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FLORAL DIVERSITY IN GRAM FIELDS OF TEHSIL SERAI NAURANG, DISTRICT LAKKI MARWAT, PAKISTAN

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ABSTRACT

Fifty (50) weed species belonging to 43 genera and 20 different families were collected from the Gram fields of Tehsil Serai Naurang during 2013-14. The leading families were Asteraceae and Poaceae with 6 species (12%) each, the runners were Boraginaceae and Papilionaceae having five species (10%) each, Brassicaceae contributed 8% with four species while Solanaceae, Zygophylaceae and Caryophylaceae had 3 species each (6%). Amaranthaceae, Chenopodiaceae and Fumariaceae contained two species each (4%). Asphodelaceae, Azoaceae, Convulvulaceae, Cucurbitaceae, Cyperaceae, Euphorbiaceae, Plantaginaceae, Polygonaceae and Umbilifereae had only one species each (2%). According to the percentage of genera, Papilionaceae and Poaceae were with five genera (11.2%). Asteraceae, Boraginaceae and Brassicacea made 9.3% each and had four genera while Zygophylaceae had 3 genera (7%). Amaranthaceae, Solanaceae, Caryophylaceae, and Fumariaceae contribution was 4.7% each and had two genera. Asphodelaceae, Azoaceae, Chenopodiaceae Convulvulaceae, Cucurbitaceae, Cyperaceae, Euphorbiaceae, Plantaginaceae, Polygonaceae and Umbilifereae included only one Genus each (2.3%). The weeds data in gram fields revealed that Monocots were from three families (15%), eight genera (16.2%) and eight species (16%) while dicots were represented by 17 families (85%), 36 genera (36.8%) and 42 species (84%). The most abundant weeds were Astragalus bakaliensis Bunge, Trigonella spp., Asphodelus teunifolius Caven, Medicago monantha (C.A.Mey.) Trautv., Trigonella incise, Medicago denticulata, Silene arenosa C. Koch, Silene vulgaris (Moench) Garcke, Poa supina Schrad., Psamogeton biternatum and Onosma chitrallichum. Among these Astragalus bakaliensis Bunge, Trigonella sp., Asphodelus teunifolius Caven, Psamogeton biternatum, Onosma chitrallichum were the most problematic because of intra specific competition, abundant seed production, drought tolerance ability and seed dispersal mechanisms.

Key words: Gram, Serai Naurang, weeds

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INTRODUCTION

Serai Naurang is a Tehsil of District Lakki Marwat in Khyber Pakhtunkhwa province of Pakistan. It is located at 32°49'32N 70°46'55E and has an altitude of 275 meters. Administratively, the Tehsil is divided into 9 Union Councils viz. Union Council Serai Naurang, UC Mama Khail, UC. Shakh Quli Khan, UC. KotKashmir, UC. Takhti Khail, UC. Nar Abu Samand Baigo Khail, UC. Ghandi Khan Khail, UC. Marmandi Azim, and UC. Baist Khail. Overall, 100% of the population is muslims, all speaking Pashto language. Serai Naurang city is the center of trade and communication. Main agricultural products are wheat, maize, gram and different types of vegetables (Calvino, 2011). The average annual rain fall is 82 mm. The temperature could reach 45°C in summer and as low as 0°C in winter. Most of the area is irrigated while the bed of River Kurram which is extended from U.C. Mamma Khel to U.C. Baist Khail is arid (Hassan, 2008).

