INNSPUB

International Journal of Biosciences | IJB |
ISSN: 2220-6655 (Print), 2222-5234 (Online)
http://www.innspub.net
Vol. 15, No. 5, p. 227-232, 2019

RESEARCH PAPER OPEN ACCESS

Floral diversity and Impact of runoff salts on native vegetation at south eastern side of the salt range in Pakistan

Allah Nawaz Khan[1*], Noor Ull Huda[2], Mansoor Hameed[2], Farooq Ahmad[3], Muhammad Asif Akram[3], Atfa Iqbal[4]

[1,2,3]*Department of Botany, University of Agriculture Faisalabad, Pakistan*

[4]*Department of Botany Institute of pure and applied biology, Bahaudin Zakariya University Multan, Pakistan*

Key words: Floral diversity, Salt stress, Salt Tolerance, Salt range.

http://dx.doi.org/10.12692/ijb/15.5.227-232 Article published on November 15, 2019

Abstract

Present study was conducted to investigate the floral diversity and Impact of runoff salts on native vegetation at south eastern side of the salt range in Pakistan, because this area has a lot of importance due to its unique kind of floral diversity including many salt tolerating plant species. Firstly an extensive survey was conducted and sample from plant species present at south eastern side of salt range were collected, pressed, and dried. It was concluded that Plant species are different in their tolerance capacity and this capability is different with in different cultivars of same species. Salinity causes much limitation to agricultural sector in area of low rain fall as arid and semi-arid zones. Salinity inhibition of plant growth and their distribution in different area. Salinity distributes plants according to their concentration and plant resistance to these concentrations.

* **Corresponding Author:** Allah nawaz khan ✉ nawazniazi409@yahoo.com

Introduction

Plants have great influence on our environment (Ali, 2008). Floral diversity have key role in social and economic conditions of mankind, floral diversity and their friendly environmental standards have great importance due to deprivation of land destruction. (Ahmad *et al.*, 2010). Salts are important part of soil but there increasing concentration causes disturbance (Munns, 2005). 6 million hectare of land in Pakistan is affected by salinity. (Chatrath *et al.,* 2007). Salinity is the main difficulty originated by breaking of minerals from rocks weathering of arid and semiarid zones that are deposited on soil by sewerage water and irrigation water, changes that convert lands to deserts and use of this saline soil by ill-fated farmers has consequential reduction in yield (Bhutta, 2011).

Salinity effect plants and there production very drastically (Allakhverdiev *et al.,* 2000b).Salt effect plants by reducing water use efficiency, it increases ionic stress, and plant suffers with heat intensity and also causes reduction in stem length. Plant important molecules are damaged with increasing free radicals (Farooq *et al.,* 2009). Salinity causes reduce water availability to the plants it also causes accumulation of reacting oxygen species and osmolytes. (Mandhania *et al.,* 2006).Salt in the soil effect plant growth and productivity of plants it also effect plant seed germination and yield. It is reported that 46 million hectares of land is polluted by salinity in all over the world (Munns and Tester, 2008). When plants are exposed to salinity stress and time duration of their exposure increases cell division and stomata functioning effected (Munns, 2002). Salt effect plants in a number of ways by disturbing ions, nutrients balance and causes drought low availability of water to the plant. Salt also effect plant membrane stability and metabolic processes. It causes reduction in cell division (Parida and Das 2005).

Salt disturbs plant vegetation in many ways, salt effects plant distribution in diverse areas. Rice is best to grow in saline land. Abbas *et al.* (1994). Many grass species like *Agrostis, Festuca, Lolium, Poa* and *Cynodon* in their natural environment resist salinity in the soil. (Hameed and Ashraf, 2008). Many stresses are important in concern with salinity on plants that are stress related to water potential, reacting oxygen species, toxic metals or ions and decrease in metabolic efficiency .Salt also damage plant membrane structure, its cell division and growth (Hasegawa *et al.,* 2000). All these effects on plants causes' reduction in plant yield and finally cause economic loss (Rahdari *et al.,* 2012).

