

Research Article



Floristic Composition of Verges of Motorway (M-1) Peshawar to Charsadda, Pakistan during Winter Season

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Abstract | Detail study was carried out on the flora of road sides and central green belt of Motorway (M-1) from Peshawar to Charsadda Interchange. A total of 30 different species, which belong to 29 genera and 16 families, were recorded from the area. Poaceae was the most dominating family including 7 genera. Ecological characteristics like life form spectra indicated that Therophytes (53.33%) were the most dominating life form. Leaf size spectra showed that the most abundant leaf size was Microphyll (50%). This study not only gives information about the flora of motorway but can provide a baseline for future studies and plantation of this area. It is suggested that plantation of invasive species should be discouraged which might become problematic in future for the indigenous flora.

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Keywords | Motorway verges, Floristic composition, Indigenous flora, Roadside vegetation, Invasive species

Introduction

Roads are constructed to join two different areas to facilitate the purpose of transport and trade. Therefore, for the social and economic development of any country it is very important to maintain the roads properly (Dierkes and Geiger, 1999). Motorway (M-1) was constructed in the year 2007 to connect the two provinces *i.e.* Punjab and Khyber Pakhtunkhwa. Its total length is 155 km including 88 km in Khyber Pakhtunkhwa and 67 km in the Province of Punjab. M-1 has 9 interchanges at Fatehjang, Bhatar, Burhan, Chachh, Rashaki, Swabi, Charsadda, Northern Bypass and Ring road on N-5.

Roads are useful as linear corridors, they provide habitats to flora and fauna and act as barriers to their dispersal (Angold, 1997). Many species of organisms are supported by road verges. In Pakistan NHA has taken steps to grow many species of trees along the major

roads like motorway, it resulted in the reduction of conservation values of the habitats (Ahmad and Akbar, 2004). Some useful studies of roadside flora on national level have been carried out by Hansen and Jansen (1972) in Denmark.

Floristic diversity is a clear reflection of the vegetation resources, it is actually the total of the species located within an area. The present study aims to study flora along the verges of Motorway (M-1) from Peshawar to Charsadda in Pakistan. This research will provide baseline knowledge about the flora of the area under study and it will be helpful in future studies.

Material and Methods

The survey was completed during the winter season. During this period due to severe cold vegetation was not very frequent and diverse. Two visits were made at one month interval. Plants were collected from differ

Table 1: Floristic list, biological and leaf size spectrum of plants of Motorway (M-1)

	Plant Name	Family	Leaf Form	Leaf Size	Habit
1	<i>Acacia nilotica</i>	Fabaceae	Mp	N	T
2	<i>Amaranthus viridis</i>	Amaranthaceae	Th	Mic	H
3	<i>Brachiaria ramosa</i>	Poaceae	H	N	H
4	<i>Calotropis procera</i>	Asclepiadaceae	Ch	Mes	S
5	<i>Cenchrus ciliaris</i>	Poaceae	H	N	H
6	<i>Chenopodium album</i>	Chenopodiaceae	Th	Mic	H
7	<i>Chenopodium sp.</i>	Chenopodiaceae	Th	Mic	H
8	<i>Chrozophora tinctoria</i>	Euphorbiaceae	Th	Mic	H
9	<i>Citrus medica</i>	Rutaceae	Mp	Mic	T
10	<i>Cleome viscosa</i>	Cleomaceae	Th	Mic	H
11	<i>Conyza bonariensis</i>	Asteraceae	Th	Mic	H
12	<i>Convolvulus arvensis</i>	Convolvulaceae	H	Mic	H
13	<i>Cynodon dactylon</i>	Poaceae	H	N	H
14	<i>Dactyloctenium aegyptium</i>	Poaceae	H	N	H
15	<i>Datura innoxia</i>	Solanaceae	Ch	Mes	S
16	<i>Dalbergia sissoo</i>	Fabaceae	Mg	Mic	T
17	<i>Dichanthium annulatum</i>	Poaceae	H	N	H
18	<i>Eragrostis minor</i>	Poaceae	Th	N	H
19	<i>Eucalyptus camaldulensis</i>	Myrtaceae	Mg	Mic	T
20	<i>Forsskaolea tenacissima</i>	Urticaceae	Th	Mic	H
21	<i>Kochia indica</i>	Amaranthaceae	Th	N	H
22	<i>Lactuca serriola</i>	Asteraceae	Th	Mic	H
23	<i>Leptochloa panacea</i>	Poaceae	Th	N	H
24	<i>Malcolmia africana</i>	Brassicaceae	Th	Mic	H
25	<i>Nerium oleander</i>	Apocynaceae	Np	Mic	S
26	<i>Parthenium hysterophorus</i>	Asteraceae	Th	Mic	H
27	<i>Phoenix dactylifera</i>	Arecaceae	Mp	Mes	T
28	<i>Silybum marianum</i>	Asteraceae	Th	Mes	H
29	<i>Verbascum thapsus</i>	Scrophulariaceae	Th	Mes	H
30	<i>Trifolium repens</i>	Fabaceae	Th	N	H