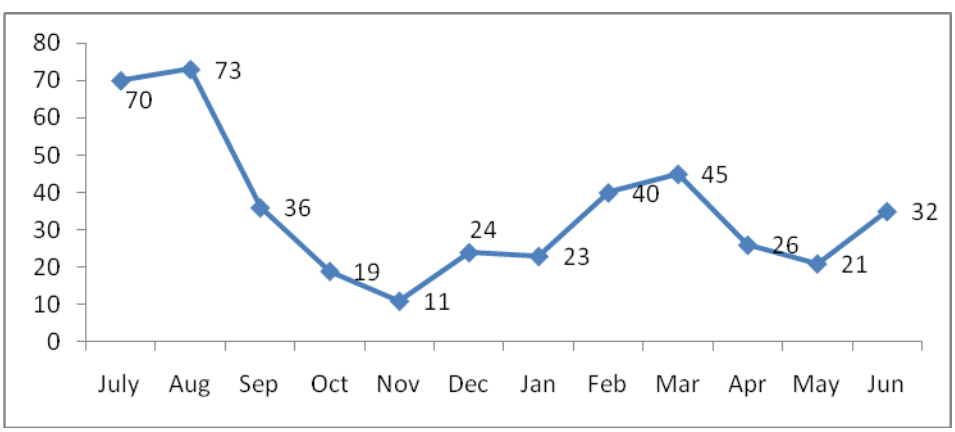

Figure 1. Graphic representation of month-wise rain fall (mm) for 2013-2014 in Serai Naurang

Gram (*Cicer arietinum*) is the important food crop of Pakistan. It is locally named as channa. This is one of the major leguminous crops in the world. In 2010-11 its global production was 11.4 million tons. India's share to the total world channa production was 66% while Pakistan's share was 4.7%. India with its huge production of 5.70 million tons was ranked first in the global production while Pakistan

with a production of 0.4 million tons was positioned as third (Food and Agriculture Organization, 2011.). India is not only the leading producer but also the consumer and importer (Ihsan *et al.,* 2011).

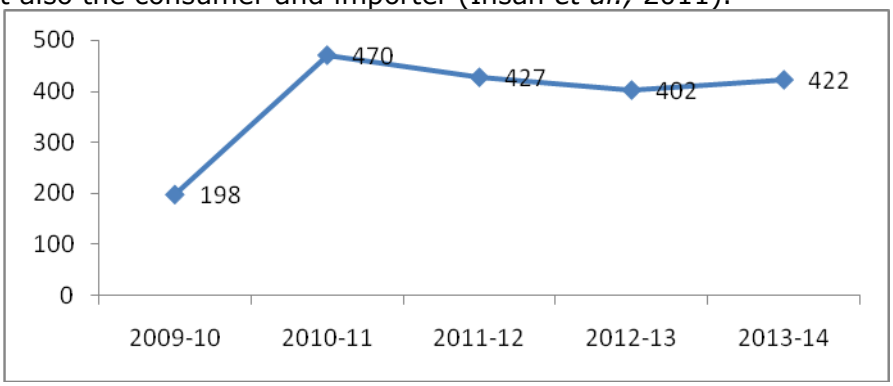

Figure 2. Graphic representation of annual rain fall (mm) from 2009-2014 in Serai Naurang
(Source: Agriculture Research Institute, Serai Naurang, Pakistan)

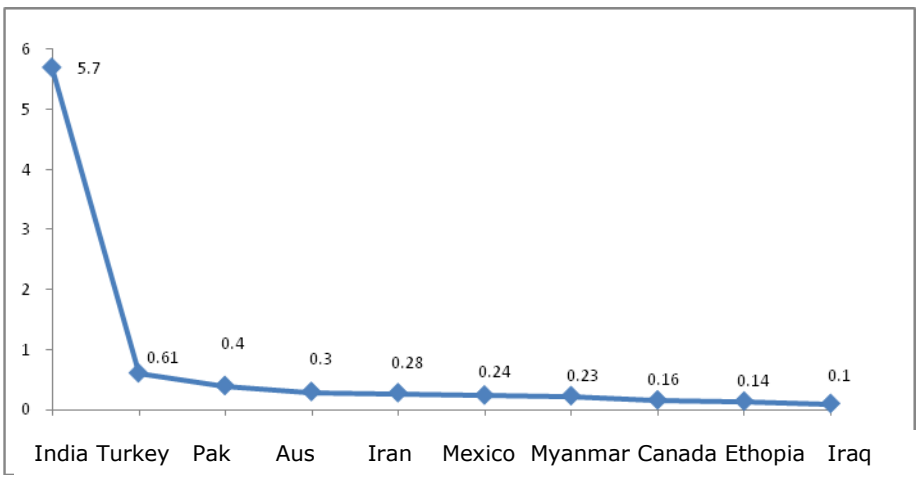

Figure 3. Graph representing Top 10 Chickpea producing countries (million tons)

