ECO-FLORISTIC STUDY OF WEED FLORA OF MAIZE CROP IN DISTRICT SWABI, KHYBER PAKHTUNKHWA, PAKISTAN

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ABSTRACT

The present study explains floristic composition and ecological characteristics of weed flora of maize crop. This study was conducted in district Swabi, Khyber Pakhtunkhwa, Pakistan during September-October 2018. A total of 28 weed species distributed in 15 families and 27 genera were reported from the selected maize fields of the study area. Out of 15 families, twevel (12) were dicots having (17 genera and 18 species) and three (3) were monocots having (10 genera and 10 species). Poaceae was dominant family with eight (8 species). Amaranthaceae has five (5 spp.) followed by Aizoaceae and Convolvulaceae 2 species each. The remaining 11 families were each represented by 1 species. Annuals contributed 19 (67.8%) species while perennials shared 9 (32.2%) species. Life form spectra indicated that therophytes were dominant and abundant life form with 17 (60.7%) species. Leaf size spectra showed that microphylls were major class with 12 (42.8 %) species. There were 25 (89.3%) species with simple leaves, 2 (7.1 %) species with compound leaves while 1 (3.6 %) species was represented by dissected leaves.

Keywords: Floristic composition, Life form spectra, Maize, Swabi, Weeds.

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INTRODUCTION

District Swabi was declared and upgraded to district on 1st July, 1988 (Anwar *et al*., 2015). Before the up-gradation, it was a tehsil of District Mardan. It lies between 72°-13' and 72°-49' East longitude and 33°-55' and 34°-23' North latitude. It is bounded in the north by Buner district, in east by Haripur district, in south by Attock district and west by Mardan and Nowshera districts. District Swabi is divided into 4 tehsils, namely Swabi, Lahor, Topi and Razar. Swabi has 2 regions; the northern hilly area and southern plains. Swabi has extreme climate with hot summer. A steep rise in temperature is observed from May onward. The hottest month is June. From October onward temperature is gradually decreased. January is the coldest month. In monsoon (July and August) maximum rainfall occurs during which weather becomes hot and humid (Anwar *et al*., 2015).

Weeds are unwanted plants growing in cultivated as well as in domesticated areas and barren areas and adapted to various edaphic and climatic conditions. There are almost 30,000 weed plants in the world, out of them, more than 50 causing considerable damage to agricultural crops (Mahmood and Niaz, 1992). Weeds are strong competitors of crops and compete with crops mainly for water, light, nutrients and space and decrease quality as well as quantity of crop (Dangwal *et al*., 2010). Oudhia and Tripathi (1998) reported that some weed plants secrete allelochemicals which affect the growth and germination of agricultural crops. Weeds develop mutualistic relationship with insect pollinators (Jesse *et al*., 2006) and effectively invade new areas that affect various ecosystems (Morale and Aizen, 2006).

A characteristic set of plant species within a plant community is known as floristic composition or species composition. The general appearance of the plant body is referred to its life-form. Percentage distribution of different life forms and leaf size in the flora of an area is termed as "biological spectrum" and "leaf size spectrum". Life form and leaf size are two physiognomic attributes and indicators of climate of an area that have been generally used in vegetation analysis (Cain and Castro, 1959).

A variety of weed plants infest maize crop in the study area. Therefore, the aim and objectives of the present study was to explore and document the distribution of weed flora in maize crop in district Swabi, Khyber Pakhtunkhwa, Pakistan. This research will provide baseline knowledge about the weed ecology and it will be helpful in future studies.

MATERIALS AND METHODS

Floristic study of weeds was conducted in maize fields during September-October, 2018. Weed plants were collected from the selected maize fields. The collected specimens were properly dried and mounted on herbarium sheets. All these plants were identified with the help of available literature and 'Flora of Pakistan' (Nasir and Ali, 1970-1989; Ali and Nasir, 1989-1991). Weed plant species were then classified into various life form and leaf size classes following Raunkiaer (1934), Cain and Castro (1959) and Hussain (1989). A complete floristic list of weeds with ecological attributes was compiled alphabetically.

