

## Estimation of Correlation among various morphological traits of *Coronopus didymus*, *Euphorbia helioscopia*, *Cyperus difformis* and *Aristida adscensionis*

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**Abstract:** The prescribed study was conducted to access the weed plant population and correlation among morphological traits of weeds during March 2015. Higher plant population was recorded for *Coronopus didymus* and *Euphorbia helioscopia*. Higher plant and inflorescence moisture percentage was recorded for *Aristida adscensionis* and *Coronopus didymus*. Higher population and moisture contents indicated that these weeds may cause the reduction in crop plant yield due to intense competition for water and nutrients. It was found that inflorescence fresh weight was strongly and significantly correlated with total plant moisture percentage, plant population, dry plant weight and inflorescence dry weight. Number of plants per square meter or plant population was strongly and significantly correlated with inflorescence fresh weight, inflorescence dry weight and total plant moisture percentage. Total plant moisture percentage and inflorescence moisture percentage was significantly correlated with each other. The positive and significant correlation suggested that the weed plants used much of the soil nutrients and water due to which the plant population is increased to so high that may cause reduction in the yield of crop plants. It was concluded that the weed plant population has to be controlled to minimize the yield reducing effects of weeds.

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### 1. Introduction:

The term weeds referred as any plant that grows at unwanted place. Taxonomically, the term "weed" has no botanical significance due to the fact that a plant which is a weed in at one place may be not a weed when growing in a situation where it is in fact wanted. Weeds are big issue in crop cultivation because it causes reduction in crop yield: Weeds starts to compete with our precious crop for water, nutrients and light (David 1998). As they are hardy and have vigorous growth habit, they outgrow the crops soon & consume large amounts of water and nutrient that cause heavy losses in yield. It may increase the cost of cultivation. Quality of the field produce also reduced. Weeds also give shelter to various insect pests & disease pathogens and they may serve as alternate hosts for spread of pest and disease (Qamar *et al.*, 2015). Besides all these facts they also hinder the beautification of lawns and recreational parks. Weed seeds can be spread in a number of ways i.e. wind, water, animals, poor quality grass seed and garden and lawn equipments. Almost all weed seeds remain dormant even for years and initiates their germination

when they met favorable conditions for germination (Robert and Chantry, 2009).

#### 1.1. *Coronopus Didymus*

*Coronopus didymus*, a member of brassicaceae family, is a weed commonly known as swine-cress or wart-cress. In Urdu it is known as Janglihalon. It have low spreading nature and consists of many long hairy cylindrical stems, green coloured deeply lobed leaves having small white or purple scented flowers and tap rooted system. It is native to Mediterranean region. It is an annual weed and dicotyledon. It consists of two species (*Coronopus didymus* -lesser swine weed) (*Coronopus squamatus* - greater swine weed). Only leaves parts are susceptible for eating purpose (Nayyar *et al.*, 2001).

#### 1.2. *Aristida adscensionis*

*Aristida adscensionis* (Lumb Ghass) is an annual needle like xerophillous grass that varies in appearance, shape and size due to some environmental factors. It is commonly known as Six weeks three awn. It is native to the America. It prefers to grow on waste or dirty areas as compared to clean one. Dry climate is suitable for its growth. It varies in height from 5 to 80 cm, exhibiting narrow spikelets

inflorescence with 3 awns on each fruit. Leaves are yellowish green in colour and vary in size. Seed are harmful for animals which cause eye irritant in it.

### 1.3. *Cyperus Difformis*

*Cyperus difformis* is an annual species of sedge, and indigenous to Africa, Australia, Asia and southern Europe and some parts of America. This moist aquatic weed is famous by several names as variable flats edge and small flower umbrella-sedge. It is found extensively in rice field but it cannot create much trouble in that field. Its soft and many erect stems can attain the height of upto 30cm which contains few but long wispy leaves originating from the base of plant. It has round inflorescence of 1-3cm width that contains 30 bracted flowers on 120 spikelets. Flower color varies from light brown with darker brown areas to yellowish and sometime purplish tint (Acevedo-Rodríguez and Strong, 2005; Tanaka *et al.*, 2005; Figueiredo and Smith, 2008; Figueiredo *et al.*, 2011).

