INT. J. BIOL. BIOTECH., 11 (1): 167-171, 2014.

FLORISTIC LEAF-SIZE AND LIFE FORM SPECTRA OF ASSHAB BABA GRAVEYARD CHAGHAR MATTI, DISTRICT PESHAWAR, KHYBER PAKHTOONKHWAH , PAKISTAN

Muhammad Aaqil Khan, Asad Ullah*, Abdur Rashid, Syed Mukaram Shah and Shehzad Fida

Center of Plant Biodiversity, University of Peshawar, Khyber Pakhtunkhwa, Pakistan
*Corresponding author's Email: asadbotanist@yahoo.com

ABSTRACT

The floristic study of Asshab Baba graveyard District Peshawar was conducted during March-June, 2013 with the aim to identify the conserve plant species. A total of 66 plant species were identified belonging to monocotyledons and dicotyledons. Three families were monocots in which Poaceae was dominant family with 12 species, followed by Cyperaceae species and Arecaceae. Dicotyledons had twenty nine families. Among them Asteraceae was the leading family with 9 species, followed by Chenopodiaceae (4 Sp), Moraceae (4 Sp.) and Amaranthaceae (3Sp.). Brassicaceae, Malvaceae, Papilionaceae, Scrophulariaceae, Solanaceae, Verbenaceae and Zygophyllaceae were represented by 2 species each. The remaining families were represented by one species each. On the basis of biological spectrum therophytes were 40(60.60%), hemicryptophytes 7(10.60%), megaphanerophytes 3(4.54%), chaemophytes 5(7.57%), microphanerophytes 4(6.06%), macrophanerophytes 3(4.54%), Geophytes 3(4.54%) and nanophanerophytes 1(1.51%). Leaf-size spectra showed that 25(37.87%) were microphylls, 17(25.75%) nanophylls, 12(19.69%) mesophylls, 5(9.09%) macrophyll and 5(7.57%) were leptophylls. Phenologically 38 species were in reproductive stages while 28 were in vegetative stages. Graveyards depict the original vegetation of an area. Due to their religious sanctity, they represent conserved flora of an area and hence can be identified as an ideal place for recording the original vegetation as indicator species.

Key words: Asshab Baba graveyard, Peshawar, Pakistan, conserved flora, Floristic inventory, Ecological characteristics

INTRODUCTION

Chaghar Matti is located in District Peshawar at a distance of 17 km from the main city, lies at $34^{0}09^{/}$ N latitudes and $73^{0}13^{/}$ longitudes at an altitude of 345 m from sea level. The name of Asshab Baba Graveyard is due to the Holy Graveyard of Hazrat Sanan Bin Salma Bin Muhbiq (R.A.). Hazrat Sanan (R.A) was a great companion (Sahabi) of the Holy Prophet (PBUH). He along with other Mujahedeen Islam reached this particular place of Peshawar in order to fight against Hindu Rajas and lighten this area with the name of Islam. He was become shaheed in 66 Hijree and was buried in Chaghar Matti. The present graveyard is actually combined grave of 40-45 Asshab of the Holy Prophet (PBUH).

It is bestowed with fertile land with enormous plant biodiversity due to flowing of river Kabul (Shahalam) on one side. Geographically, it is bounded on north by Mechani and Shabkadar, on south by University road, on east by Peshawar city and on west by Bara and Warsak. Climatically, the area has extreme conditions, with hot summers and cold winters. The hottest month is June having meant maximum temperature of 40.8 ^{0}C and coldest month is January with mean maximum temperature of 18.35 ^{0}C. The spring season lasts for March and April. The annual rainfall is 454.2mm. The maximum rainfall is received in September having 114.6mm which drops to50.0mm in June. Relative humidity varies from 85% in January to 50% in June.

Some floristic studies have been carried out by various workers on the flora of Peshawar and adjoining areas of Khyber Pakhtoonkhwah i.e. (Fazal *et al*., 2010; Khan *et al.*, 2011 & 2013; Qureshi and Khan, 1965-67; Qureshi and Khan, 1971 and Marwat *et al*., 2013). It is noted that studies on the graveyards flora of the area have not been carried out in the past therefore; the present studies were conduct to prepare a checklist of the plant species growing in the graveyards for future research.