About 11% of irrigated land and 28% of crop land is polluted by salinity, approximately half of the world land is affected by salinity (Qadir *et al.*, 2000). With the passage of time the need for water is increasing continuously along with many protective laws against water use management that forces farmers to use low quality water for their crop land (Al Omron *et al.*, 2012). Modern equipments for treating salinity are the use of halophytes plants. Halophytes are the salt tolerant crops that help to remove salt in the soil by depositing salt in their organs and remove salt from soil surface layers. (Shaaban and El-Fouly, 2002).Plant breeding techniques are also use full in saline areas but this technique is only use full in some plants not on all type of crops are effective in this technique (Cantrell and Linderman, 2001). There are many solutions to salinity problem but use of traditional salt tolerant crops is important in this concern,but the total production of crop decreases (Tester and Davenport, 2003). Salt tolerant species have many mechanisms in this concern but some species can remove salt from their organs or from cytoplasm or storing salt in their vacuole (Muhling and Lauchli, 2002).

Khewra is a famous town located in Tehsil Pind Dadan Khan under the Jhelum district in province of Punjab. Khewra is present approximately 210 km from Islamabad move towards Pind Dadan Khan. Khewra salt mine is the part of a salt range, extending along the river of Jhelum at south of Pothohar plateau, from this site the river of Jhelum joins river Indus. Aims and objectives of the study were to fill the gap of study which was not previously completed, study survey was conducted to investigate floral

diversity and Impact of runoff salts on native vegetation at south eastern side of the salt range in Pakistan.

Materials and methods

First of all a broad survey was conducted and sample from plant species present at south eastern side of salt range was gathered , hard-pressed, and dried out. Later aid were taken from list of Pakistan flora, all the plant samples species were identified. Every species were enlisted and samples were mounted on the herbarium sheets and pictures were gathered. Photograph of habitat was taken in the original habitat with the help of digital camera including close up view of inflorescence. The 10 permanent quadrates (each of 05 m^2) were laid at every habitat along a straight transect line, each were alienated by a distance of 10 m at every site. Representative sites of the Lilla region near Pind-Dadan-Khan were chosen along different levels of environmental attributes particularly variation in altitude ,soil structure, habitation, plant life type, aspects and plant population structure and were surveyed for three weather spans all through 2016-2017. Data was recorded from the above mentioned sites throughout the years with a regular interval of three month thus each season has a representation.

Results

In the present research work 52 plant species were collected. South eastern side of the salt range is affected by salt concentration. Salt concentration in this area varies along with different altitude from foothill zone to river and road side of this region.

Species are distributed along concentration gradient. There is reduction in population of plant species due to salt stress, many of the plants were found to be in stunted growth while *Acacia nilotic, Cgrysopogon serrulatus, Dactyloctenium scindicum* have greater tolerance because they are good in salinity tolerance and help to cover and reclaim soil.

Table1. Floral diversity recorded scientific name and family of recorded 52 plant species.

1	*Grewia villosa*	Tiliaceae	27	*Conyza ambigua*	Asteraceae
2	*Olea ferruginea*	Oleaceae	28	*Cyperus rotundus*	Cyperaceae
3	*Acacia nilotica*	Fabaceae	29	*Oxalis corniculata*	Oxalidaceae
4	*Prosopis juliflora*	Fabaceae	30	*Verbascum Thapsus*	Scrophulariaceae
5	*Capparis deciduas*	Capparidaceae	31	*Euphorbia hirta*	Euphorbiaceae
6	*Salvadora oleoides*	Salvadoraceae	32	*Aeluropus lagopoides*	Poaceae
7	*Cgrysopogon serrulatus*	Poaceae	33	*Tamarix aphylla*	Tamaricaceae
8	*Rhazya stricta*	Apocynaceae	34	*Ochthochloa compressa*	Poaceae
9	*Cymbopogon jwarancusa*	Poaceae	35	*Acacia modesta*	Fabaceae
10	*Suaeda vera*	Amaranthaceae	36	*Dactyloctenium scindicum*	Poaceae
11	*Aristida adscensionis*	Poaceae	37	*Cressa cretica*	Convolvulaceae
12	*Ziziphus nummularia*	Rhamnaceae	38	*Eragrostis ciliaris*	Poaceae
13	*Cenchrus setigerus*	Poaceae	39	*Fagonia ovalifolia*	Zygophyllaceae
14	*Dactyloctenium scindicum*	Poaceae	40	*Grewia villosa*	Tiliaceae
15	*Asphodelus tenuifolius*	Asphodelaceae	41	*Justicia adhatoda*	Acanthaceae
16	*Alopecurus aequalis*	Poaceae	42	*Achyranthes aspera*	Amaranthaceae
17	*Achyranthes aspera*	Amaranthaceae	43	*Bombax cieba*	Malvaceae
18	*Morus alba*	Moraceae	44	*Boerhavia diffusa*	Nyctaginaceae
19	*Cynodon dactylon*	Poaceae	45	*Malvastrum coromandelianum*	Malvaceae
20	*Xanthium strumarium*	Asteraceae	46	*Verbascum Thapsus*	Scrophulariaceae
21	*Dalbergia sissoo*	Papilionaceae	47	*Calotropis procera*	Asclepidaceae
22	*Saccharum bengalense*	Poaceae	48	*Cenchrus pennisetiformis*	Poaceae
23	*Boerhavia diffusa*	Nyctaginaceae	49	*Cyperus compressus*	Cyperaceae
24	*Digitaria adscendens*	Poaceae	50	*Fimbristylis dichotoma*	Cyperaceae
25	*Malvastrum coromandelianum*	Malvaceae	51	*Schoenoplectus juncoides*	Cyperaceae
26	*Eucalyptus camaldulensis*	Myrtaceae	52	*Sporobolus arabicus*	Poaceae