### 1.4. *Euphorbia helioscopia* (Chatri Dhodhak)

*Euphorbia helioscopia* (Sun Spurge, "madwoman's milk, umbrella and milkweed), a highly noxious weed, is an annual plant belongs to the species of spurge and indigenous to Europe, northern Africa, and Asia. They prefer to grow in arable and disturbed grounds. Its single, hairless and erect stem attains the height of 10-50cm that is branched at its top. The leaves of this weed are oval but broadest from the tip having toothed margins and ranges from 1.5-3cm in length. The flowers of this weed vary from yellow to green exhibiting the same appearance as leaves but consist of 2-5 basal bracts. Mid spring to late spring is the blooming time of that weed (Zhang and Wei, 2006).

## 2. Materials and Methods

The present study was conducted at Centre of Excellence in Molecular Biology, University of the Punjab Lahore, Pakistan during March 2015. The of *Coronopus didymus*, *Euphorbia helioscopia*, *Cyperus difformis* and *Aristida adscensionis* weeds was collected from 4 different locations *viz.* Centre of Excellence in Molecular Biology, University of the Punjab Lahore, Institute of Agricultural Sciences (IAGS), University of the Punjab Lahore, Hanjerwal colony near Centre of Excellence in Molecular Biology, University of the Punjab Lahore and Road side area of Ferozpur Road Kasur. The data was recorded for fresh plant weight, fresh inflorescence weight, dry plant weight, dry inflorescence weight by using an electronic balance (OHAUS-GT4000, USA), total plant moisture percentage [(fresh plant weight – dry plant weight)/fresh plant weight\*100], total inflorescence moisture percentage [(fresh inflorescence weight - dry inflorescence weight)/ fresh inflorescence weight\*100] and number of plants per

square meter area. The data was statistically analyzed by using analysis of variance technique (Steel *et al.*, 1997).

## 3. Results and discussions

It was persuaded from table 1 that significant differences were reported for all studied traits. It was also found from results that weeds × location interaction was also significant for all traits. The results indicated that average dry plant weight of weeds at all four locations was 4.941±0.1032g while fresh plant weight was recorded as 21.305±2.1028g. The fresh inflorescence weight was found to be 3.9619±0.1002g while dry inflorescence weight was 1.1337±0.0447g. The average number of plants of weed plant population was found to be 30.374±3.0817 for all weeds at all locations. The total plant body moisture percentage (76.459±4.0903%) was found higher as compared with the inflorescence moisture percentage 70.4±5.0072%. It was indicated from results that the population of weeds caused the increase in the loss of soil water and nutrients that was used by weeds to develop higher body weights. The weeds used much of the soil nutrients due to which the yield of crop plant decreased. The large number of plant or higher plant population the competition for nutrients, water, light and survival is increased between weed plant and crop plants. The control of weeds from field of crop plant is much necessary to get maximum crop plant yield and production. The cultural practices should be used and also have to develop herbicide (glyphosate) resistant varieties of crop plant (Elahi *et al.*, 2011ab; Harrem *et al.*, 2015; Sadia *et al.*, 2015 and Qamar *et al.*, 2015).

It was persuaded from results (Table 2) that higher weed plant population of *Euphorbia helioscopia* (29.01) at Centre of excellence in Molecular Biology (CEMB), University of the Punjab Lahore while lowest was found for *Aristida adscensionis* (23.11). Higher weed population of *Coronopus Didymus* (43.33) was found at Hanjerwal Colony while lowest was for *Cyperus difformis* (26.34). Higher plant population of *Coronopus Didymus* (56.21) was found at Institute of Agricultural Sciences (IAGS), University of the Punjab Lahore and Ferozpur Road side area of Kasur (67.32) while lowest was for *Aristida adscensionis* (11.22) at Punjab University and 15.12 at kasur location. The weeds that showed higher plant population caused to increase competition with crop plants due to which the yield of crop plants decreased. The weeds use much more nutrients and water due to which the availability of water and nutrients to crop plants decreased. The weed population should be controlled management practices or through the use of herbicide tolerance transgenic varieties of crop plants (Harrem *et al.*, 2015 and

