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RESEARCH ARTICLE

Diversity of xylariales in Sharavathi wild life sanctuary

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SUMMARY

Sampling was done by 50x10m transects. The species richness, species evenness and Shannon diversity index was determined. *Xylaria hypoxylon* (L.: Fr.) Grev. was the dominant species and found in all the months, followed by *Rosellinia necatrix* Prillieux. *Xylaria filiformis* (Alb. and Schw.: Fr.) Fr. was the only species collected on dead dicot leaf and remaining from dead dicot and monocot stems.

Key Words **:** *Xylaria*, Xylariales, Diversity, *Rosellinia*, Diversity indices

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One of the fascinations of life is its incredible variet.The Indian tradition estimates this variety at 84 lakh different types, the sequence of births through which humans must pass before being united with Brahma, the ultimate. Remarkably enough, this is right on target, for modern science estimates that there are somewhere between 80 to 120 lakh different species of living organisms on the earth today. But the bulk of this diversity of life is in the form of fungi and smaller animals that are yet to be described by scientists. Only about 16 lakh species are known to science, and India with a land area of 2.2 per cent of the earth as a whole harbours over 1.2 lakh or more than 7.5 per cent of the world's known species. This is why India ranks amongst the world's top twelve megadiversity countries (Gadgil, 2004).

Tropical forests harbour the greatest wealth of biological and genetic diversity (Hubbell and Foster 1983). Covering only 7 per cent of the earth's land surface these forests have more than half of the worlds' species (May and Stumpf 2000). The tropical forests with a mean annual rainfall of 250 to 2000 mm and potential evapo-transpiration (PET) >1 represent tropical dry forests (Holdridge 1967).

The order Xylariales was established by Tulsane and Tulsane (1863). These members are generally saprobes or weak pathogens; many are endophytic, mainly in wood and bark. About 243 species of Xylariales members are known from Western Ghats of Maharastra (Pande, 2008). The majority of species previously reported from Uttar Pradesh, Bihar, Maharastra and West Bengal and only few reports from Khassi hills, Darjeeling and Nilgiri hills. Despite numerous studies in Western Ghats, still remain a number of interesting *Xylaria* species in protected areas and special habitats which are unexplored (Dargan, 2006).

Xylariales play an important role in plant litter decomposition in forest ecosystems through soil nutrient recycling and build-up of soil organic matter because they decompose the lignocellulose matrix in litter that other organisms are unable to decompose (Takashi and Takeda, 2006).

MATERIALS AND METHODS

Repeated survey was carried from January to June for Xylariales in Sharavathi Wild Life Sanctuary (SWLS). It comes under central western ghats of Karnataka *i.e.* malnad region,

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means hilly area with forests. SWLS is around 10 Kms away from world famous Jog falls and around 5 Kms away from Linganamakki dam. It includes both moist deciduous and evergreen forest. It is having 431 Sq. Kms of total area with two divisions as Kargal Wild Life Range under Kargal Range Forest Officer (RFO) provenance and Sharavathi Wild Life Range under Kogar RFO provenance. It situated between latitude 13^0 to 14^0 15´ North and longitude 74^0 30´ to 75^0. During survey the average temperature 27.3^{0}C, humidity 70-80 per cent and light intensity 1123 (x10) Lux.

The sampling was done by laying 50x10m transects in study area. Telomorphic Xylariales were searched along the transects distributed in different types of vegetation. The climatic factors like light intensity, temperature, humidity and altitude of the habitats was documented. The species richness, species evenness and Shannon diversity index was determined.

Specimens were collected in polythene/tea bags, dried in shade/low temperature heat using electric bulbs. After processing specimens were preserved in thick khaki packets (13.5 x 11.5 cm) with herbarium details like- species name, substrate, family, altitude, locality, date of collection, collection number, collectors name herbarium number (like 233(XH)) and important note. The essential data of specimen recorded using standard diagnostic sheet (Ju and Rogers, 1996) and deposited in college herbarium. Microscopic observations were done under 400x magnification power in bright field microscope.

RESULTS AND DISCUSSION

In present study 33 species belongs to 4 genera were collected. *Xylaria* was the dominant genera and available in all study area. *Xylaria hypoxylon* (L.: Fr.) Grev. was the dominant species and found in all the months, followed by *Rosellinia necatrix* Prillieux. *Xylaria filiformis* (Alb. and Schw.: Fr.) Fr. was the only species collected on dead dicot leaf and remaining from dead dicot and monocot stems. More species were found in the month of February followed by June, January and other months (Table 1-6). Percentage occurrence of

