

Fire Control – A Conservation Tool for certain Medical Plants in Grass Hills Ecosystem, The Western Ghats

**S.Paulsamy, R. Sivakumar, V. Balasubramaniam,
K. Arumugasamy and N. Nagarajan**

Kongunadu Arts and science college , Coimbatore -641029

Received : 14.11.2000

Accepted :10.2.2001

ABSTRACT: *Grass Hills ecosystem lies in Anaimalais. The western ghats possesses rich biodiversity, The annual summer fire, an integral part of this ecosystem, promotes the ecological status of certain perennial grasses including the dominant grass. Chrysopogon zeylanicus Thw. On the other hand, some medicinal plants Viz., Impatiens tomentosa Heyne, Drosera peltata Sm Osbeckia parviflora Arn., Emilia sonchifolia Dc. Lecanthus penduncularis Wedd. And Lobelia nicotianifolia Heyne were identified as fire threatened species and it has been observed that their sociological attributes were hampered severely by fire. Hence, the conservation of such species is needed through effective fire control measures.*

INTRODUCTION:

Grass Hills ecosystem (ca 19000 ha) lies in Anaimalais, the western ghats at an elevation range of 1650m to 2100 meters above m.s. I. Annual summer fire is an integral part of this ecosystem(1) and it suppresses the distribution, density and basal cover of many plant species(2). The present study mainly aims to know the effect of annual summer fire on the ecological status of certain medicinally important herbaceous plants and hence the need of their conservation in Grass Hills.

MATERIALS AND METHODS:

There experimental sites each with an area of ca I ha were selected in grass Hills. The site II was burned only once, during February, 1988 an the site III was burned twice during the February of 1988 and 1989. the site I protected form fire during the study period served as control. The stud was carried out over a period of 25 months form February, 1988 to February, 1990 and the samplings were made at an interval of 3 months. In each site during sampling, 20 quadrats of 1x1 size each, were laid and the phytosociological observations were recorded the ecological attributes were arrived at by using the following formulae given by ⁽³⁾

$$\text{Frequency} = \frac{\text{No of quadrats in which the species present}}{\text{Total no. of quadrats studied}} \times 100$$

$$\text{Density} = \frac{\text{No. of individuals of the species in all quadrats}}{\text{Total no.of quadrats studies}}$$

Basal cover + pr2X total no of individuals of a species present in 20 quadrats.

Where, p-22/7

R= radius of a stem of the individual of a species.

$$\text{Relative frequency} = \frac{\text{No.of occurrence of the species}}{\text{No of occurrence of all species}} \times 100$$

$$\text{Relative density} = \frac{\text{No. of individuals of the specie}}{\text{No of individuals of all species}} \times 100$$

$$\text{Relative dominance} = \frac{\text{Total basal area of the species}}{\text{Total basal area of II species}} \times 100$$

Importance value index (IVI) is the sum quantities of relative frequency, relative density and relative dominance expressed in per 300.

RESULTS AND DISCUSSION:

Grass Hills ecosystem of an animalia, a habitat of rich plant diversity is being dominated by a perennial grass, *chrysopogon zeylanicus* Thw. In association with various species of ecological importance⁽²⁾. It is a diclimax community maintained at *chrysopogon zeylanicus* dominated stage b the annual summer fire⁽⁴⁾. The species *vi anaphalis subdecurrans* gamble and *pteridium aquilinum* L. Are the indicators, enhancing their ecological attributes in the post fire communities^(5,6). Certain medicinal plants viz., *Impatiens tomentosa* Heyne, *drosera peltata* S., *osbeckia parviflora* Arn. *Emilia sonchifolia* Dc., *Lecanthus peduncularis* wedd and *Lobelia nicotianifolia* Heyne were also identified in the stud area⁽²⁾. The species *impatiens tomentosa* is used as ornamental plant due to its blossoms; the alcoholic extract of flowers has marked antibiotic activity. The insectivorous plant, *Drosera peltata* reported to be used by Aurvedic practitioners in the preparation of gold bhasma⁽⁷⁾. The powdered form of *Osbeckia parvifolia* is used for swellings⁽⁷⁾. The herb, *Emilia sonchifolia* is edible and is also used as salad plant before flowering; the root is