Gram is a short cycle crop and can be grown between September and November. The best time for sowing is the second week of October reported by Khan *et al.* (2012). It was cultivated on 875 thousand hectors in Pakistan and the annual production was 429 thousand tons (CRS, 2015).

In Pakistan, chickpea (gram) crop is mostly grown in Punjab followed by Balochistan. Punjab contribution is greater than the total production of Balochistan, Khyber Pakhtunkhwa and Sindh (Pak

Bureau of Statistics, 2010-2011). Gram needs a well aerated soil for their growth, Compact Soil may hinder seed germination and seedling emergence (Hassan *et al*., 2008) and there are certain plants that cause trouble and losses in the production of gram. These unwanted plants are weeds.

Weeds are those plants whose negative values outweigh their positive values (Khan *et al.,* 2013), causing trouble in production and easy harvesting in chickpea. Slow growth rate and limited leaf area make Chickpea a poor competitor to weeds. Yield losses due to weed competition vary considerably depending on the weed species prevailing and the level of weed infestation. In our country the chickpea yield is lower compared to potentials of the cultivars. The gap is due to the weed competition in addition to other production constraints. Although chickpeas are traditionally grown on residual soil moisture, weeds competition pose major problem in many situations. Chickpea is sensitive to weed competition (Marwat, 1984). Interference of weeds can greatly decrease yield of crop (Saeed *et al.,* 2010). The use of herbicides significantly reduced the weed growth and resulted in increase yield of 50% against the control (Stork, 1998). Sultan and Nasir (2003) surveyed chickpea fields in District Chakwal, Punjab to highlight the relative importance of different species. The yield losses due to weeds were observed to vary between 40-94% in the Indian subcontinent (ICARDA, 1985; Bhan and KuKula, 1987). Gram growers facing the problems of low rain fall, diseases, soil conditions and weeds, which greatly affects the annual production. The majority of weeds are annual with high reproductive potential (Hashim, 2002). Weeds compete with plants for water, nutrients, space and light. Some weeds are also allelopathic and adversely affect the crops (Khan *et al*., 2004; Shah, 2006). Weeds are spread through water, wind, animals and Agriculture machinery. The present study reported the weeds biodiversity for the 1st time from Gram fields of Serai Naurang Distt: Lakki Marwat. Major weeds of the study area are: *Astragalus, Asphodalus tenufolius,* and *Carthamus oxicantha.*

MATERIALS AND METHODS

Several trips were made to the research area to collect and analyze weeds from October 2013 to April 2014 . The collected weeds were dried using specified method i.e. placing plants in old news papers and applied Phenophthalein to protect them from microbial damage. The dried and preserved specimens were identified using different identification procedures viz; identification keys, getting help of plant experts, and internet. Using internet some website proved very helpful. The links are given in the references at the end. www.theplantlist.com is the authentic source of plant naming. I

confirmed most of the plants species from this site. Oosting scale was used to estimate the population (Khan *et al.,* 2013; Ihsan *et al.,* 2011). As weeds emerge and grow at different time zones during the crop season, fields were visited at 3 different stages viz. seedling stage, pre-flowering stage, and fruit & flower stage.

Table-1. Oosting Scale (Oosting, 1956)

Position	Class
Very Rare	Class I
Rare	Class II
Infrequent	Class III
Abundant	Class IV
Very abundant	Class V

The present research was conducted at Tehsil Serai Naurang. Most of the area is irrigated while the arid area is lying on the bank of River Kurram and extended from Union councils Mama Khail to Baist khail.