Discussion

In present studies salt stress has some powerful effects on *Cgrysopogon serrulatus* and *Cymbopogon jwarancusa,* while *Asphodelus tenuifolius, Alopecurus aequalis, Acacia nilotic, Cgrysopogon serrulatus, Dactyloctenium scindicum* have greater tolerance. *Alopecurus aequalis* are not found in greater number. *Prosopis juliflora, Suaeda vera, Dactyloctenium scindicum, Alopecurus, Capparis deciduas, Aeluropus lagopoides*, *Ziziphus nummularia, Prosopis juliflora* are found in average numbers. Salt tolerant plants that are halophytes are best grown in high saline areas especially in saline area of Pakistan, many species that are *Cgrysopogon serrulatus, Cymbopogon jwarancusa, Dactyloctenium scindicum, Cynodon dactylon, Ochthochloa compressa* and *Aeluropus lagopoides.*

Tree plantation in Pakistan is very effective in controlling salinity. It also help to recover saline soil. Some trees species that are Acacia, Eucalyptus and prosopis were planted in Punjab especially in south eastern side of salt range. *Eucalyptus camaldulensis* show good quality growth in these areas. *Eucalyptus microtheca* is planted in unirrigated lands. Acacia is also planted in highly saline areas. *Acacia ampliceps* and *Prosopis juliflora*. Grown in less saline areas. (Mahmood *et al.* 2001).

Fig. 1. Habitat of Area and runoff salts.

In earlier studies it is noticed that underground water resources are saline and their chemical formulation is the important factors for species allocation in different areas of South Africa and same as in Pakistan due to same arid environmental conditions. Where again Species population is linked with different concentrations of Na and electrical conductivity of soil at different levels. (Ellery *et al.* 1997). It is obvious that trees grow best in saline environment as compare to crops but the growth of trees in natural environment is suitable for nature. It is noticed that due to fallen leaf deposition and decomposition of organic roots in the soil causes more organic content in forest soil and along with this, trees have many mechanisms that help them to reduce salinity and sodicity effect.

Tree species are used to reclaim or recovery soil that is affected by salinity. In recent study under survey method the population of, *Eucalyptus camaldulensis*

shows less growth in highly saline area under foothill zone of salt range while *Dalbergia sissoo* shows better growth. From the above discussion, it can be concluded that species of saline area of Pakistan especially South eastern side of the salt range are effected by salt concentration. Salt concentration in this area varies along with different altitude from foothill zone to river and road side of this region. Species are distributed along concentration gradient. All these species are important in saline area because they are good in salinity tolerance and help to cover and reclaim soil.

References

Abbas ST, Azra Q, Chughtai MID. 1994. Salt affected soils-problems and prospects. Pakistan Journal of Agricultural Research **15(1),** 176-184.