MATERIALS AND METHODS

Floristic studies of various graveyards of Chaghar Matti including Ashab Baba, Muhammad Akram Deray, Sedano Deray, Rangoo Bibi and Mian Jee Baba were carried out during March-June, 2013. Data regarding the plant specimens including family, locality, sub locality, vegetative, reproductive stage, life-form classification and leaf size (Raunkiaer, 1934) were noted in the field note book. The plant specimens were collected, pressed, documented, dried, identified and mounted on standard herbarium sheets. The identification was carried out with the help of available literature i.e. Nasir and Ali (1970-1989); Ali and Nasir (1991-1993); Ali and Qaiser (1993-2012); Qureshi

and Khan (1965-1967) and Qureshi and Khan (1971).The voucher specimens were deposited in the Herbarium of Centre of Plant Biodiversity (UPBG).

RESULTS AND DISCUSSION

There were 66 plant species of different taxa, which belonged to 32 families, including 29 dicotyledonous families and 3 monocotyledonous families. Floristic distribution among families become differ, Asteraceae dominating dicotyledonous families with 8 genera and 9 species, followed by Chenopodiaceae and Moraceae with 3 genera and 4 plant species and Amaranthaceae with 3 genera and 3 plant species. 7 families were represented by 2 genera and 2 plant species viz. Brassicaceae, Malvaceae, Papilionaceae, Scrophulariaceae, Solanaceae, Verbenaceae and Zygophyllaceae. The remaining 21 families of dicots were represented by 1 geus and 1 plant species. Poaceae leads monocotyledonous families with 12 genera, each having 1 plant species, followed by Cyperaceae with 1 genus and 2 plant species and Arecaceae with 1 genus and 1 plant species.

With respect to the list of the plants compiled during present study (Table1 and 2), it appears that number of species per genus is much lower than the global average showing beta diversity. There were 40(60.60%) Therophytes, 7(10.60%) Hemicryptophytes, 3(4.54%) Megaphanerophytes, 5(7.57%) Chaemophyte, 4(6.06%) Microphanerophytes, 3(4.54%) Geophytes, 3(4.54%) Macrophanerophytes and 1(1.51%), Nanophanerpphyte. Leaf size spectrum showed 25 (37.88%) microphyll, 17 (25.76%) nanophyll, 13(19.69%) mesophyll, 6 (9.09%) macrophyll and 5 (7.57%) leptophylls. A plant species undergo different phenotypic changes during its life cycle. In the present study, phenologies were interpreted as an indicator of specific plant flourishing time and as expresser of modulations in life cycle. The investigation revealed that 38 plant species were in reproductive stage and 28 were in vegetative stage.

Graveyard represents a protective area for plant species and seems an ideal place for conservation purpose naturally. Floristically investigating graveyard trace back to the original vegetation of an area. It is considered sacred place in Muslim society and therefore its flora remain undisturbed to a large extent. For studying the natural flora of the region these graveyards are regarded suitable place by Stewart (1972) and Champion *et al.*, (1965). The decay of the human bodies release nutrients to the soil and hence assists in establishing plant species which complete their life cycle in comparison to the open fields. In the investigated area species diversity was shown greatly by Asteraceae in Dicots while Poaceae ranked first in monocots. Stewart (1972) recorded that Asteraceae and Poaceae are well represented in Pakistan and Azad Jammu and Kashmir. In flora of Pakistan, they are also supported to be the dominant families (Nasir and Ali, 1970-1989; Ali and Nasir, 1989-1991 and Ali & Qaisar,1993-2012).

Life form of plant species are recorded and divided into different life form classes. A bio spectrum is formed when all the species of higher plants are classified into life forms and their ratio expressed in number or percentage (Saxina *et al*., 1987). Biological spectrum reveals prevailing environmental conditions of an area and is economical in comparison of different areas vegetation. However, proportion of life form change due to different environmental conditions and biological disturbance. Phytoclimatically, therophytic type deduce from analysis of work. The dominance of therophytes shows either adverse condition for plant species or under biotic pressure in the form of pasture collection for livestock. Cain and Castro (1959) and Shimwell (1971) recorded that therophytes depicts desert climate, geophytes shows/indicator of Mediterranean climate, while hemicryptophytes indicates temperate zone. The climate of the studied area is of dry sub-tropical type.

