunachal Pradesh to East India. Description- Rootstocks perennial, bright yellow inside; leafy stem 2m; leaves oblong- lanceolate, 45-50 x 7-9cm, pubescent beneath; spikes oblong' 25-30 cm; bracts ovate, reddish, 2-3cm , corolla tube as long as the bract; lip with an orbicular unspotted midlobe, 3cm; stamen yellowish white, shorter than the lip; capsule small, globose. Fl. & Fr. – April- May
25. *Zingiber montanum* (J.König) Link ex A.Dietr. Sp. Pl. 1: 52 1831 Habitat- Mediterranean forest and scrub. Distribution- Assam, Bangladesh, East Himalaya and Indo Myanmar Description- A rhizomatous herb, with rather stout, leafy stem, up to 2 m high. Rhizome yellow inside, strongly aromatic. Leaves lanceolate, 30-45 cm long, sessile, pubescent or pubescent along midrib only

on the lower surface. Ligule 1 mm or less. Scape radical, spikes purplish brown, 7-15 cm long, ovate to oblong on 15-30 cm long peduncle. Corolla pale yellow, tube about 2.5 cm long. Labellum 3-lobed, pale yellow, mid-lobe suborbicular, bifid. Fl. & Fr. - August to November

26. *Zingiber officinale* Roscoe. Trans. Linn. Soc. London 8: 348 1807; Baker in Hook. f. Fl. Brit. Ind. 6: 246 1892; Haines, Bot. Bih. Or. 1143 1924. Habitat- Humid, partly-shaded habitat in the tropics and subtropics. Distribution- Native to India, commercial crop in south and southeast Asia, tropical Africa and Australia. Description- Herbs rhizomatous, with erect slender stem, about 1m high; leaves distichous, 15-30 x 1-2 cm, narrowly lanceolate, tapering to the apex, glabrous beneath, subsessile on the sheath; spikes radical, 3.8-7.5 cm long; peduncles 15-30 cm long; bracts suborbicular, cuspidate; flowers greenish with a small purplish black lip; stamen dark purple, as long as the lip, rather shorter than the corolla. Fl. & Fr.- November- February
27. *Zingiber zerumbet* (L) Roscoe ex. Sm. Exot. Bot. 2: 105 1806; Rosc. In Trans. Linn. Soc. 8:348 1807; Baker in Hook. f. Fl. Brit. Ind. 6:247 1892; Haines, Bot. Bih. Or. 1143 1924. Habitat- Wetland forest and moist shady area. Distribution- Tropical Asia and India to the Malay Peninsula. Description- Herbs rhizomatous, with leafy stem; leaves 30-35 x 7.5-9 cm, elliptic-lanceolate, acuminate at the apex, rounded at the base; petiole short; ligule rounded; spikes oblong, 7-10 cm, clothed with sheathing bracts; bracts orbicular, obtuse; flowers pale yellow; calyx sheathing, hyaline; corolla tube as long as the bract; lip with lateral lobes suborbicular, nearly as long as the bract; mid lobe emarginated; stamen as long as the lip; filament very short and broad, minutely puberulous; connective beaked with incurved edge; stigma surrounded by a ring of hairs. Fl. & Fr. - August- November

DISCUSSION:

Due to increase in anthropogenic pressure on the vegetation over few decades and consequent dependence on plant products has led to the vast exploitation of natural flora in Manipur. A total of 27 plant species under 7 genera are recorded. Out of the 27 species 23 species are confined in Imphal East, 11 Imphal West, and the lowest in Bishnupur district and 23 species of them are medicinally used which are mostly found in wild and only few genera such as *Curcuma amada*, *Curcuma caesia* are domesticated. The differences in the number of species may be due to variation in climatic conditions, edaphic characteristics, biotic disturbances and altitude among different study sites. Among these plant species *Hedychium coronarium* and *Alpinia nigra* is an important food source for Sangai (*Rucervus eldii eldii* McClelland) (M.H.Devi et al, 2015). So there is importance of sustainable utilization of such plants in view of conservation of endangered Sangai.