Qamar *et al.*, 2015). The results persuaded that higher weed fresh and dry plant weight of *Euphorbia helioscopia* (35.6g) and *Aristida adscensionis* (10.37g) at CEMB while lowest was found for *Cyprus difformis* (21.74g, 4.58g) respectively. Higher weed fresh and dry plant weight of *Aristida adscensionis* (18.19g, 7.79g) was found at Hanjerwal Colony while lowest was for *Coronopus difformis* (4.75g, 1.15g) respectively. Higher fresh and dry plant weight of *Euphorbia helioscopia* (44.25g, 9.56g) was found at University of the Punjab Lahore and *Cyprus difformis* (34.25g) and *Euphorbia helioscopia* (8.73g) for Kasur while lowest was for *Cyprus difformis* (14.12g, 1.67g) at Punjab University and *Aristida adscensionis* (5.49g, 3.24g) at kasur location respectively. It was found that higher weed fresh and dry inflorescence weight of *Euphorbia helioscopia* (5.16g, 3.17g) at CEMB while lowest was found for *Aristida adscensionis* (0.72g, 0.12g). Higher weed fresh and dry inflorescence weight of *Aristida adscensionis* and *Cyprus difformis* (12.49g, 0.95g) was found at Hanjerwal Colony while lowest was for *Cyprus didymus* and *Coronopus didymus* (1.37g, 0.25g) respectively. Higher weed fresh and dry inflorescence weight of *Euphorbia helioscopia* (6.09g, 1.42g) was found at University of the Punjab Lahore while lowest for *Aristida adscensionis* (0.92g, 0.22g), while highest fresh and dry inflorescence weight was for *Euphorbia helioscopia* (5.33g, 1.33g) and *Aristida adscensionis* (2.18g, 1.01g) at kasur location respectively. It was persuaded from results that higher weed plant and inflorescence moisture percentage of *Coronopus didymus* and *Aristida adscensionis* (82.127%, 83.333%) at CEMB while lowest was found for *Aristida adscensionis* and *Euphorbia helioscopia* (64.278%, 38.566%). Higher weed plant and inflorescence moisture percentage of *Coronopus didymus* and *Aristida adscensionis* (88.916%, 95.677%) was found at Hanjerwal Colony while lowest was for *Aristida adscensionis* and *Cyprus didymus* (57.17%, 77.647%) respectively. Higher weed plant and inflorescence moisture percentage of *Coronopus Didymusi* and *Euphorbia helioscopia* (81.455%, 76.683%) was found at University of the Punjab Lahore while lowest for *Cyprus difformis* and

*Coronopus didymus* (69.581%, 66.230%), while highest plant and inflorescence moisture percentage was for *Cyprus difformis* and *Euphorbia helioscopia* (87.766%, 75.047%) and lowest for *Euphorbia helioscopia* and *Aristida adscensionis* (65.991%, 53.670%) at kasur location respectively. The higher amount of moisture percentage in plant body and inflorescence of weed plants suggested that the weeds used much of soil water and nutrients that caused reduction in yield of crop plants and productivity of the soil (Harrem *et al.*, 2015; Sadia *et al.*, 2015 and Qamar *et al.*, 2015).