Leaf size spectra revealed that microphyllous species (25 spp) followed by nanophyllous species (17 spp) were dominant in the area. Microphylls are representative of steppes, while nanophylls and leptophylls are representative of hot deserts (Cain and Castro, 1959; Tareen and Qadir, 1993) Cold and dry climate harbour small leaves species while warm and moist climate favors larger leaves species. A high percentage of microphyll might be due to dry subtropical conditions. Furthermore, the appearance of small leaves is related to the maintenance of soil moisture besides an ecological adaptation of surviving unfavorable conditions. Life form spectrum of the graveyard under study significantly deviated from the Normal Raunkiaerian Spectrum (Raunkiaer, 1934).. The very high proportion of therophytes appears to be due to aridity and discrete seasonal changes which bring the therophytes in prominence in spring when sampling was made. Tareen and Qadir (1993) also reported high percentage of microphylls in dry temperate conditions of Quetta District. Shaukat and Qadir (1972) also reported nanophylls (43%) and microphylls (33%) as the dominant classes in the calcarious hills around Karachi. The flora of Pakistan coast was found to be dominated by chamaephytes followed by therophytes and phanerophytes. The leaf size was slightly more dominated by nanophylls than microphyllous category of leaves (Khan and Ahmad, 1992). It reveals that the dominance of leaf size class is associated with altitude. Saxina *et al*., (1987) also recorded microphyll dominance with altitude. Beside leaf size, other features of plants such as habit and root system also determine specific leaf zone (Khan *et al*., 2011).

Phenology shows that plants in reproductive stage were dominant over plants in vegetative state. Phenology shows the favorable season for plant propagation influenced significantly by environmental conditions. It gives information about aggressiveness of species. Climate change the Phenological state of a plant by relatively increasing or decreasing day length and temperature. Plants detect climatic condition by special pigments and hence affecting phenology. Therefore, phenology of a plant can be mould in any direction by changing climatic condition.

Table 1. Checklist of plant species containing information regarding their family, botanical name, life- form, leaf-size and phenology.

S. No.	Family	Botanical Name	Life Form	Leaf size	Phenology
Monocotyledons					
1.	Poaceae	1. *Bromus catharaticus* Vahl.	Th	Mes	R
		2. *Cenchrus ciliaris* L.	H	L	R
		3. *Cynodon dactylon* (L.) Pers	H	N	R
		4. *Cymbopogan jowarancusa* (Jomes) schult	H	Mes	R
		5. *Desmostachya bipinnata* L.	H	Mac	R
		6. *Echinochloa clona* L	Th	N	V
		7. *Imperata cylindrical* (L.)Raeush	H	Mic	R
		8. *Phalaris minor* Retz	Th	Mic	R
		9. *Phragmites australis* (Cav) Trinexsteud.	G	Mes	V
		10. *Polypogan monospeliences* (L.) Desf.	Th	Mic	R
		11. *Saccharum spontaneum* L.	H	Mic	V
		12. *Secale cereal* L.	Th	Mic	R
2.	Cyperaceae	13. *Cyperus diformis* L.	G	Mes	R
		14. *Cyperus rotundus* L.	G	N	R
3.	Arecaceae	15. *Phoenix dactylifera* L.	Mc	Mic	R
Dicotyledons					
4.	Amaranthaceae	16. *Achyranthes aspera* L.	Th	Mic	R
		17. *Amaranthus viridis* L.	Th	N	V
		18.*Emex australis* Steinh	Th	N	R
5.	Apiaceae	19. *Ammi visnaga* (L.) Lam.	Th	L	R
6.	Asteraceae	20. *Calendula arvensis* L.	Th	Mic	R
		21. *Catharanthus roseus* (L.) G. Don	Th	Mic	R
		22. *Cnicus benedictus* L.	Th	Mic	V
		23. *Conyza aegyptica* (L.) Ait	Th	Mes	V
		24. *Conyza Canadensis* (L.) Cronquist	Th	Mac	V
		25. *Launaea procumbens* Roxb.	Th	N	R
		26. *Silybum marianum* (L.) Gaertn.	Th	Mes	R
		27.*Sonchus asper* L.	H	Na	V
		28.*Xanthium strumarium* L.	Th	Mac	V
7.	Asclepiadaceae	29. *Calotropis procera* (Wild.) R. Br.	Ch	Mac	V
8.	Boraginaceae	30. *Heliotropium europium* L.	Th	N	R
9.	Brassicaceae	31. *Coronopus didymus* (L.)Sm.	Th	L	R
		32. *Sisymbrium irio* L.	Th	N	R
10.	Chenopodiaceae	33. *Chenopodium album* L.	Th	Mic	V
		34. *Chenopodium murale* L.	Th	L	R
		35. *Kochia indica* Wight.	Ch	N	V
		36. *Suaeda fruticosa* Forssk. ex J. F. Gmel	Th	N	V
11.	Cannabaceae	37. *Canabis sativa* L.	Th	Mic	R
12.	Convulvulaceae	38. *Convolvulus arvensis* L.	Th	Mic	V
13.	Cucurbitaceae	39. *Citrullus colocynthis* (L.) Schard	Th	Mes	R