Th: Therophyte; **H:** Hemicryptophyte; **Ch:** Chamaephyte; **Np:** Nanophanerophyte; **Mp:** Microphanerophyte; **Mg:** Megaphanerophytes; **N:** Nanophyll; **Mic:** Microphyll; **Mes:** Mesophyll; **T:** Tree; **S:** Shrub; **H:** Herb. Photographs of plants (1-30) are given at the end of the article.

ent sites at about one km distance. Plants were then dried and identified with the help of available literature and referred to their families. They were classified according to Raunkiar's classification of life form and leaf size. Plants were related to their families and a floristic list of all plants was prepared. Plants were divided into different classes of leaf size and life form (Table 1). The collected data was further analysed in the result.

Results and Discussion

The soil of Motorway (M-1) roadsides is dry, sandy and having abundance of stones and gravel. After analyzing the plant data a comparison is made. This research consist of the floristic survey of road verges. In the present study flora along Motorway (M-1) from Peshawar to Charsadda Interchange in Pakistan was recorded. A total number of 30 species belonging to 17 families and 29 genera were collected from the area. The families include Poaceae (7 spp.), Amaranthaceae (2 spp.), Asteraceae (4 spp.) and Fabaceae (3 spp.) (Table 2). In Pakistan some surveys have been recorded about the composition of flora of the roadside (Akbar et al., 2003; Adnan and Rashid, 2001). A similar study was conducted by Ahmad (2007) in which wild medicinal plants were highlighted along road side verges of (M-2) Pakistan.

Table 2: Summary of flora of Motorway (M-1)

S. No	Ecological Characteristics	No.
1	Total species	30
2	Families	17
3	Genera	29
4	Family Poaceae	07 (23.33%)
5	Family Asteraceae	04 (13.33%)
6	Family Fabaceae	03 (10%)
7	Family Chenopodiaceae	02 (6.6%)

Ahmad (2007) worked on wild medicinal plants from Lahore to Islamabad Motorway (M-2). During his research he recorded a total of 81 plants belonging to 44 families known for their medicinal uses like fever, jaundice, dysentery, skin diseases, snakebite etc. Ahmad (2010) worked on detrended correspondence analysis (DCA) of Vegetation along motorway (M-2) in Pakistan. Ahmad (2010) collected data from 397 quadrats. A total of 227 vascular plant species were collected which belonged to 75 families. Amongst them there were 60 trees, 38 shrubs and 129 herbs.

Out of these 227 species, the frequency of 15 species was more than 9%. It was revealed that the dominating plants along roadsides in the area are *Cynodon dactylon*, *Bothriochloa pertusa*, *Heteropogon contortus*, *Calotropis procera*, *Cenchrus ciliaris* and *Rhynchosia minima*. Amongst these plants *Cenchrus ciliaris*, *Heteropogon contortus*, *Calotropis procera* and *Cynodon dactylon* cover around 35.90 % of the area sampled. The floristic composition and ecological characteristics of Tank District were studied by [Badshah et al. \(2013\)](#). During this survey 205 species were collected from the area which belonged to 56 families. Amongst the different species the leading families were Polygonaceae (7 spp.), Brassicaceae (9 spp.), Asteraceae (14 spp.), Boraginaceae (7 spp.), Papilionaceae (19 spp.), Poaceae (34 spp.), Chenopodiaceae (10 spp.) and Euphorbiaceae (8 spp.). [Ahmad et al. \(2013\)](#) worked on vegetation along Motorway (M-1), his study area comprised on 90 km, from Rawalpindi to Attock district in Pakistan. He recorded 45 species of plants belonging to 23 plant families and classified vegetation data using detrended correspondence analysis (DCA) and two way indicator species analysis (TWINSPAN) techniques. *Heteropogon contortus*, *Cynodon dactylon*, *Carthamus oxycantha*, *Chrysopogon aucherii*, *Lepidium apetalum*, *Calotropis procera* and *Conyza canadensis* dominated the area under study. Besides these, some other frequent species are *Conyza bonariensis*, *Sorghum halepense*, *Cymbopogon jwarancusa*, *Medicago polymorpha*, *Prosopis cineraria*, *Avena sativa*, *Euphorbia helioscopia* and *Dalbergia sisso* etc. Vegetation along coastal roads of Egypt has also been studied ([Abd-el-Ghani and El-Sawaf, 2005](#)). Plants along roadsides were also studied by [Hansen and Jansen \(1972\)](#).

