CORRELATION STUDIES ON VEGETATIVE AND FLORAL CHARACTERISTICS IN GLADIOLUS

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ABSTRACT

*A field experiment was established during the winter of 1999/2000 under Chitwan condition using five commercial varieties of gladiolus (Gladiolus grandiflorus) viz. Friendship, American Beauty, Her Majesty, Echo-Wonder and Pacifica to access the association among the different vegetative and floral characteristics by using the method of Karl Pearson's simple correlation. The total effective leaf area was positively correlated with spike weight (0.749**), rachis length (0.733**), diameter of floret (0.558**) and length of floral bract (0.661**). Also, leaf length was directly contributing in plant height (0.719**).*

Key Words: Gladiolus, vegetative characters, floral characters, correlation

INTRODUCTION

Gladiolus (*Gladiolus grandiflorus*) varieties show narrow adaptation and fluctuating performance in terms of various traits over varying environment, which justifies the need of varietal selection for different production environments (Arora and Sharma, 1991). To select the varieties for different production environments, a vast knowledge about the association among different vegetative and reproductive behavior is must. In monocotyledonous monocarpic plants like gladiolus, the reproductive growth of a plant reflects its vegetative growth (Rajeevan *et al.*, 1994). Yield in plants is the end product of many correlated characters. Preliminary selection for these characters is more effective when based on component characters, which are positively correlated. To access the association among the vegetative and reproductive behavior, simple correlation study is one of the strong tools that might be helpful to make a foundation about the selection criteria of the crop. Since, gladiolus cultivation is a very recent phenomenon in Nepal, very few varieties so far have been introduced from India and abroad. As the demand (both actual and latent demand) of this plant as cut flower is increasing, it has the potential to become a good cash generating industry in the areas, which are located near the big flower markets like Kathmandu valley where transportation is not a problem. To fulfill the increasing demand of this flower there is need to screen varieties suitable for different production domains, which range from tropical terai to warm temperate hill valleys. In this regard, a study was conducted to reveal the relationship among the various vegetative and floral characteristics in gladiolus.

MATERIALS AND METHODS

A field experiment was established to study the effects of different dates of planting on growth and development with respect to cut flower yield of different varieties of gladiolus with varietal performances under Chitwan condition during 1999/2000. An experiment was laid out in split-plot randomized complete block design (RCBD) with five varieties as the main plot factor and two dates of planting as sub-plot factor with four replications. Size of

sub-plat was 2.1 m x 0.9 m (2.1m2) accommodating 28 plants/plot with row to row and plant to plant spacing of 30 cm and 25 cm respectively (Khan et al., 1999). First planting was done in December 31, 1999 and second in January 30, 2000 at an interval of 30 days. Five commercial varieties, Friendship, American Beauty, Her Majesty, Echo-Wonder and Pacific were used in this experiment. Inorganic fertilizers were applied in the form of di-ammonium phosphate (DAP), muriate of potash (MOP) and urea @ of 200:200:200kg NPK/ha (Chattopadhya, 1995). Half the dose of nitrogen and full dose of phosphorus and potash were applied at the time of final land preparation. Remaining half of nitrogen was further splitted into two parts. The first part was top dressed when plants attained four leaf stage and the second part at six leaf stage through urea (Singh *et al.*, 1994). Well-decomposed farmyard manure was applied at the time of final land preparation at the rate of 200 t/ha. Standard cultural operations were followed for successful production of gladiolus cut flowers. Irrigation was done as per need to overcome the moisture stress. Weeding and earthing-up were done in the experimental plot to reduce the weed population and lodging. Multiple sprouts were removed from the plot after completion of sprout emergence and the retained single sprout to produce standard sized spikes. Spikes were harvested at the tight bud stage (first basal floret showing colour) with two bract leaves for taking observations related to spike morphology. The following observations were recorded on five randomly selected plants per replication for each variety.

a. **Plant height**
   Height of plants was measured in centimeter from the base of the plant to the apex of the longest leaf.

b. **Plant span**
   Measurement on plant span was made at the point of leaf sheath from where leaf starts spreading.

c. **Total number of leaves at spike harvest**
   Total number of leaves per plant was recorded by counting at the time of spike harvest

d. **Length of the leaf**
   Average leaf length was measured from the base to the tip of the leaf at the stage of spike heading.

e. **Breadth of leaf**
   Leaf breadth was measured at maximum leaf span at the time of spike heading.

f. **Total effective leaf area**
   Effective leaf area was calculated by using non-destructive method developed by Barbieri
   et al., (1994) as below.
   Leaf area = (Length of leaf x Breadth of the leaf) x 0.62.
   The total effective leaf area is the sum of individual leaf area of the effective leaves at the time of spike initiation.

g. **Spike length**
   Length of spike was measured from the base of the lower bract leaf to the tip of the uppermost floret after harvesting of the spike.

h. Rachis length
Rachis length was measured from the base of the first floret to the tip of the uppermost floret after harvest.

i. Number of florets/spike
Total number florets per spike were recorded after harvesting of the spikes.

j. Weight of spike
Weight of individual spikes was taken immediately after harvesting.

k. Diameter of spike
Diameter of spike was taken at the base of the first floret with the help of a Vernier caliper.

l. Diameter of floret
Diameter of an open floret at field condition was recorded without stretching the petals from two sides. The measurement was done from the basal floret only to maintain the uniformity of the results.

m. Length of floret bract
Only the length of the bract of the first floret was measured.