RESULTS AND DISCUSSION

Floristic composition

A total of 28 weeds species distributed in 15 families and 27 genera were reported from the study area. Out of 15 families, 12 were dicots having (17 genera and 18 species) and 3 were monocots having (10 genera and 10 species) (Table-1). Poaceae was dominant family that contributed eight (8) species. Amaranthaceae (5 spp.) followed by Aizoaceae and Convolvulaceae (2 spp.) each. The remaining 11 families were each represented by one (1) species (Figure 1). Annuals contributed 19 (67.8%) species while perennials shared 9 (32.2%) species. Comparing with Muhammad *et al*. (2011) who reported 39 weed species distributed in 21 families from maize fields of FR Bannu, Pakistan. Zabihullah and Rashid (2013) recorded 31 weed species of 15 families

from maize fields of Mankial valley, Hindukush, Pakistan. Fazlullah *et al*. (2015) listed 46 weed species of 39 genera representing 22 families from maize fields of district Dir (Lower), Pakistan. Afridi *et al*. (2015) reported 25 weed species of 11 families from maize crop in district Mardan, Pakistan. Similarly, Ahmad *et al*. (2016) reported 29 weed species of 27 genera representing 15 families from maize fields of district Mardan, Pakistan. Among them Poaceae and Amaranthaceae were the dominant families. Poaceae was leading family followed by Fabaceae, Solanaceae and Amaranthaceae in the study of Fazal *et al*. (2019). Similarly, Poaceae was the dominant family followed by Asteraceae, Amaranthaceae and Brassicaceae in the study of Naveed *et al*. (2019). In the present study, grasses were the most abundant weed species in maize fields.

Life form and leaf size spectra

Life form spectra of weed flora of maize in the study area revealed that therophytes were dominant life form comprised 17 (60.7 %) species. Hemicryptophytes shared 8 (28.6 %) species followed by chamaephytes 2 (7.1 %) and geophytes 1 (3.6 %) species (Figure 2). Leaf size spectra indicated that microphylls were dominant leaf size group with 12 species (42.8 %) followed by nanophylls 10 species (35.7 %). Leptophylls shared 5 (17.9 %) species followed by mesophylls 1 (3.6 %) species (Figure 3). In the present investigation, therophytes and microphylls were dominant. Our findings are in consonance with the results of Fazlullah *et al*. (2015) who reported therophytes and microphylls as major life-form and leaf-size classes. Therophytes were leading life-form followed by hemicryptophytes in the study of Naveed *et al*. (2019). While studying weeds of maize, potato and mungbean in Kalash Valley, Chitral, Pakistan, Fazal *et al*. (2019) reported therophytes and microphylls and nanophylls as major life form and leaf size classes.

Table-1. Floristic list and ecological attributes of weed flora of maize crop in district Swabi, Pakistan.