Table 3: Life form spectra of plants of Motorway (M-1)

S. No.	Leaf Form	No.	%age
1	Therophyte	16	53.33
2	Hemicryptophyte	6	20
3	Chamaephyte	2	6.66
4	Nanophanerophyte	1	3.33
5	Microphanerophyte	3	10
6	Megaphanerophyte	2	6.66

Life form gives information about the physiognomy of the vegetation ([Badshah et al., 2013](#)). [Raunkiaer \(1934\)](#) classification of life form is found to be more reliable. In Brazil phanerophytes and therophytes are generally the most common types of life forms ([Costa et al., 2007](#)). In this study, a comparison of life

form spectra indicated that Threophytes are the most dominating plants which include members of Poaceae as the dominating community. The percentage of Hemicryptophyte is 20 which shows that they are the second most dominating community of Motorway (M-1) ([Table 3](#)). During present study family Poaceae was the dominating family with a total of 7 species including *Brachiaria ramosa*, *Cenchrus ciliaris*, *Cynodon dactylon*, *Dactyloctenium aegyptium*, *Dichanthium annulatum*, *Eragrostis minor* and *Leptochloa panacea*. The other families had less than 7 species. [Ahmad \(2010\)](#) found that out of 227 species 9.2 % belonged to Poaceae. *Cynodon dactylon* occurred in high degree because while growing it forms a complete cover on the ground ([Ali et al., 2004](#)). [Heindl and Ullmann \(1991\)](#) studied roadside vegetation in France, they found that *Cynodon dactylon* is highly adapted to mechanical impact, therefore it is able to suppress the growth of other plants, forming large monotypic stands. *Cynodon dactylon* was declared by [Ali et al. \(2004\)](#) and [Heindl and Ullmann \(1991\)](#) to be able of restraining the spread of other flora.

[Badshah et al. \(2013\)](#) studied flora of District Tank and found microphanerophytes with 12 (15.3%) species, nanophanerophytes 13 (16.6 %) species, hemicryptophytes 10 (12.8%) species, geophytes 8 (10.2%) species and chamaephytes 9 (11.5%) species during his research. He declared that therophytes with 25 (32.0%) species were most dominating life forms of the area. [Shimwell \(1971\)](#) and [Cain and Castro \(1959\)](#) reported that therophytes are the representatives of xerophytic climate. Another situation similar to present findings was revealed by [Costa et al. \(2007\)](#) revealed in Brazil where phanerophytes and therophytes are generally regarded as the most common life forms, which is a situation similar to the present findings. [Sher and Khan \(2007\)](#), [Fazal et al. \(2010\)](#) and [Hussain et al. \(2009\)](#), observed similar situation of hemicryptophytes and therophytes in arid and degraded environment. During studies of [Batalha and Martins \(2002\)](#) phanerophytes and hemicryptophyte were reported to be the dominant life forms in Brazil. [Badshah et al. \(2013\)](#) indicated that the most frequent leaf sizes in the flora of District Tank were mesophylls, leptophylls, nanophylls and microphylls. [Malik et al. \(2007\)](#) and [Badshah et al. \(2010\)](#) studied plants of Waziristan and Kotli Azad Kashmir and reported that microphylls were the dominant leaf size of the study area. [Sher and Khan \(2007\)](#) reported high percentage of leptophylls and nanophylls from Chagarzai

area. In the present study leaf size spectra showed that the most abundant leaf size is Microphyll with a percentage of 50. Nanophylls and Mesophyll are 33.33 and 16.66, respectively (Table 4).

Table 4: Leaf size spectra of plants of Motorway (M-1)

S. No.	Leaf Size	No.	%age
1	Nanophyll	10	33.33
2	Microphyll	15	50
3	Mesophyll	5	16.66

Conclusion

It is concluded that indigenous flora should be planted to preserve the floristic diversity and vegetation cover of the country in general and roadside in particular. The thirst to grow fast growing exotic plants will be a sort of welcoming to invasive species. The most dominating family was poaceae. Detailed study is recommended to regarding conservation status and planting flora. Detailed study is recommended regarding conservation status and planting flora.

Authors' Contribution

This paper is a part of Major author's contribution for the requirement of Ph.D course work. Syeda Farzana collected the plants from Motorway M-1 verges. Dr. Siraj and Dr. Lal Badshah helped her in data compilation and analysis.'

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1. *Acacia nilotica*



2. *Amaranthus viridis*



3. *Brachiaria ramosa*



6. *Forsskaolea tenacissima*



4. *Calotropis procera*



7. *Chenopodium sp*



5. *Cenchrus ciliaris*



8. *Chrozophora tinctoria*



10. *Cleome viscosa*



10. *Citrus medica*



11. *Conyza bonariensis*



12. *Convolvulus arvensis*



14. *Dactyloctenium aegyptium*



13. *Cynodon dactylon*



15. *Datura inoxia*



16. *Dalbergia sissoo*



18. *Eragrostis minor*



19. *Eucalyptus camaldulensis*



17. *Dichanthium annulatum*



20. *Chenopodium album*



22. *Lectuca serriola*



21. *Kochia indica*



23. *Leptochloa panacea*



24. *Malcolmia africana*



26. *Phoenix dactylifera*



25. *Nerium oleander*



27. *Parthenium hysterophorus*



28. *Silybum marianum*



30. *Trifolium repens*



29. *Verbascum thapsus*