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Studies on correlation between yield and seed characters in cucumber, *Cucumis sativus* L

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ABSTRACT

Seed is the most important input factor in any crop production programme as the success or failure of any crop solely depends on the quality and potential performance of seed. Therefore thirty diverse genotypes of cucumber collected from different indigenous sources were assessed to know the nature and magnitude of association among yield and different seed characters. The experiment was conducted in randomized block design at the experimental farm of the Department of Vegetable Science, Dr YS Parmar University of Horticulture and Forestry, Nauni, Solan, HP during Kharif season of 2009. Analysis of variance indicated significant differences among the genotypes for all the characters under study. Correlation studies indicated that yield was significantly and positively correlated with all the seed characters under study. Hence direct selection on the basis of seed germination, dry seedling weight, seedling length, seed vigor index-I and seed vigor index-II is reliable for yield improvement in cucumber.

Keywords: Correlation, cucumber, yield, seed characters

INTRODUCTION

Cucumber (*Cucumis sativus* L) is one of the most important cucurbitaceous vegetable crops grown extensively in tropical and sub-tropical parts of the country. It is grown for its tender fruits which are consumed either raw as salad, cooked as vegetable or as pickling cucumber in its immature stage. It is a rich source of vitamin B and C, carbohydrates, Ca and P (Yawalkar 1985). The demand for high quality vegetable seeds has increased with the emergence of new crop production technologies or hi-tech horticulture. Hence high quality seed is required for rapid and synchronous seedling emergence which is prerequisite for successful stand establishment, uniform plant growth and development in open as well as in protected conditions. The laboratory germination tests provide information about the seedling emergence potential of seed lots under favorable sowing conditions. However conditions in seed bed are generally lower than optimal. Low temperature (early spring

sowing), mechanical stress (deep sowing) and salinity (saline water irrigation) are some abiotic stress factors that prevail in seed bed and reduce seedling performance in cucumber seeds in open field or transplant production in glasshouse. Standard laboratory germination tests may fail to predict emergence under sub optimal sowing conditions (Basak et al 2006). This promoted the development of vigor test for more reliable assessment of emergence performance of the seed lots in wider range of planting environments. Therefore the present investigations have been undertaken to assess the seed germination and vigor potential of different genotypes of cucumber and to determine their correlations with the yield.

MATERIAL AND METHODS

The present investigations were carried out in the laboratory for seed germination and vigor tests and for fruit yield performance seeds were sown at research farm of the Department of Vegetable Science, Dr YS Parmar University of Horticulture and Forestry, Nauni, Solan, HP during Kharif season of 2009. The experimental material consisted of 30 diverse genotypes of cucumber, including check cultivars viz K-75 and K-90 (Table1). Seed germination of each genotype was tested in laboratory conditions through blot paper method. Four hundred seeds of each genotype were grown in four replications (100 seeds each). Seeds were allowed to germinate on the top of germination paper and final count was taken on 8th day. A sample of 20 seedlings from each replication was taken for vigor test. The dry weight (mg) and length (cm) of germinated seedlings were recorded. The average dry seedling weight was calculated by dividing the total dry weight of seedlings with number of seedlings and average length of seedlings was calculated by dividing the total length of seedlings with number of seedlings. Seed germination of each genotype was tested as per ISTA (Anon 1985) and germination percentage of each replication was worked out by using following formula:

$$\text{Germination percentage} = \frac{\text{Number of seeds germinated}}{\text{Total number of seeds placed for germination}} \times 100$$

Means of all the replications were taken to obtain germination percentage of each genotype.

Seed vigor index was calculated as per the formula given by Abdul-Baki and Anderson (1973):

Seed Vigor Index - I = Seed germination percentage x dry seedling weight (mg)

Seed Vigor Index - II = Seed germination percentage x seedling length (cm)

For yield performance the experiment was laid out in randomized block design with three replications of each genotype. The standard cultural practices were followed to raise healthy crop stand. The data recorded on seed characters as well as on fruit yield were subjected to analysis of variance as per procedure described by Gomez and Gomez (1983). Simple correlation coefficient (Karl Pearson's Coefficient) between the different characters was worked out by the formula given by Panse and Sukhatme (1978).