RESULTS AND CONCLUSION

In the present study a total of 50 weeds species belonging to 43 genera and 20 different families were collected from gram fields. As the research area is limited, analysis of the data revealed that all the locations in the area was less diverse in chickpea weeds. Fields scrutinized showed that the leading families were Asteraceae and Poaceae with six species (12%) each, , the runners were Boraginaceae and Papilionaceae having five species (10%) each, Brassicaceae contribute 8% with four species while Solanaceae, Zygophylaceae and Caryophylaceae had three species each (6%). Amaranthaceae, Chenopodiaceae and Fumariaceae contained two species each (4%). Asphodelaceae, Azoaceae, Convulvulaceae, Cucurbitaceae, Cyperaceae, Euphorbiaceae, Plantaginaceae, Polygonaceae and Umbilifereae had only one species each (2%). Papilionaceae and Poaceae were with five genera (11.2%), as far as the genera percentage was concerned. Asteraceae, Boraginaceae and Brassicacea made 9.3 % each having four genera while Zygophylaceae had three genera (7%). Amaranthaceae, Solanaceae, Caryophylaceae, and Fumariaceae contribution was 4.7% each and had two genera. Asphodelaceae, Azoaceae, Chenopodiaceae Convulvulaceae, Cucurbitaceae, Cyperaceae, Euphorbiaceae, Plantaginaceae, Polygonaceae and Umbilifereae included only one genus each (2.3%). The weeds data in gram fields revealed that Monocots were from three families (15%), eight genera (16.2%) and eight species (16%) while Dicots were represented by 17 families (85%), 36 genera (36.8%) and

42 species (84%) in the research area. Gram is leguminous crop and is strongly resisted by one of its family member *Astragalus bakaliensis*. Table-8 showed ranking of 10 weeds species of the gram fields. The descending order of these weeds on the basis of Oosting scale is *Astragalus bakaliensis* Bunge, *Trigonella sp.*, *Asphodelus teunifolius* Caven, *Medicago monantha* (C.A.Mey.) Trautv. *(Trigonella incise*), *Medicago denticulate*, *Silene arenosa* C. Koch, *Silene vulgaris* (Moench) Garcke, *Poa supina* Schrad., *Psamogeton biternatum* and *Onosma chitrallichum.* These species greatly interfered within the crop growth because of intera-specific competition, abundant seed production, drought tolerance ability and seed dispersal mechanisms. *Veronica pesica, Anagalis arvensis, Medicago denticulata* dominate the wheat crops in early stage but later they were over shadowed by the wheat culms. Similar type of study was conducted by various researchers like Marwat *et al.* (2010), Muhammad *et al.* (2005), Naveed *et al.* (2007), Shah *et al.* (2006), Sultan *et al.* (2003), Khan *et al*. (2004) and Wazir *et al.* (2007). The detail of further data about gram fields is expressed in the form of different tables (Table 2-7).

Table-2: List of Weeds with their respective Families and the Status on Oosting Scale

Name of weed	Family	Oosting Scale
Alhagi maurorum Medik.	Papilionaceae	I
Amaranthus viridis L	Amaranthaceae	II
*Arve javanica (*Burm.f) Juss	Amaranthaceae	II
Asphodelus teunifolius Caven	Asphodalaceae	V
Astragalus bakaliensis Bunge	Papilionaceae	V
Calendula arvensis L	Asteraceae	II
Carthamus oxycantha M. Bieb.	Asteraceae	IV
Carthamus tictorus L	Asteraceae	IV
Cenchrus ciliaris L.	Poaceae	III
Chenopodium album L.	Chenopodiaceae	III
Chenopodium murale L	Chenopodiaceae	III
Chrozophora plicata(Vahl)A juss.ex Spreng	Boraginaceae	II
Chorispora tenella (Pall.) DC	Brassicaceae	II
*Citruluscolocynthus (*L.) Sherd.	Cucurbitaceae	I
Convolvulus arvensis L.	Convolvulaceae	II
Cyperus rotundus L.	Cyperaceae	IV
Cynodon dactylon (L.) p	Poaceae	IV
Datura alba Nees.	Solanaceae	I
Emex australis Steinh.	Polygonaceae	III