S.No.	Divisions/Families/Species	Life form	Leaf size	Life span	Leaf type
A. Monocotyledonae					
1. Commelinaceae					
1.	*Commelina benghalensis* L.	Therophyte	Microphyll	Annual	Simple
2. Cyperaceae					
2.	*Cyperus rotundus* L.	Geophyte	Nanophyll	Perennial	Simple
3. Poaceae					
3.	*Brachiaria ramosa* (L.) Stapf	Therophyte	Leptophyll	Annual	Simple
4.	*Cynodon dactylon* (L.) Pers.	Hemicryptophyte	Leptophyll	Perennial	Simple
5.	*Dactyloctenium aegyptium* (L.) Willd.	Therophyte	Microphyll	Annual	Simple
6.	*Digitaria ciliaris* (Retz.) Koeler	Hemicryptophyte	Nanophyll	Annual	Simple
7.	*Echinochloa colona* (L.) Link	Therophyte	Nanophyll	Annual	Simple
8.	*Eleusine indica* (L.) Gaertn.	Hemicryptophyte	Nanophyll	Annual	Simple
9.	*Leptochloa panicea* (Retz.) Ohwi	Therophyte	Microphyll	Annual	Simple
10.	*Sorghum halepense* (L.) Pers.	Hemicryptophyte	Microphyll	Perennial	Simple
B. Dicotyledonae					
4. Aizoaceae					
11.	*Portulaca oleracea* L.	Therophyte	Leptophyll	Annual	Simple
12.	*Trianthema portulacastrum* L.	Therophyte	Nanophyll	Annual	Simple
5. Amaranthaceae					
13.	*Achyranthes aspera* Linn.	Therophyte	Microphyll	Perennial	Simple
14.	*Alternanthera pungens* Kunth	Therophyte	Nanophyll	Perennial	Simple
15.	*Amaranthus tenuifolius* Willd.	Therophyte	Nanophyll	Annual	Simple
16.	*Amaranthus viridis* L.	Therophyte	Microphyll	Annual	Simple
17.	*Digera muricata* (L.) Mart.	Therophyte	Microphyll	Annual	Simple
6. Asteraceae					
18.	*Parthenium hysterophorus* L.	Therophyte	Mesophyll	Annual	Dissected
7. Capparidaceae					
19.	*Cleome viscosa* L.	Therophyte	Nanophyll	Annual	Compound
8. Convolvulaceae					
20.	*Convolvulus arvensis* L.	Chamaephyte	Nanophyll	Perennial	Simple
21.	*Ipomoea triloba* L.	Chamaephyte	Microphyll	Annual	Simple
9. Cucurbitaceae					
22.	*Citrullus colocynthis* (L.) Schrad.	Hemicryptophyte	Microphyll	Perennial	Simple
10. Euphorbiaceae					
23.	*Euphorbia prostrata* Aiton	Hemicryptophyte	Leptophyll	Perennial	Simple
11. Fabaceae					
24.	*Sesbania concolor* J.B. Gillett	Therophyte	Leptophyll	Annual	Compound
12. Malvaceae					
25.	*Malvastrum coromandelianum* (L.) Garcke	Hemicryptophyte	Microphyll	Annual	Simple

13. Nyctaginaceae					
26.	*Boerhavia procumbens* Banks ex Roxb.	Hemicryptophyte	Nanophyll	Perennial	Simple
14. Solanaceae					
27.	*Physalis minima* L.	Therophyte	Microphyll	Annual	Simple
15. Tiliaceae					
28.	*Corchorus olitorius* L.	Therophyte	Microphyll	Annual	Simple

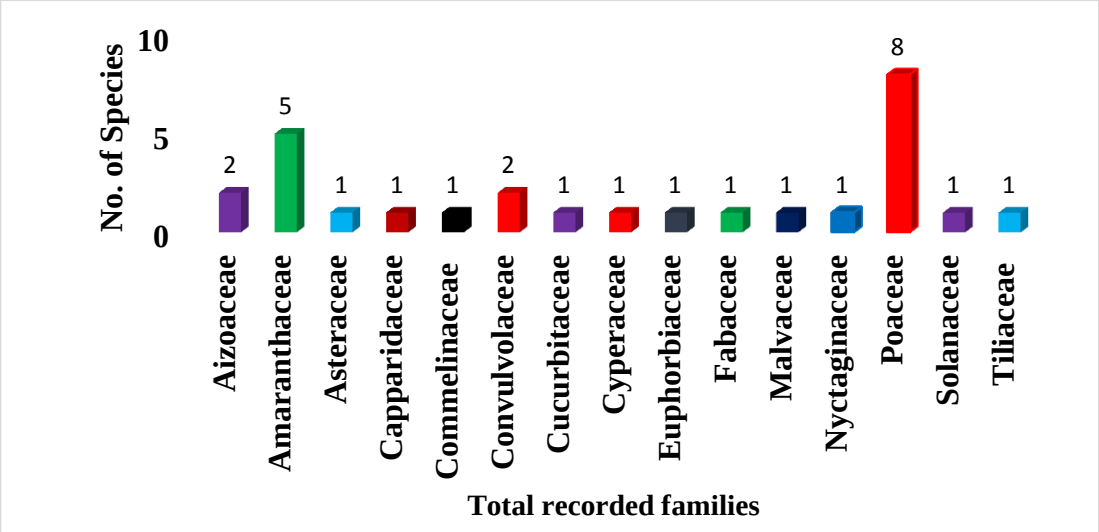

Figure 1. Number of weed species in the recorded families.