Table 1: Species of January

Sr. No.	Species	% occurrence	Relative abundance (pi)	pi ln pi	pi (ln pi)^2
1.	*Hypoxylon nicaraguense* Ellis and Everh.	6.349206349	0.063492063	-0.175037484	0.4825504
2.	*Hypoxylon michelianum* Ces. and De Not.	7.936507937	0.079365079	-0.201087049	0.509493615
3.	*Xylaria tuberiformis* Berk.	9.523809524	0.095238095	-0.223940501	0.526568152
4.	*Nemania gwyneddii* (Whalley, Edwards and Francis) Pouzar.	12.6984127	0.126984127	-0.262056277	0.540803754
5.	*Xylaria hypoxylon* (L.: Fr.) Grev.	23.80952381	0.238095238	-0.341686792	0.490349427
6.	*Rosellinia necatrix* Prillieux.	14.28571429	0.142857143	-0.277987164	0.540938044
7.	*Xylaria aenea* Mont.	11.11111111	0.111111111	-0.244136064	0.53642176
8.	*Nemania atropurpurea* (Fr.:Fr.) Pouzar.	7.936507937	0.079365079	-0.201087049	0.509493615
9.	*Xylaria multiplex* (Kze) Fr.	6.349206349	0.063492063	-0.175037484	0.4825504

Table 2: Species of February

Sr. No.	Species	% occurrence	Relative auundance (pi)	pi ln pi	pi (ln pi)^2
1.	*Hypoxylon fragiforme* Pers.	2.409638554	0.024096386	-0.0897757	0.334476904
2.	*Hypoxylon monticulosum* Mont.	3.614457831	0.036144578	-0.1200083	0.398454798
3.	*Hypoxylon petriniae* Stadler and Fournier.	2.409638554	0.024096386	-0.0897757	0.334476904
4.	*Hypoxylon subticinense* Y. M. Ju and J. D. Rogers.	4.819277108	0.048192771	-0.1461468	0.443196951
5.	*Nemania effusa* (Nitschke) Pouzar.	3.614457831	0.036144578	-0.1200083	0.398454798
6.	*Xylaria schreuderiana* van der Bijl.	7.228915663	0.072289157	-0.1899095	0.498907613
7.	*Xylaria hypoxylon* (L.: Fr.) Grev.	22.89156627	0.228915663	-0.3375136	0.49763064
8.	*Xylaria castorea* Berk.	8.43373494	0.084337349	-0.2085604	0.515755366
9.	*Rosellinia mycophila* (Fr. : Fr.) Sacc.	2.409638554	0.024096386	-0.0897757	0.334476904
10.	*Rosellinia necatrix* Prillieux.	19.27710843	0.192771084	-0.3173498	0.522437643
11.	*Rosellinia submilis* Karsten and Starb.	7.228915663	0.072289157	-0.1899095	0.498907613
12.	*Xylaria polymorpha* (Pres. ex Fr.) Grev.	6.024096386	0.060240964	-0.1692411	0.475466476
13.	*Xylaria longipes* Nits.	9.638554217	0.096385542	-0.2254842	0.527497638

Table 3: Species of March

Sr. No.	Species	% occurrence	Relative auundance (pi)	pi ln pi	pi (ln pi)^2
1.	*Hypoxylon fragiforme* Pers.	17.30769231	0.173076923	-0.30358	0.53249
2.	*Hypoxylon monticulosum* Mont.	3.846153846	0.038461538	-0.12531	0.40828
3.	*Hypoxylon salicicola* Granmo.	1.923076923	0.019230769	-0.07599	0.30024
4.	*Nemania gwyneddii* (Whalley, Edwards and Francis) Pouzar.	7.692307692	0.076923077	-0.1973	0.50607
5.	*Xylaria hypoxylon* (L.: Fr.) Grev.	28.84615385	0.288461538	-0.35861	0.44583
6.	*Rosellinia necatrix* Prillieux.	21.15384615	0.211538462	-0.32859	0.51042
7.	*Rosellinia callosa* G. Winter.	5.769230769	0.057692308	-0.16457	0.46947
8.	*Xylaria theissenii* Lloyd.	9.615384615	0.096153846	-0.22517	0.52731
9.	*Xylaria polymorpha* (Pres. ex Fr.) Grev.	3.846153846	0.038461538	-0.12531	0.40828

Table 4 : Species of April

Sr. No.	Species	% occurrence	Relative auundance (pi)	pi ln pi	pi (ln pi)^2
1.	*Hypoxylon nicaraguense* Ellis and Everh.	3.448275862	0.034482759	-0.116113649	0.390989007
2.	*Hypoxylon michelianum* Ces. and De Not.	6.896551724	0.068965517	-0.184424045	0.49317731
3.	*Hypoxylon salicicola* Granmo.	6.896551724	0.068965517	-0.184424045	0.49317731
4.	*Xylaria hypoxylon* (L.: Fr.) Grev.	34.48275862	0.344827586	-0.367141633	0.390899639
5.	*Rosellinia aquila* (Fr.: Fr.) De Not.	10.34482759	0.103448276	-0.234691401	0.532440518
6.	*Rosellenia mammaeformis* (Pers.: Fr.) Ces. and De Not.	13.79310345	0.137931034	-0.273241582	0.541291975
7.	*Rosellinia necatrix* Prillieux.	24.13793103	0.24137931	-0.343093095	0.487667613