Euphorbia peplus	Euphorbiaceae	II
Fagonia indica Burm. F	Zygophyllaceae	I
Farsetia jacqmontii	Brassicaceae	III
Fumaria indica Pugsley	Fumariaceae	II
Heliotropium europaeum Fisch. & C.A. Mey Kazmi	Boraginaceae	II
Heliotropium crispum Desf.	Boraginaceae	II
Hypecoum pendulum L.	Fumariaceae	II
Hypochaeris radicata	Asteraceae	I
Ifloga spicata	Papilionaceae	III
Imperata cylindrica (L.) Raeusch.	Poaceae	II
Launaea procumbens (Roxb.) Ramayya & Rajagopa	Asteraceae	II
Launaea angustifolia (Desf..) O. Kuntze	Asteraceae	II
Medicago monantha C.A.Mey. *(Trigonella incise)*	Papilionaceae	V
Nonea pulla (L.) DC.	Boraginaceae	III
Onosma chitrallichum	Boraginaceae	IV
Plantago ovata Forssk.	Plantaginaceae	II
Pegnum harmala L.	Zygophyllaceae	I
Poa annua L.	Poaceae	II
Poa supina Schrad.	Poaceae	IV
Psamogeton biternatum	Apiaceae	IV
Raphanus raphanistrum L.	Brassicaceae	I
Sacharum arundinaceum	Poaceae	I
Sisymbrium irio L.	Brassicaceae	I
Silene arenosa C. Koch	Caryophyllaceae	IV
Silene vulgaris (Moench) Garcke	Caryophyllaceae	IV
Solanum nigrum L.	Solanaceae	I
Solanum surattense Burm. f.	Solanaceae	I
Spergula arvensis L.	Caryophyllaceae	I
Tribulus terrestris L.	Zygophyllaceae	I
Trigonella sp.	Fabaceae	IV
Trianthema portulacastrum L.	Aizoaceae	II

In Table-2 above the "V" represents that the high percentage of cover, the classes IV, III, II, and I show comparatively less cover on Oosting scale in the gram fields. Table-3 below showed Papilionaceae and Poaceae with maximum percentage of genera while the highest percentage of species was of the families Boraginaceae and Poaceae.

Table-3: Number and percentage of genera and species of the respective families in gram fields

S. No.	Family	No. of Genra	Percentage of genera	No. of species	%age of species
1	Amaranthaceae	2	4.7	2	4

2	Aizoaceae	1	2.3	1	2
3	Asphodalaceae	1	2.3	1	2
4	Asteraceae	4	9.3	6	12
5	Boraginaceae	4	9.3	5	10
6	Brassicaceae	4	9.3	4	8
7	Caryophyllaceae	2	4.7	3	6
8	Chenopodiaceae	1	2.3	2	4
9	Convolvulaceae	1	2.3	1	2
10	Cucurbitaceae	1	2.3	1	2
11	Cyperaceae	1	2.3	1	2
12	Euphorbiaceae	1	2.3	1	2
13	Fumariaceae	2	4.7	2	4
14	Fabaceae	5	11.2	5	10
15	Plantaginaceae	1	2.3	1	2
16	Poaceae	5	11.2	6	12
17	Polygonaceae	1	2.3	1	2
18	Solanaceae	2	4.7	3	6
19	Apiaceae	1	2.3	1	2
20	Zygophyllaceae	3	7.0	3	6
Total	Families	43	100	50	100

Table-4: Number of percentage of genera and species of the respective Monocot families in gram fields

S.No.	Family	No. of Genra	%age of genera	No. of species	%age of species
1.	Asphodalaceae	1	2.5	1	2
2.	Cyperaceae	1	2.5	1	2
3.	Poaceae	5	11.2	6	12
Total	Families	7	16.2 %	8	16%

The monocots had less percentage, hence Table-4 showed the genera and species percentages for the three monocot families of the grams fields of Tehsil Serai Naurang. The Dicot families' percentage was higher as compared to monocots, as Table-5 below showed the individual percentage of 17 dicot families reported from the gram fields of Serai Naurang.