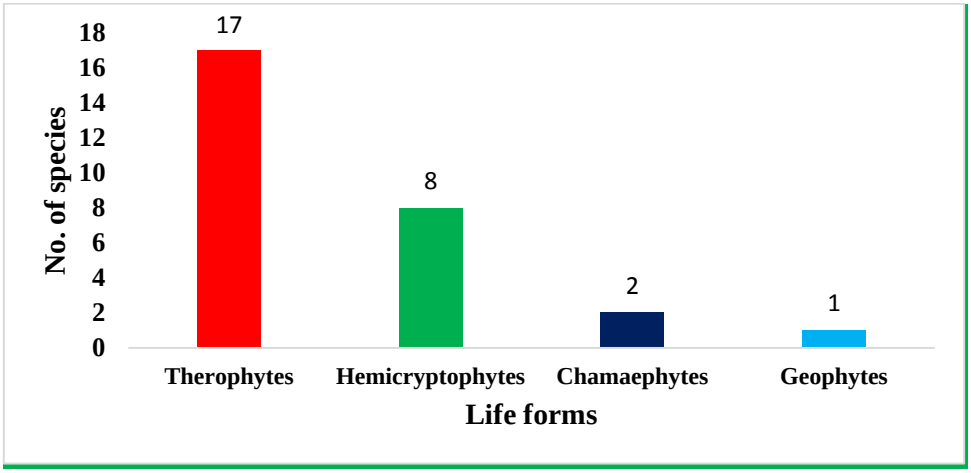

Figure 2. Life form of weed species of maize crop

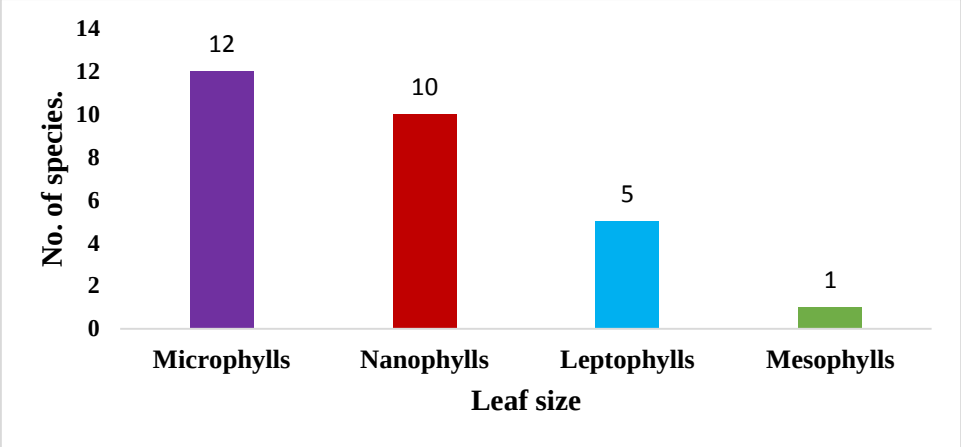

Figure 3. Leaf size spectrum of weed species of maize crop

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10


11


12

1. *Commelina benghalensis*
2. *Cynodon dactylon*
3. *Dactyloctenium aegyptium*
4. *Portulaca oleracea*
5. *Trianthema portulacastrum*
6. *Achyranthes aspera*
7. *Amaranthus viridis*
8. *Parthenium hysterophorus*
9. *Convolvulus arvensis*
10. *Euphorbia prostrata*
11. *Malvastrum coromandelianum*
12. *Physalis minima*

CONCLUSIONS

The present findings suggest that a large number of weed plants infest maize crop in the study area that cause loss to crop yields on large scale. For acquiring better yield, it is important to take appropriate biological, chemical and mechanical measure for weed control.

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