It was persuaded from results indicated in table 3 that there was a significant correlation of dry plant weight of weed with inflorescence dry weight, fresh plant weight, inflorescence fresh weight and total plant moisture percentage. The inflorescence dry weight was significantly correlated with dry plant weight, fresh plant weight, plant population or number of plants per square meter and total inflorescence moisture percentage. The fresh plant body weight was significantly correlated with inflorescence fresh weight, plant population and total inflorescence moisture percentage. Inflorescence fresh weight was strongly and significantly correlated with total plant moisture percentage, plant population, dry plant weight and inflorescence dry weight. Number of plants per square meter or plant population was strongly and significantly correlated with inflorescence fresh weight, inflorescence dry weight and total plant moisture percentage. Total plant moisture percentage and inflorescence moisture percentage was significantly correlated with each other. The positive and significant correlation suggested that the weed plants used much of the soil nutrients and water due to which the plant population is increased to so high that may cause reduction in the yield of crop plants. The weed plant population has to be controlled to minimize the yield reducing effects of weeds. The higher inflorescence moisture percentage also indicated that the weed seeds have enough ability to face environmental changes that can help in survival of weed plants (Ali *et al.*, 2013; Ali *et al.*, 2014abc; Sadia *et al.*, 2015; Saeed *et al.*, 2015; Qurat-ul-Ain *et al.*, 2015 and Qamar *et al.*, 2015).

**Table 1. ANOVA for various morphological traits of weeds**

Source of variation	DF	Dry plant weight	Inflorescence Dry weight	Fresh plant weight	Inflorescence Fresh weight	No of plants/m <sup>2</sup>	Total plant moisture percentage	Total inflorescence moisture percentage
Replications	2	0.1352	0.1352	0.1352	0.1352	0.1352	0.1352	0.1352
Weeds	3	18.3462*	1.90515*	372.221*	7.35875*	191.458*	3.36474*	1249.47*
Location	3	28.6875*	1.67485*	283.869*	5.34808*	1203.13*	246.237*	322.778*
Weeds×Location	9	13.7038*	1.01044*	205.583*	21.3904*	351.063*	151.808*	321.365*
Error	15	7.21E-32	5.05E-33	3.77E-30	1.44E-31	3.48E-30	1.44E-29	1.48E-29
Grand Mean		4.941	1.1337	21.305	3.9619	30.374	76.459	70.4
Standard Error		0.1032	0.0447	2.1028	0.1002	3.0817	4.0903	5.0072

\* = Significant at 5% probability level

Table 2. Mean performance of weeds for various morphological traits at different locations

