

Correlation studies between seed, seedling, growth and yield characters in sunflower (*Helianthus annuus* L.)

■ SHARNKUMAR AND BASAVEGOWDA

SUMMARY

The present experiment was undertaken with a view to study the correlation among the seed, seedling, growth and yield characters on kernel yield of sunflower hybrids. Studies were conducted during *Kharif* season of 2005. Among the characters of F1 hybrid studied, highly significant positive correlation was observed with hundred seed weight (0.749), seed density (0.831), kernel to hull ratio (0.592), root length (0.592), shoot length (0.81), seedling vigor index (0.716), plant height (0.538) at harvest, number of leaves (0.718) at 60DAS and capitulum diameter (.804), seed filling percentage (0.615), hundred seed weight (0.546) and seed weight per head (0.781), with commercial kernel yield. It is obvious from the present study that hundred seed weight, seed density, kernel to hull ratio, head diameter, number of filled seeds per head, seed filling percentage and number of seeds per head were the chief characters which contributed to the seed yield of sunflower. However, plant height and number of leaves were also useful as phenotypic indices for identification of better genotypes.

Key Words : Sunflower, Correlation, Seed quality, Yield

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Sunflower (*Helianthus annuus* L.) is one of the important members of asteraceae family and the second most important edible oilseed crop of the world next to soybean. The crop has been well accepted by farming community because of its desirable attributes such as short duration, photo period insensitivity, low seed rate, high seed multiplication ratio, drought tolerance, high quality edible oil and high degree of poly unsaturated fatty acid content. Several hybrids from private and public sector have been developed for commercial cultivation in our country. The yielding ability of sunflower hybrids may be influenced by seed vigour and

quality. Seed vigour also influences the in field establishment, growth of plant. Resistance to pest and diseases besides kernel yield.

The information on the nature and magnitude of variation present in the available material and their association among the various morphological characters is a pre-requisite for any programme of breeding for high yields. Further nature of relationship with seed quality parameters and yield is meagre. Hence, this study was initiated.

MATERIAL AND METHODS

The study was conducted at Main Agricultural Research Station, UAS, Dharwad during *Kharif* 2005, seeds of eight released sunflower hybrids (KBSH-1, KBSH-41, KBSH-44, RSFH-1, S-212, S-275, S-278 and K-618) were procured from the respective seed producing organization and graded with 2.8 mm oblong screen to have uniformity in seed size, and the different seed characters like 100 seed weight, seed density, kernel weight, hull weight, kernel to hull ratio.

MEMBERS OF THE RESEARCH FORUM

Author to be contacted :

SHARNKUMAR, Department of Seed Science and Technology, University of Agricultural Science, DHARWAD (KARNATAKA) INDIA
Email: aosharankumar@gmail.com

Address of the Co-authors:

BASAVEGOWDA, Department of Seed Science and Technology, University of Agricultural Science, DHARWAD (KARNATAKA) INDIA

Seedling characters like seed germination, rate of germination, root length, shoot length, seedling vigour index, and seedling dry weight were estimated by following the procedure prescribed by International Rules for Seed Testing (Anonymous, 1999).

In order to study the performance of these hybrids during different growth stages, these hybrids were grown by following the recommended package of practices for sunflower in a Randomized Complete Block Design with three replications during *Kharif* 2005. Each plot consisted of seven rows of six meter length with a spacing to 60 cm between rows and 30 cm between plants and followed the same recommended agronomic practices for all the hybrids.

Then data were collected on plant height (cm), number of green leaves, mean leaf area (cm²), head dry matter (g/plant), days to button initiation, days to 50 per cent flowering, days to maturity, capitulum diameter (cm), number of filled seeds per head, seed filling percentage, 100 seed weight (g), seed yield per plant (g), seed yield per hectare (kg), seed density (g/ml), kernel weight (g), hull weight (g) and oil content (%). Correlation co-efficients were calculated between and among seed, seedling, growth and yield characters on yield of sunflower hybrids adopting the procedure suggested by Panse and Sukhatme (1967).

RESULTS AND DISCUSSION

The result of present investigation are presented in Table 1 and the yield per plant was significantly positively correlated with F1 hybrid hundred seed weight (0.749), seed density (0.831), kernel weight (0.496), kernel to hull ratio (0.592), germination percentage (0.500), root length (0.592), shoot length (0.810), seedling vigour index (0.716) and seedling dry weight (0.434). Similarly punia and gill (1994), Doddamani *et al.* (1997), Madrap *et al.* (1998) and Nehru and Manjunath (2003) revealed that 100 seed weight had significant positive correlation with the kernel yield in sunflower, The positive and significant association between kernel yield and seedling fresh and dry weight in sunflower were also reported by Choudhary and Anand (1985).

Commercial kernel yield per plant was significantly positively correlated with plant height at harvest (0.538) number of leaves at 60 DAS (0.718), 100 seed weight (0.546), seed weight per head (0.781), number seeds per head (0.589), number of filled seeds per head (0.645), seed filling percentage (0.615) and capitulum diameter (0.804) Pathak *et al.* (1983). reported that, seed yield had highly significant positive correlation with total dry matter and plant height. Dagustu, (2002) and Nehru and Manjunath (2003) reported that seed yield was positively correlated with 100 seed weight and head diameter. Aybukhan (2001) also reported that head diameter, 100 seed weight, number of filled seeds and seed yield per plant were positively correlated with seed yield in sunflower.

When the plant height is more, obviously the number of

Table 1 : Correlation coefficients of various characters with yield per plant in sunflower

Sr. No.	Characters	r values
Seed characters		
1.	100 seed weight	0.749**
2.	Seed density (g/cc)	0.831**
3.	Kernel weight (%)	0.496*
4.	Hull weight (%)	-0.496*
5.	Kernel to hull ratio	0.592**
6.	Electrical conductivity of seed leachate (dsm ⁻¹)	-0.047
Seedling characters		
1.	Germination (%)	0.500*
2.	Rate of germination	0.312
3.	Root length (cm)	0.592**
4.	Shoot length (cm)	0.810**
5.	Seedling vigour index	0.716**
6.	Seedling dry weight (mg)	0.434*
Growth characters		
1.	Plant height at 30 DAS (g)	-0.199
2.	Plant height at 60 DAS (g)	0.480*
3.	Plant height at 90 DAS (g)	0.522**
4.	Plant height at harvest (g)	0.538**
5.	Number of leaves at 30 DAS (g)	0.146
6.	Number of leaves at 60 DAS (g)	0.718**
7.	Number of leaves at 90 DAS (g)	0.259
8.	Days to button initiation	0.113
9.	Days to 50% flowering	0.260
10.	Days to maturity	0.167
Yield characters		
1.	Head diameter (cm)	0.804**
2.	No. of seeds / head	0.589**
3.	No. of filled seed/ head	0.645**
4.	No of unfilled seeds / head	-0.163
5.	Seed filling (%)	0.615**
6.	100 Seed weight (g)	0.546**
7.	Seed weight/ head (g)	0.781**
8.	Oil content (%)	0.230

* and ** indicate significance of values at P=0.05 and 0.01, respectively

leaves will be more. Suggesting greater total canopy available for fixation of carbon leading to more accumulation of dry matter. This may culminate in increase in stem weight and size, head diameter and head weight resulting in greater yields.

It could be concluded that 100 seed weight, seed density, kernel to hull ratio, head diameter, number of filled seeds per head, seed filling percentage and number of seeds per head are the most important characters contributing the yield of sunflower and were positively correlated. Hence, these characters can be utilized as the effective tool in identifying the better hybrids for cultivation under varied agro climatic

conditions .

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