Ahmad F, Khan MA, Ahmad M, Zafar M, Mahmood T, Jabeen A, Marwat SK. 2010 Ethnomedicinal uses of grasses in the Salt Range Region of Northern Pakistan. Journal of Medicinal Plants Research **4(5),** 362-369.

Al Omron AM, El-Maghraby SE, Nadeem ME, A, El-Eter AM, Al-Mohani H. 2012. Long term effect of irrigation with the treated sewage effluent on some soil properties of Al-Hassa Governorate, Saudi Arabia. Journal of the Saudi Society of Agricultural Sciences **11(1),** 15-18.

Ali SI. 2008. Significance of flora with special reference to Pakistan. Pakistan Journal of Botany **40(3),** 967-971.

Allakhverdiev SI, Sakamoto A, Nishiyama Y, Inaba M, Murata N. 2000. Ionic and osmotic effects of NaCl-induced inactivation of photosystems I and II in *Synechococcus* sp. Plant physiology **123(3),** 1047-1056.

Bhutta WM. 2011. Antioxidant activity of enzymatic system of two different wheat (*Triticum aestivum* L.) cultivars growing under salt stress. Plant, Soil and Environment **57(3),** 101-107.

Cantrell IC, Linderman RG. 2001. Preinoculation of lettuce and onion with VA mycorrhizal fungi reduces deleterious effects of soil salinity. Plant and Soil **233(2),** 269-281.

Chatrath R, Mishra B, Ferrara GO, Singh SK, Joshi AK. 2007. Challenges to wheat production in South Asia. Euphytica ***157*(3),** 447-456.

Farooq M, Wahid A, Kobayashi N, Fujita D, Basra SMA. 2009. Plant drought stress: effects, mechanisms and management. Sustainable agriculture (p 153-188). Springer, Dordrecht.

Hameed M, Ashraf M. 2008. Physiological and biochemical adaptations of *Cynodon dactylon* (L.) Pers. from the Salt Range (Pakistan) to salinity stress. Flora-Morphology, Distribution, Functional Ecology of Plants **203(8),** 683-694.

Hasegawa PM, Bressan R A, Zhu JK, Bohnert HJ. 2000. Plant cellular and molecular responses to high salinity. Annual review of plant biology **51(1),** 463-499.

Mandhania S, Madan S, Sawhney V. 2006. Defense mechanism under salt stress in wheat seedlings. Biologia Plantarum ***50*(2),** 227-231.

Mühling KH, Läuchli A. 2002. Effect of salt stress on growth and cation compartmentation in leaves of two plant species differing in salt tolerance. Journal of Plant Physiology **159(2),** 137-146.

Munns R. 2002. Comparative physiology of salt and water stress. Plant, cell & environment **25(2),** 239-250.

Munns R. 2005. Genes and salt tolerance: bringing them together. New phytologist **167(3),** 645-663.

Munns R, Tester M. 2008. Mechanisms of salinity tolerance. Annu. Rev. Plant Biology **59,** 651-681.

Parida AK, Das AB. 2005. Salt tolerance and

salinity effects on plants: a review. Ecotoxicology and environmental safet **60(3),** 324-349.

Qadir M, Ghafoor A, Murtaza G. 2000. Amelioration strategies for saline soils: a review. Land Degradation & Development **11(6),** 501-521.

Rahdari P, Tavakoli S, Hosseini SM. 2012. Studying of salinity stress effect on germination, proline, sugar, protein, lipid and chlorophyll content in purslane (*Portulaca oleracea* L.) leaves. Journal of Stress Physiology & Biochemistry **8(1),** 182-193.

Shaaban MM, El-Fouly MM. 2000. Nutrient contents and salt removal potential of some wild plants grown in salt affected soils. In International Symposium on Techniques to Control Salination for Horticultural Productivity **573,** p 377-385.

Tester M, Davenport R. 2003. Na+ tolerance and Na+ transport in higher plants. Annals of botany **91(5),** 503-527.

Mahmood K, Morris J, Collopy J, Slavich P. 2001. Groundwater uptake and sustainability of farm plantations on saline sites in Punjab province, Pakistan. Agricultural Water Management **48(1),** 1-20.

Ellery WN, Ellery K, McCarthy TS. 1993. Plant distribution in islands of the Okavango Delta, Botswana: determinants and feedback interactions. African Journal of Ecology **31(2),** 118-134.