Table-5: Number and percentage of genera and species of the respective Dicot families in gram fields.

S. No.	Family	No. of Genra	%age of genera	No. of species	%age of species
1	Amaranthaceae	2	4.7	2	4
2	Aizoaceae	1	2.3	1	2
3	Asteraceae	4	9.3	6	12

4	Boraginaceae	4	9.3	5	10
5	Brassicaceae.	4	9.3	4	8
6	Caryophyllaceae	2	4.7	3	6
7	Chenopodiaceae	1	2.3	2	4
8	Convolvulaceae	1	2.3	1	2
9	Cucurbitaceae	1	2.3	1	2
10	Euphorbiaceae	1	2.3	1	2
11	Fumariaceae	2	4.7	2	4
12	Fabaceae	5	11.2	5	10
13	Plantaginaceae	1	2.3	1	2
14	Polygonaceae	1	2.3	1	2
15	Solanaceae	2	4.7	3	6
16	Apiaceae	1	2.3	1	2
17	Zygophyllaceae	3	7.0	3	6
Total	Families	36	83.8%	42	84%

Table-6: Summary of number and percentage of genera and species of the respective monocot and dicot families in gram fields.

S. No	Nature of Plants	No. of Families	Percent of Families	No. of Genra	Percent of genera	No. of species	Percent of species
1	Monocot	3	15	7	16.2	8	16
2	Dicot	17	85	36	83.8	42	84
Tot	Families	20	100	43	100	50	100

Table-6 above expressed the comparative percentages of families, genera and species of monocot and dicots collected from the grams fields of Serai Naurang. However, Table-7 indicated 10 species with high percentage of cover in the gram fields of Tehsil Serai Naurang, in which the most problematic weeds were *Astragalus bakaliensis* Bunge, *Trigonella sp.* and *Asphodelus teuniflius* because of intra-specific competition and high seed production.

Table-7: Top 10 weeds in gram fields on the basis of Oosting scale

S. No.	Weed	Family	Oosting scale
1	*Astragalus bakaliensis* Bunge	Fabaceae	V
2	*Trigonella sp.*	Fabaceae	V
3	*Asphodelus teunifolius* Caven	Asphodalaceae	V
4	*Medicago monantha (C.A.Mey.) Trautv.*	Fabaceae	V
5	*Medicago denticulate*	Fabaceae	V
6	*Silene arenosa* C. Koch	Caryophyllaceae	V
7	*Silene vulgaris* (Moench) Garcke	Caryophyllaceae	V

8	*Poa supina* Schrad.	Poaceae	V
9	*Psamogeton biternatum*	Apiaceae	V
10	*Onosma chitrallichum*	Boraginaceae	V