used for diarrhea; the juice of fresh leaves is used for sore ears, sore eyes and night blindness⁽⁸⁾. The leaves of the plant, *Lecanthus peduncularis* are edible and the whole plant is used for curing wounds and cuttings⁽⁸⁾. The species, *Lobelia nicotianifolia* has diverse use. The leaves are sweet ; acrid; aphrodisiac; stomachic; diuretic; cure 'Kapha' diseases of blood, heart, uterus, and the vagina; also used as leech repellent; stem bark is used to cure toothache⁽⁹⁾. These medicinal plants are highly hampered and significantly lost their ecological importance due to fire in the stud area. (Table 1). Generally, The distribution, density, basal cover and their relative values and the total ecological importance of these plants were significantly reduced during burned years in the experimental sites further, it has been observed that these species in fire influencing communities is already well documented^(10,11). Occurrence of continual annual fire may terminate, these threatened species form the community in course of time since qualitative evolution of the plants was more homogeneous in the burned plots than in the unburned plots⁽¹²⁾. This may be due to the reduction of seed

pools of such species on the burned plots⁽¹³⁾.
Hence, the conservation of these valuable

medicinal sources is needed through
effective fire control measures.

REFERENCES:

1. Wilson, J. Working plan for the coimbatore south division. Proc chief conservator of forests, Madras. Proc Mis No. 186pp317 (1964)
2. Paulsamy, S, Role of fire in the maintenance of *chrysopogon zeylanicus* the dominated grasslands of Grass Hills, western ghats India Ph.D Thesis Bharthiar University, Coimbatore, India (1992).
3. Curtis, J.T. The vegetation of wiconsin: an ordination of plant communities (University of Wisconsin Press, Wisconsin) (1959)
4. Paulsamy, S., Manian, S, and Udaiyan, K. Relationship in the response of a fern *pteris aquilia* to annual summer fire on grass hills ecosystem, Western Ghats. Indian Journal of forestry, 18 (3): 221-225 (1995).
5. Paulsamy, S., Senthilkumar, D., Manian, S. and Arumgasamy, K. Impact of annual summer fire on some sociological characters of *anaphalis subdecurrens* Gamble in a *chrysopogon zelyanicus* Thw. Dominated grassland, Geobios new reports, 16: 113-116(1997).
6. Paulsamy, S., Rangarajan, T.N. Manian, S. and Udaiyan, K. Impact of annual fore on the sociological attributes of the fern, *Pteridium aquilinum* L. in the grass hills ecosystem western ghats India, J., Econ, tax Bot., 19(3): 745-749 (1995)
7. Anonymous, the Wealth of India, Raw Materials , council of scientific and industrial publication and information directorate, New Delhi, Vol III 113, (1952)
8. Jain S.K. Dictionary of Indian folk medicine and Ethnobotany, deep Publications, New Delhi (1991).
9. Kirtikar, K.R. and Basu, B.Z Indian Medicinal plants, L.M. Basu, Allahabad, India (1933).
10. Whisenant, S.G and Bulsiewicz. W.R. Effects of prescribed burning on Japanese brome population dynamics proc. XV Int Grassland cong., Kyoto, Japan. The science council of Japan and the Japanese society of grassland science (1985).
11. Young, R.P and Miller, RF. Response of *sitanion hystrix* (Nutt.) J.G to prescribed burning, Am Midl. Nat 113:182-187 (1985).
12. Abbadie, L. Evolution saisonniere du stock d' azote dans la strate herbacee d' une savane de cote-d'. Ivoire protégée des feux de brousse. Acta Ecologica/Ecol. Plant, 6:323-335 (1985)

13. Hassan, M.A. and West, N.E. Dynamics of soil seed pools in burned sagebrush semi-deserts, Ecology, 67:269-272 (1986).

Table 1: Frequency, density, basal cover relative frequency, relative dominance and important value index (IVI) of certain herbaceous species which need conservation in the Grass Hills ecosystem, Anaimalais.