CONCLUSION:

Developmental activities cannot be stopped, but during such activity efforts have to be made to do the minimum harm to the habitat of threatened plants. If any construction or developmental work is essential at any place, the area should be explored properly and all the endemic as well as threatened plants should be

transferred carefully to other similar habitats and should also be preserved in the botanic gardens as an ex-situ method. The most effective method to conserve the threatened plants is considered to multiply these plants through tissue culture technique and then reintroduction of the propagated clones to their natural habitats. This should be given top priority where habitat destruction is contemplated in the immediate future. Illegal cutting of trees should be checked properly by the forest officials. Active participation of tribal people living inside the forest and to make them aware for the protection and self benefit from the forest. Mass awareness should be created among the local people regarding the importance of conserving the plant species. Village panchayat level committees should be formed and their active participations are necessary to spread awareness among the local inhabitants. As the herbaceous flora are more vulnerable to extinction. Overgrazing must be controlled to conserve the threatened herbaceous species and demarcation of grazing land for cattle's is suggested. To meet the ever-increasing demand for the fodder and fuel wood in the region plantations should be raised on village community lands, so that villagers less dependent on the natural forest for fuel wood.

Reference

- [1] A.D.Livingston and H. Livingston, (1996). The Wordsworth Guide to edible plants and animals. Wordsworth Edition Ltd. Cumberl and Hous, Cribstreet, Ware, Hertfordshire, pp.192.
- [2] Bhunia, D. and Mondal, A.K. (2012). Antibacterial activity of *Alpinia* L. (Zingiberaceae) from Santal and Lodha Tribal areas of Paschim Medinipur Districts in Eastern India. *Advances in Bioresearch* 3 (1): 54-63.
- [3] Dahlgren, R.M.T, H.T. Clifford, and P.F. Yeo.(1985). The families of the monocotyledons. Springer Verlag, Berlin.
- [4] Deb, D.B. (1961). Monocot and Dicot plants of Manipur 3: 119-120.
- [5] Larsen, K. and Delin, W. (2000). *Flora of China* 24:322-377.
- [6] M. H. Devi, P. K. Singh and M.D. Choudhury (2014). Income generating plants of Keibul Lamjao National Park, Loktak Lake, Mnaipur and man-animal conflicts. *Pleione*,8(1):30-36.
- [7] M. H. Devi, P. K. Singh, M.D. Choudhury, (2015). Water Quality and Socio-economic Studies of the Phumdi Environment of Keibul Lamjao National Park, Loktak Lake, Manipur, India. *Frontiers in Environmental Microbiology*, 1(1): 1-8
- [8] Pandey, P. C. and Samant, S.S. (eds) (2001). *Plant Diversity of the Himalaya*: pp 101-118. Gyanodaya Prakashan Nainital.

- [9] Prakash, V. and Mehrotra, B.N. (1996). Zingiberaceae of Northeast India: diversity and taxonomic status. Proceedings of the 2nd symposium of the family Zingiberaceae: 262-273.
- [10] Sanoj, E. and Sabu, M. (2001). The identity of *Hedychium marginatum* C.B.Clarke (Zingiberaceae), and a new species, *H. nagamiense* from North-Eastern India. Bangladesh J.Plant taxon 18(2): 169-176.
- [11] Sravani, T. and Paarakh, P.M. (2011). *Hedychium spicatum* Buch- Ham. Pharmacologyonline 2: 633-642.
- [12] Smith, R.M, 1989. A review of Bornean Zingiberaceae V(Zingiberaceae). Notes from Royal Botanical Garden Edinburgh 45: 409-423.
- [13] Sinha, S.C. (1996). Medicinal plants of Manipur.
- [14] Singh, J.S., Batra, V.K., Sanjive, K.S. and Thiyam, J.S. (2012). Diversity of underutilized vegetable crops species in North-East India with special reference to Manipur: A review. Nebio 3 (2): 87-95.
- [15] Sukumar, S.S. (2009). The economic plants of Manipur and their uses. 28-85.
- [16] Singh, N.R. and Singh, M.S. (2009). Wild medicinal plants of Manipur included in the Red list. Asian agri- history 13 (3): 221-225.
- [17] Tushar, B. S., Sarma, G.C. and Rangan, L. (2006). Ethnomedicinal uses of Zingiberaceous plants of Northeast India. J. Ethnopharmacology 132 Ham- An overview. (1): 286-296.