RESULTS AND DISCUSSION

Analysis of variance indicated significant differences among the genotypes for all the characters under study viz seed germination, seedling length, dry seedling weight, seed vigor index-I and II and fruit yield per plot. These differences indicated the presence of variability in the available germplasm and offered opportunity for improvement in yield on the basis of seed characters in cucumber. The correlation coefficient among the different characters (Table 2) was worked out which revealed that yield per plot had significant positive association with seed germination (0.300), dry seedling weight (0.458), seedling length (0.405), seed vigor index-I (0.450) and II (0.408). Seed vigor index-I and II exhibited significant positive correlation with seed germination (0.810 and 0.845), dry seedling weight (0.982 and 0.901) and seedling length (0.844 and 0.911) respectively. Moreover seed germination percentage also exhibited significant positive correlation with dry seedling weight (0.709) and seedling length (0.559). The correlation coefficient among seed vigor index-I and II, and dry seedling weight and seedling length were recorded as 0.937 and 0.875 respectively. Similar correlations of yield with various seed characters in cucumber were also reported by Solanki and Seth (1980), Rastogi and Rathore (1990) and Singh (1997).

In nutshell correlation studies indicated that dry seedling weight showed highest correlation with yield followed by seed vigor index-I and II, seedling length and seed germination percentage. Among all the genotypes studied, the genotype LC-6 and LC-20 performed better for seed germination percentage, LC-9 for seedling length and LC-3 for dry seedling weight, seed vigor index-I and II, along with good yield performance. Therefore while making the selection for yield improvement in cucumber these characters must be taken into consideration.

Table 1. List of cucumber genotypes studied and their sources

Sr No	Genotype	Source
1.	LC-1	Dhangota, Hamirpur
2.	LC-2	Bhota, Hamirpur
3.	LC-3	Awahdevi, Hamirpur
4.	LC-4	Jahu, Hamirpur
5.	LC-5	Lambloo, Hamirpur
6.	LC-6	Taunidevi, Hamirpur
7.	LC-7	Bharari, Bilaspur
8.	LC-8	Dangar, Bilaspur
9.	LC-9	Palampur, Kangra
10.	LC-10	Paprola, Kangra
11.	LC-11	Baijnath, Kangra
12.	LC-12	Gagal, Kangra
13.	LC-13	Nerchowk, Mandi
14.	LC-14	Mori, Mandi
15.	LC-15	Sarkaghat, Mandi
16.	LC-16	Rampur, Shimla
17.	LC-17	Sainj, Shimla
18.	LC-18	Bajaura, Kullu
19.	LC-19	Katrain, Kullu
20.	LC-20	Anni, Kullu
21.	LC-21	Saru, Chamba
22.	LC-22	Khajiar, Chamba
23.	LC-23	Bhararighat, Solan
24.	LC-24	Dharampur, Solan
25.	LC-25	Arki, Solan
26.	LC-26	Amb, Una
27.	LC-27	Chintpurni, Una
28.	LC-28	Sambha, Jammu
29.	K-75*	UHF, Nauni, Solan
30.	K-90*	UHF, Nauni, Solan

* Check cultivars

Table 2. Correlations of seed characters with yield in cucumber

Traits	Seed Germination (%)	Dry seedling weight (mg)	Seedling length (cm)	Seed vigor index-I	Seed vigor index-II	Yield/plot (kg)
Seed germination (%)	1.00	.709**	.559**	.810**	.845**	.300**
Seedling dry weight (mg)		1.00	.875**	.982**	.901**	.458**
Seedling length (cm)			1.00	.844**	.911**	.405**
Seed vigor index-I				1.00	.937**	.450**
Seed vigor index-II					1.00	.408**
Yield/plot (kg)						1.00

**Significant at 1% level of significance

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