14.	Euphorbiaceae	40. *Euphorbia helioscopia* L.	Th	Mic	R
15.	Fumariaceae	41. *Fumaria indica* Pugsley	Th	L	R
16.	Gentianaceae	42. *Centaurium pulchellum* (Sw.) Druce	Th	Mic	R
17.	Malvaceae	43. *Malva neglecta* Wallr	Th	Mic	R
		44. *Malvastrum coromandelianum* (L.) Garcke.	Th	Mic	R
18.	Meliaceae	45. *Melia azedarach* L.	Meg	Mic	R
19.	Moraceae	46. *Brousonetia papyrifera* (L.) Vent.	Meg	Mac	V
		47. *Ficus carica* L.	Mic	Mes	R
		48. *Ficus relegiosa* L.	Mic	Mes	V
		49. *Morus alba* L.	Mp	Mes	V
20.	Myrtaceae	50. *Eucalyptus lanceolatus* Honey	Meg	Mes	V
21.	Oxalidaceae	51. *Oxalis corniculata* L	Th	N	R
22.	Papilionaceae	52. *Alhaji maurorum* Medik	Th	N	V
		53. *Dalbergia sisso* Roxb. ex DC.	Mp	Mic	V
23.	Polygonaceae	54. *Rumex dentatus* L.	Th	Mac	R
24.	Rhamnaceae	55. *Zizyphus nummularia* (Burm. f) Wight and Am.	Np	Mic	V
25.	Scrophulariaceae	56. *Verbescum Thapsus* L.	Th	Mes	R
		57. *Veronica biloba* L.	Th	N	V
26.	Simaroubaceae	58. *Alianthus altissima* (Mill.) Swingle.	Mp	Mic	V
27.	Solanaceae	59. *Solanum nigrum* L.	Th	Mic	R
		60. *Withania somniferum* (L.) Dunal	Ch	Mes	R
28.	Tamaricaceae	61. *Tamarix aphylla* (L.) Lanza	Mc	N	V
29.	Thymelaeaceae	62. *Thymelea passerina* (L.) Cossouy	Ch	Mic	V
30.	Verbenaceae	63. *Phyla nodiflora* (L.) Greene.	Th	N	R
		64. *Verbenia officinalis* L.	Th	Mic	V
31.	Zygophyllaceae	65. *Peganum harmala* L.	Ch	Mic	V
		66. *Tribulus terrestris* L.	Th	N	V

Keys: Th: Therophytes, H: Hemicryptophytes, G: Geophytes, Mc: Microphanerophytes, Ch: Chamaephytes, Meg: Megaphanerophytes, Mp: Macrophanerophytes, N: Nanophytes, L: Leptophylls, N: Nanophylls, Mic: Microphylls, Mes: Mesophylls, Mac: Macrophylls, R: Reproductive, V: Vegetative.

Table 2. Biological and leaf size spectra of the plants of Asshab Baba graveyard.

S. No.	Life Form	No of species	Percentage %
A.	Life form classes		
1.	Therophytes	40	60.60
2.	Hemicryptophytes	7	10.60
3.	Chamaephytes	5	7.57
4.	Microphanerophytes	4	6.06
5.	Macrophanerophytes	3	4.54
6.	Megaphanerophytes	3	4.54
7.	Geophytes	3	4.54
8.	Nanophytes	1	1.51
B.	Leaf size classes		
1.	Microphylls	25	37.87
2.	Nanophylls	17	25.75
3.	Mesophylls	13	19.69
4.	Macrophylls	6	9.09
5.	Leptophylls	5	7.57

REFERENCES

Ali, S. I. and M. Qaiser (1993-2012). *Flora of Pakistan.* Nos. 194-221. Department of Botany, Karachi University, Karachi Pakistan.

Ali, S. I. and Y. J. Nasir (1991-1993). *Flora of Pakistan*. Nos. 191-193.Department of Botany, Karachi University, Karachi Pakistan.