Attributes	Site	SPECOES											
		Impatiens tomentosa		Drosera pelata		Osbeckia parviflora		Emilia sonichifolia		Lecanthus peduncularis		Lobelia icotianifolia	
		1988-89	1989-90	1988-89	1989-90	1988-89	1989-90	1988-89	1989-90	1988-89	1989-90	1988-89	1989-90
Frequency	I	35 ^a	38.3 ^a	16.6 ^a	18.3 ^a	45 ^a	416 ^a	48.3 ^a	46.6 ^a	15 ^a	11.6 ^a	43.3 ^a	40.0 ^a
	II	36.6 ^a	36.6 ^a	20 ^b	16.6 ^b	45 ^a	45.0 ^b	55.0 ^b	56.6 ^b	11.6 ^b	10 ^b	40.0 ^b	41.6 ^b
	III	35 ^a	36.6 ^a	20 ^b	21.6 ^b	43.3 ^a	46.6 ^b	51.6 ^c	50.0 ^c	11.6 ^c	5 ^c	40.0 ^b	38.3 ^c
Density (individuals /m ²)	I	0.62 ^a	0.75 ^a	0.68 ^a	0.60 ^a	0.90 ^a	0.98 ^a	0.78 ^a	0.81 ^a	0.36 ^a	31 ^a	0.66 ^a	0.75 ^a
	II	0.43 ^b	0.65 ^b	0.60 ^b	0.51 ^b	0.68 ^b	0.68 ^b	0.70 ^b	0.73 ^b	0.20 ^b	0.13 ^b	0.53 ^b	0.58 ^b
	III	0.40 ^b	0.58 ^b	0.56 ^b	0.38 ^c	0.70 ^c	0.51 ^c	0.83 ^c	0.65 ^c	0.25 ^c	0.08 ^c	0.60 ^c	0.50 ^c
Basal cover (sq.mm/20 quadrats)	I	24.49 ^a	29.79 ^a	32.2 ^a	15.25 ^a	115.83 ^a	126.55 ^a	44.80 ^a	46.71 ^a	2.32 ^a	2.00 ^a	118.81 ^a	133.84 ^a
	II	17.21 ^b	25.82 ^b	15.25 ^b	13.13 ^b	87.94 ^b	40.0 ^b	41.94 ^b	1.26 ^b	0.84 ^b	0.84 ^b	68.64 ^b	79.36 ^b
	III	15.89	23.17 ^c	14.40	9.74 ^c	90.09	66.49 ^c	39.08	37.18 ^c	1.58 ^c	0.53 ^c	77.22 ^c	64.35 ^c
Relative frequency (%)	I	2.03 ^a	2.14 ^a	0.83 ^a	0.93 ^a	2.35 ^a	2.24 ^a	2.71 ^a	2.67 ^a	0.72 ^a	0.48 ^a	2.21 ^a	2.05 ^a
	II	1.89 ^b	1.92 ^b	0.91 ^b	0.77 ^b	0.28	2.25	2.83 ^b	3.09 ^b	0.47 ^b	0.40 ^b	1.86 ^b	1.00 ^b
	III	1.83	1.85 ^c	0.93	0.63 ^c	2.17	2.60	2.67 ^c	2.73 ^c	0.47	0.20 ^c	1.92 ^c	1.82 ^c
Relative density (%)	I	0.65 ^a	0.80 ^a	0.68 ^a	0.59 ^a	0.98 ^a	1.06 ^a	0.85 ^a	0.88 ^a	0.35 ^a	0.28 ^a	0.69 ^a	0.77 ^a
	II	0.43 ^b	0.68 ^b	0.54 ^b	0.50 ^b	0.67 ^b	0.71 ^b	0.70 ^b	0.79 ^b	0.16 ^b	0.11 ^b	0.49 ^b	0.61 ^b
	III	0.41	0.58 ^c	0.51	0.34 ^c	0.68	0.51 ^c	0.66 ^c	0.64 ^c	0.21 ^c	0.07 ^c	0.55 ^c	0.46 ^c
Relative dominance (%)	I	0.12 ^a	0.15 ^a	0.51 ^a	0.07 ^a	0.60 ^a	0.66 ^a	0.23 ^a	0.24 ^a	0.01 ^a	0.00 ^a	0.43 ^a	0.48 ^a
	II	0.07 ^b	0.12 ^b	0.06 ^b	0.06 ^b	0.40 ^b	0.43 ^b	0.18 ^b	0.21 ^b	0.00	0.00	0.30 ^b	0.51 ^b
	III	0.07	0.10	0.06	0.04	0.41	0.30 ^c	0.17	0.17 ^c	0.00	0.00	0.33	0.28 ^c
IVI	I	2.69 ^a	3.11 ^a	1.66 ^a	1.60 ^a	3.95 ^a	3.96 ^a	3.80 ^a	3.81 ^a	1.09 ^a	0.77 ^a	3.34 ^a	3.31 ^a
	II	2.41 ^b	2.73 ^b	1.52 ^b	1.32 ^b	3.37 ^b	3.96 ^b	3.71 ^b	3.29 ^b	0.64 ^b	0.52	2.65 ^b	3.01 ^b
	III	2.31 ^c	2.60 ^c	1.50	1.41	3.16 ^c	3.25 ^c	3.52 ^c	3.37 ^c	0.69	0.27 ^c	2.81 ^c	2.58 ^c

Means followed by same letter between sites for each species are not significant at 5% by DMRT.

The values are the average of 4 samples taken during one ear (February, May August and November).