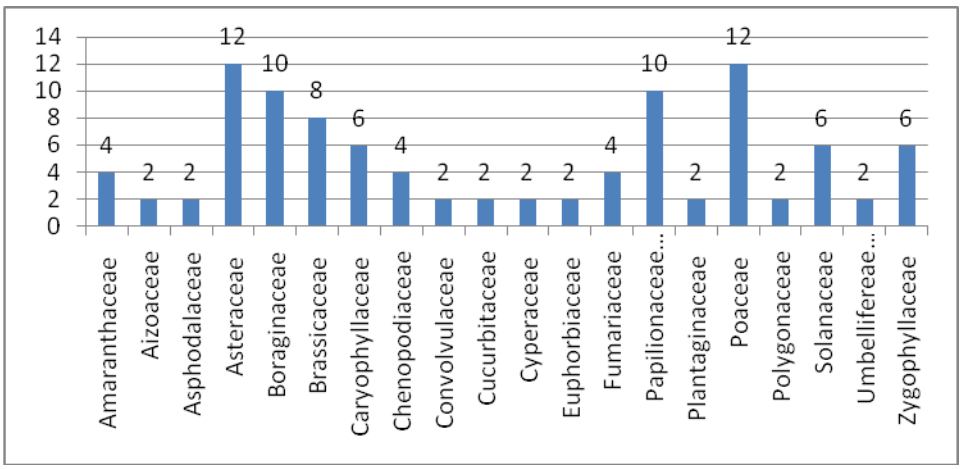

Figure 4. Percentage of species for individual families in gram fields.

Photographs of some weeds representatives of the research area

Calendula arvensis

Astragalus bakaliensis

Carthamus oxicantha

Trigonella incise

Fagonia indica

Asphodelus teunipholius

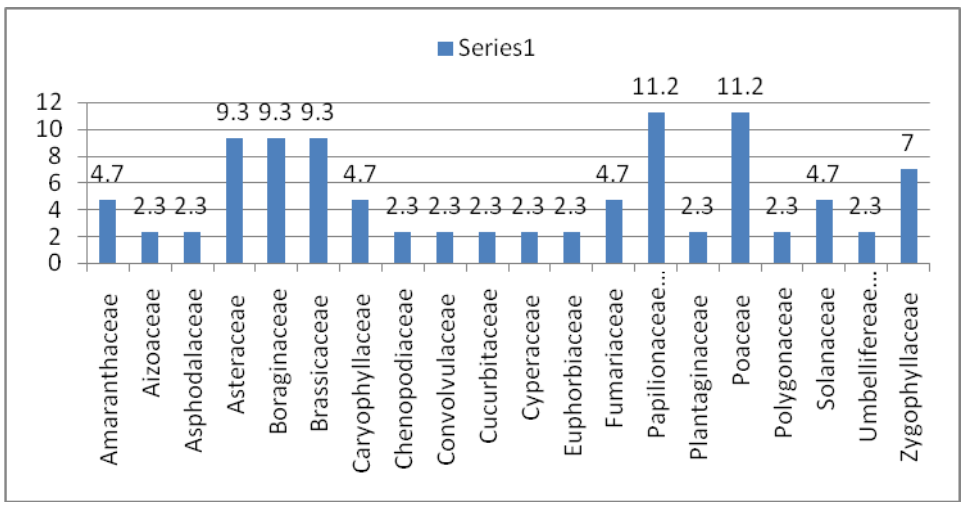

Figure 5. Percentage of genera of the individual families in gram fields

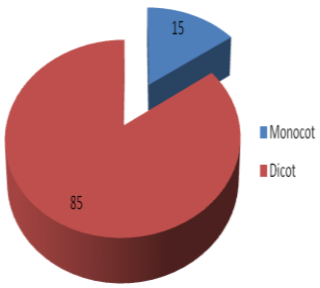

Figure 6. % of Monocot and Dicot families

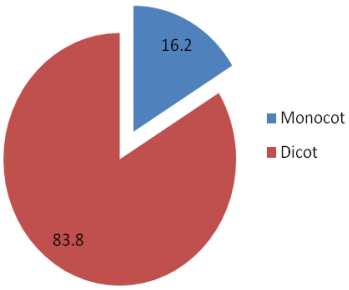

Figure 7. % of Monocot and Dicot genera

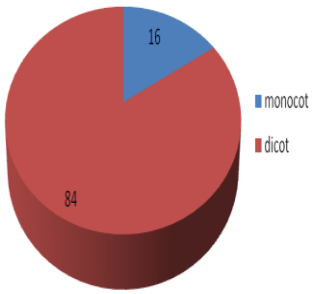

Figure 8. % of Monocot and Dicot species

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