Correlation study was done on different morphological and floral characteristics to access the role of these characters on economic characters of the cut spikes. The correlation coefficients were calculated by using Karl Pearson's method.

RESULTS AND DISCUSSION

The correlation coefficients estimated in all the possible ways among different pairs of characters are presented in Table 1. Significant correlations of the vegetative and floral characters suggest the scope of selection of cultivars for commercial production of the cut spikes of gladiolus.

Vegetative Characters

The leaf area was positively correlated with floral parts of gladiolus like spike weight (0.749), rachis length (0.733), floret diameter (0.676) and bract length (0.661). Leaf breadth was positively correlated with total leaf area (0.830), which is obvious. Also, this trait was positively associated with spike length (0.647), rachis length (0.812), number of florets per spike (0.687), diameter of florets (0.696) and length of floral bract (0.680). Leaf length was found directly associated with plant height (0.719). The results obtained are in harmony with the findings reported by Rajeevan et al. (1994) and Mahanta and Paswan (1994). They also reported the positive association among the spike length, leaf breadth, number of florets per spike, rachis length and size of florets. Leaf has important role in manufacturing and supplying substrates to the sinks. So, leaf characters like length, breadth and total effective area have direct association with sink i.e. floral parts in case of gladiolus.

Floral Characters

Spike diameter of gladiolus was positively associated with rachis length (0.538) and spike weight (0.649). Spike length was responsible for rachis length (0.639) and number of florets

Table:1 Correlation matrix of different characters of gladiolus studied during 1999/2000 at IAAS, Rampur, Chitwan.

Characters	Plant height (cm)	Plant span (cm)	Spike weight (g)	Spike length (cm)	Rachis length (cm)	Spike diameter (cm)	Number of florets /spike	Diameter of floret (cm)	Length of flower bract (cm)	Leaf length (cm)	Leaf breadth (cm)
Plant span	-0.028										
Spike weight	0.397*	0.553**									
Spike length	0.229	0.245	0.444**								
Rachis length	0.294	0.498**	0.816**	0.639**							
Spike diameter	0.297	0.333*	0.649**	0.117	0.538**						
Number of floret/spike	0.168	0.631**	0.734**	0.533**	0.754**	0.504**					
Diameter of floret	0.261	0.450**	0.591**	0.342*	0.588**	0.380*	0.324*				
Length of flower bract	0.480**	0.679**	0.737**	0.343*	0.643**	0.594**	0.509**	0.785**			
Leaf length	0.719**	-0.166	0.325*	0.016	0.083	0.197	0.035	0.259	0.331*		
Leaf breadth	0.274	0.648**	0.732**	0.647**	0.812**	0.415**	0.687**	0.696**	0.680**	0.115	
Total leaf area	0.575**	0.336*	0.749**	0.531**	0.733**	0.441**	0.558**	0.676**	0.661**	0.596**	0.830**

*, **, Correlation coefficients significantly different from zero at the P = 0.05 and P = 0.01 levels respectively.

per spike (0.533). The diameter and length of spike may have the role in translocation of more substrate to the florets efficiently, and contributing in floral morphology directly. The length of rachis was observed positively correlated with the number of florets per spike (0.754), which confirmed that the long spikes had long rachis accommodating more number of florets per spike. The length of floral bract had positive impact on the number of florets per spike (0.509). Sandhu et al., (1993) have also reported the positive association between the numbers of florets per spike with bract length.

The results indicated that leaf characters (length, breadth and total leaf area) were found highly influential to the floral characters of gladiolus. So, these characters should be considered for varietal selection for economic production of the cut spikes of this plant.

Among the studied floral characters, spike length was found responsible for the length of rachis and number of florets per spike. It was observed that the diameter of florets was influenced by number of leaves, spike weight, rachis length and bract length.

CONCLUSION

The result implied that leaf characters (length, breadth and total leaf area) were found highly influential to the floral characters of the gladiolus viz. spike length, rachis length, floral diameter and length of floral bracts. These floral characters have been considered as important economic characters of cut spikes of gladiolus by which the price of cut spike is fixed either in wholesale or in retail markets.

According to the study, association among different vegetative and floral characteristics, the role of leaf characters (length, breadth and total effective leaf area) were found highly influential to the economic characters of the gladiolus cut spike. So, these characters should be considered as criteria for varietal selection for the production of cut spikes of gladiolus for different production environments.

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