No of plants/m <sup>2</sup>					
Weeds/Locations	CEMB	Hanjerwal Colony	Punjab University	Kasur	Average
<i>Coronopus didymus</i>	23.12c	43.33a	56.21a	67.32a	47.495a
<i>Aristida adscensionis</i>	23.11c	29.23b	11.22d	15.12c	19.67d
<i>Cyprus difformis</i>	25.43b	26.34c	28.12b	15.23c	23.78c
<i>Euphorbia helioscopia</i>	29.01a	37.12b	12.92c	42.12b	30.2925b
Average	25.1675d	34.005b	27.1175c	34.9475a	
Fresh plant weight (g)					
Weeds/Locations	CEMB	Hanjerwal Colony	Punjab University (IAGS)	Kasur	Average
<i>Coronopus didymus</i>	31.5b	16.42b	17.3b	18.23c	20.8625b
<i>Aristida adscensionis</i>	29.03c	18.19a	9.81c	14.12d	17.7875c
<i>Cyprus difformis</i>	21.74d	4.75d	5.49d	34.25a	16.5575d
<i>Euphorbia helioscopia</i>	35.6a	13.49c	44.25a	25.67b	29.7525a
Average	29.4675a	13.2125d	19.2125c	23.0675b	
Inflorescence Fresh weight (g)					
Weeds/Locations	CEMB	Hanjerwal Colony	Punjab University (IAGS)	Kasur	Average
<i>Coronopus didymus</i>	4.39b	1.37d	3.82bc	2.33bc	2.9775d
<i>Aristida adscensionis</i>	0.72d	12.49a	0.92c	2.18bc	4.0775b
<i>Cyprus difformis</i>	3.21c	4.25b	3.98bc	3.01b	3.6125c
<i>Euphorbia helioscopia</i>	5.16a	3.1c	6.09a	5.33a	4.92a
Average	3.37c	5.3025a	3.7025b	3.2125bc	
Dry plant weight (g)					
Weeds/Locations	CEMB	Hanjerwal Colony	Punjab University (IAGS)	Kasur	Average
<i>Coronopus didymus</i>	5.63c	1.82c	3.21b	4.22bc	3.72c
<i>Aristida adscensionis</i>	10.37a	7.79a	2.2c	3.24d	5.9b
<i>Cyprus difformis</i>	4.58d	1.15d	1.67d	4.19bc	2.8975d
<i>Euphorbia helioscopia</i>	6.96b	2.7b	9.56a	8.73a	6.9875a
Average	6.885a	3.365d	4.16c	5.095b	
Inflorescence Dry weight (g)					
Weeds/Locations	CEMB	Hanjerwal Colony	Punjab University (IAGS)	Kasur	Average
<i>Coronopus didymus</i>	2.49b	0.25bc	1.29ab	1.02b	1.2625b
<i>Aristida adscensionis</i>	0.12d	0.54b	0.22d	1.01b	0.4725d
<i>Cyprus difformis</i>	0.98c	0.95a	1.01c	1.03b	0.9925c
<i>Euphorbia helioscopia</i>	3.17a	0.27bc	1.42a	1.33a	1.5475a
Average	1.69a	0.5025d	0.985c	1.0975b	
Total plant moisture percentage (%)					
Weeds/Locations	CEMB	Hanjerwal Colony	Punjab University (IAGS)	Kasur	Average
<i>Coronopus didymus</i>	82.127a	88.916a	81.445a	76.851c	82.335a
<i>Aristida adscensionis</i>	64.278d	57.174d	77.574c	77.054b	69.020d
<i>Cyprus difformis</i>	78.933c	75.789c	69.581d	87.766a	78.017b
<i>Euphorbia helioscopia</i>	80.449b	79.985b	78.395b	65.991d	76.205c
Average	76.447c	75.466d	76.749b	76.916a	
Total inflorescence moisture Percentage (%)					
Weeds/Locations	CEMB	Hanjerwal Colony	Punjab University (IAGS)	Kasur	Average
<i>Coronopus didymus</i>	43.280c	81.752c	66.230d	56.223c	61.871d
<i>Aristida adscensionis</i>	83.333a	95.677a	76.087b	53.670d	77.192a
<i>Cyprus difformis</i>	69.470b	77.647d	74.623c	65.781b	71.880b
<i>Euphorbia helioscopia</i>	38.566d	91.290b	76.683a	75.047a	70.397c
Average	58.662d	86.591a	73.406b	62.680c	

**Table 3. Pooled correction among various morphological traits of weeds**

Traits	Dry plant weight	Inflorescence Dry weight	Fresh plant weight	Inflorescence Fresh weight	No of plants/m <sup>2</sup>	Total plant moisture percentage
Inflorescence Dry weight	0.2304*					
P<0.05	0.2047					
Fresh plant weight	0.7595*	0.5081*				
P<0.05	0.0000	0.003				
Inflorescence Fresh weight	0.381*	0.2498*	0.1699			
P<0.05	0.0314	0.168	0.3526			
No of plants/m <sup>2</sup>	-0.1423	0.9556*	0.2245*	0.9136*		
P<0.05	0.4371	0.0103	0.2168	-0.0200		
Total plant moisture percentage	0.4918*	0.225*	-0.1549	-0.5211	0.9121*	
P<0.05	0.0043	0.2157	0.3972	0.0022	0.0203	
Total inflorescence moisture percentage	0.0232	0.8132*	0.3326*	0.2108	-0.0266	0.4315*
P<0.05	0.8996	0.0000	0.0629	0.2468	0.8853	0.0137

#### 4. Conclusions

The prescribed study suggested that the weeds should be controlled to reduce harmful effects of weed on the yield of crop plants. There should be such crop plants that have tolerance for herbicides (glyphosate) to get maximum yield.

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