Table 5: Species of May

Sr. No.	Species	% occurrence	Relative auundance (pi)	pi ln pi	pi (ln pi)^2
1.	*Hypoxylon nicaraguense* Ellis and Everh.	6.25	0.0625	-0.17329	0.48045
2.	*Hypoxylon perforatum* (Schwein.: Fr.) Fr.	12.5	0.125	-0.25993	0.54051
3.	*Hypoxylon salicicola* Granmo.	6.25	0.0625	-0.17329	0.48045
4.	*Nemania maritime* Ju and Rogers.	25	0.25	-0.34657	0.48045
5.	*Xylaria hypoxylon* (L.: Fr.) Grev.	50	0.5	-0.34657	0.24023

Table 6 : Species of June

Sr. No.	Species	% occurrence	Relative auundance (pi)	pi ln pi	pi (ln pi)^2
1.	*Xylaria cubensis* (Mont.) Fr.	6.542056075	0.065420561	-0.1784	0.48647
2.	*Xylaria apiculata* Cooke.	5.607476636	0.056074766	-0.16156	0.46545
3.	*Xylaria hypoxylon* (L.: Fr.) Grev.	19.62616822	0.196261682	-0.31957	0.52036
4.	*Xylaria castorea* Berk.	7.476635514	0.074766355	-0.1939	0.50285
5.	*Xylaria anisopleura* (Mont.) Fr.	5.607476636	0.056074766	-0.16156	0.46545
6.	*Rosellinia necatrix* Prillieux.	16.82242991	0.168224299	-0.29985	0.53447
7.	*Xylaria filiformis* (Alb. & Schw.: Fr.) Fr.	13.08411215	0.130841121	-0.2661	0.54119
8.	*Xylaria aenea* Mont.	5.607476636	0.056074766	-0.16156	0.46545
9.	*Xylaria arbuscula* Sacc.	7.476635514	0.074766355	-0.1939	0.50285
10.	*Xylaria grammica* Mont.	4.672897196	0.046728972	-0.14315	0.43852
11.	*Xylaria polymorpha* (Pres. ex Fr.) Grev.	7.476635514	0.074766355	-0.1939	0.50285

Table 7: Month wise alpha diversity indices of Xylariales in SWLS

Sr. No.		January	February	March	April	May	June
1.	Shannon diversity index H' = - SUM(pi ln pi)	2.10	2.29	1.90	1.70	1.30	2.27
2.	Species richness (S)	1.930905106	2.715644	2.0247	1.7818	1.4427	2.14
3.	Species evenness J = H'/ H'max = H'/ ln S	3.194667859	2.295687	2.6998	2.9484	3.546	2.9881

Xylaria hypoxylon (L.: Fr.) Grev. was highest in all the months followed by *Rosellinia necatrix* Prillieux.

Shannon diversity index in February was 2.29, followed by June 2.27 and January 2.10. Species richness in February was 2.715644, followed by June 2.14 and March 2.0247. Species evenness in May was 3.546, followed by January 3.194667859 and June 2.9881 (Table 7 and Fig. 1).

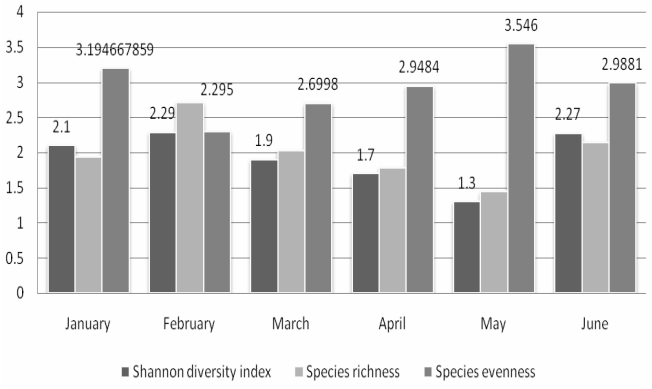

Fig. 1 : Diversity indices of all months

Conclusion :

The present study reveals that Xylariales are perennial in nature. But as per earlier study most of the telomorphs were available only in September to February (Nejakar and Nejakar, 2009). But problems facing the future of Xylariales discovery are rapid decrease of rain forest, which holds the greatest possible resource for acquiring novel species and their products. Each year large area is lost to clearing, harvesting, fire, agriculture development, mining or either human originated activities. Therefore, it needs to establish information basis of their biodiversity, ecology and economics.

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