Cain, S. A and G. M. De Olivera- Castro (1959). *Manual of vegetation analysis*. Harper and Brothers, N.Y

Chagatai, M. S., S.H. Shah and M. A. Akhtar (1968). Phytosociological study of graveyard of Peshawar District, NWFP, Pakistan. *Pak. J. Bot.* 10(1):17-30.

Champion, G. Harry and S. K. Seth (1965). *Forest types of Pakistan*. Pakistan Forest Institute, Peshawar. 233

Durrani, J. M, A. Razaq, S. G. Muhammad and F. Hussain (2010). Floristic diversity, ecological characteristics and ethnobotanical profile of plants of Aghbeag Rangelands, Baluchistan, Pakistan. *Pak. J. Plant Sciences,* 16 (1): 29-36.

Fazal, H, N. Ahmad, A. Rashid and S. Farooq (2010). A checklist of Phanerogamic flora at Haripur Hazara, K. P., Pakistan. *Pak. J. Bot*., 42(3):1511-1522.

Hussain, F., I. Iqbal and M. F. Durrani (2000).Vegetation studies on Ghalegay Hills, District Swat, Pakistan. *Pak. J. Plant Science*. 1-10.

Ilyas, M., Z. K. Shinwari and R. Qureshi (2012). Vegetation composition and threats to the Montane temperate forest ecosystem at Qalagai Hills, Swat, KPK, Pakistan. *Pak. J. Bot.*, 44: 113-122.

Khan, D. and R. Ahmad (1992). Floristics, life-form, leaf-size and halo-physiotypic spectra of coastal flora of Pakistan (pp. 158-189). In: Proc. National Conference – *Problems and Resources Of Pakistan and Plan of Action for Its Developmen*t. PCST Islamabad (28-30 September. 1991).

Khan, M., F. Hussain and S. Musharaf (2013). Floristic composition and biological characteristics of the vegetation of Sheika Multon Town, District Mardan, Pakistan. *Annual Review and Research in Biology* 3 (1):31-41.

Khan M, F. Hussain, S. Musharaf and Imdad Ullah (2011). Floristic composition, life form, leaf size spectra of the coal mine area vegetation of Darra Adam Khel, KP, Pak. *Journal of Biodiversity and Environmental Sciences*, 1 (3): 1-6.

Marwat, K. S, K. Usman, R. A. Shah, A. Shah and E. A. Khan (2013). Floristic account at emergent-aquatic and marsh land, Angiosperm at D.I . Khan District KPK, Pakistan.

Nasir, E. and S. I. Ali (1970-1989). *Flora of Pak.* Nos. 1-190. Department of Botany, Karachi University, Karachi Pakistan.

Naveed, S., F. Hussain, I. Khattak and L. Badshah (2012). Floristic composition and ecological characteristic at Olea, Acacia Forest Shamshokii District Kark. *Global Journal at Science Frontier Research*, 12(8). 31-36.

Qureshi, M. A. and S. A. Khan. (1965-67). Flora of Peshawar District and Khyber Agency. *Pak. J. For*., 15: 364-393 and 203-244.

Qureshi, M. A. and K. A. Khan. (1971). An illustrated Flora of Peshawar District and Khyber Agency. Ranunculaceae to Moringaceae. *Pak. J. For.* 1. 212.

Raunkiaer, C. (1934). *The life form at plants and statistical plants geography*. Darendon Press, Oxford. 23.

Saxina, A. K, T. P. Pandey and J. S. Singh (1987). Altitudinal variation in the vegetation at Kaumaun, Himalaya. *Perspective in Environ. Bot*: 44-66.

Shaukat, S.S. and S.A. Qadir (1972). Life-form and Leaf-size spectra of the flora of calcarious hills around Karachi. *J. Sci. Univ. Karachi.* 1(2): 126-132.

Shimwell, D. W. (1971). *The description and classification of vegetation*. Sedgewick and Jackson. London. 322

Stewart, R. R. (1972). An annotated catalogue to the vascular plants of West Pakistan & Kashmir. Fakhri Printing Press, Karachi.

Tareen, R. B. and S. A. Qadir (1993). Life form and leaf size spectra of the plant communities of diverse areas ranging from Harnai, Sinjawi to Duki region of Pakistan. *Pak. J. Bot*., 25: 83-92.

(*Accepted for publication December 2013*)