Original Research Article

Studies on character association in Fennel (*Foeniculum vulgar* Mill.)

Abstract: Economic yield of seed is an important character in case of seed spices. The yield of plant is a complex character and is governed by several factors. The present investigation was carried out with ninety genotypes of fennel along with three checks namely Pant Madhurika (Pantnagar, Uttarakhand), GF-11(Gujarat) and RF-125 (Rajasthan) at Pantnagar (Uttarakhand) during 2009-10 and 2010-2011 to estimate relationship between yield and yield-components. The analysis shows that yield shows highly significant and positive correlation with plant height upto main umbel (0.375), plant height upto top of plant (0.446), number of primary branches (0.290), number of secondary branches (0.303), seed yield per plant (0.982), number of fruits per umbel (0.324) and number of fruits per umbellate (0.364) and positive and significant correlation with number of umbellate per umbel (0.219) indicating the importance of these traits as components for yield.

Keywords: - Character association, Yield components, Fennel, *Foeniculum vulgare*.

Introduction

Yield is a complex character which is highly influenced by environment. Selection based on yield alone will limit the improvement, where as the yield component characters are less complex in inheritance and influenced by the environment to a lesser extent. Thus, effective improvement in yield may be brought about through selection of yield component characters. Yield components characters show associations among themselves and with yield. Selection may limit genetic advance if unfavorable associations are present among the desired yield attributes. In order to initiate an effective selection programme for the genetic improvement in yield of fennel it is essential to know the importance as well as degree of association of various quantitative traits. The present study was under taken to find out the association between yield and yield components in fennel through correlation analysis.

Materials and methods

Field research was conducted at Vegetable Research Centre (VRC), G.B. Pant University of Agriculture and Technology, Pantnagar, Uttarakhand. The healthy seeds of ninety germplasm

lines and three checks namely Pant Madhurika (Pantnagar, Uttarakhand), GF-11(Gujarat) and RF-125 (Rajasthan) of *Foeniculum vulgare* were sown in field at row to row distance of 45 cm and plant to plant distance of 30 cm in the second week of November 2010-11. Recommended cultural practices were followed. The observations were recorded on nineteen economically important traits on ten randomly selected plants of each genotype. The nineteen traits that are included in the present study are days to germination in field, plant height upto main umbel (cm), plant height upto top of plant (cm), number of primary branches, number of secondary branches, number of effective branches, duration of complete anthesis in main umbel, days to 50 percent flowering, duration of 75 percent maturity in main umbel, 1000 Seed weight (gm), diameter of main umbel (cm), size of leaf sheath (cm), length of first internode (cm), seed yield per plant (gm), number of umbel per plant, number of umbellate per umbel, number of fruits per umbel, number of fruits per umbellate and yield (quintals per hectare). The analysis of variance for augmented design was done by using method given by Federer (1956), Federer and Raghavarao (1975). Correlation coefficients were estimated as described by Dewey and Lu (1959).

Results and Discussion

The character association is based on pooled data of two years adjusted means estimates are presented in the Table 1 represents correlation coefficient between yield and yield component. The present study indicate that the yield shows highly significant and positive correlation with plant height upto main umbel (0.375), plant height upto top of plant (0.446), number of primary branches (0.290), number of secondary branches (0.303), seed yield per plant (0.982), number of fruits per umbel (0.324) and number of fruits per umbellate (0.364) and positive and significant correlation with number of umbellate per umbel (0.219). Non-significant but positive correlation was seen between yield and number of effective branches (0.086), diameter of main umbel (0.168), size of leaf sheath (0.159) and number of umbels per plant (0.129). Negative and non-significant correlation of yield was observed between duration of complete anthesis in main umbel (-0.140), days to germination in field (-0.015), days to 50 percent flowering (-0.128), duration of 75 percent maturity in main umbel (-0.099), 1000 seed weight (-0.148) and length of first internode (-0.196).

The association of all other characters that influence yield was also seen. Number of fruits per umbellate showed highly significant and positive correlation with plant height upto

main umbel (0.484), plant height upto top of plant (0.357), number of primary branches (0.270), seed yield per plant (0.369), number of umbellate per umbel (0.440) and number of fruits per umbel (0.755). Number of fruits per umbel showed highly significant and correlation with plant height upto main umbel (0.486), plant height upto top of plant (0.358), seed yield per plant (0.308) and number of umbellate per umbel (0.805). Number of umbellate per umbel showed highly significant positive correlation with plant height upto main umbel (0.382) and diameter of main umbel (0.313). Number of umbels per plant showed highly significant and positive correlation with days to germination in field (0.504), number of primary branches (0.346), number of secondary branches (0.662), number of effective branches (0.881), duration of complete anthesis in main umbel (0.302), days to 50 percent flowering (0.414), duration of 75 percent maturity in main umbel (0.255) and 1000 seed weight (0.374). Seed yield per plant showed highly significant and positive correlation with plant height upto main umbel (0.375), plant height upto top of plant (0.454), number of primary branches (0.277) and number of secondary branches (0.303). 1000 seed weight showed highly significant and positive correlation with number of effective branches (0.389). Positive and significant correlation was seen with days to 50 percent flowering (0.246).

The findings are similar to results obtained by Coşge *et al.* (2009), Piccaglia and Marotti (2001), Sanker and Khader (1991) and Singh and Mittal (2003).

Conclusion

Thus character association analysis revealed that the plant height upto main umbel, plant height upto top of plant, number of primary branches, number of secondary branches, seed yield per plant, number of fruits per umbel and number of fruits per umbellate was significant positive association with yield. Therefore these characters could be taken as selection criteria for achieving higher seed yield in fennel.

References

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97 **Table 1. Simple correlation coefficient between different characters**

S. No.	Characters	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1.	Days to germination in field	1.000	-0.113	0.199	0.207*	0.489**	0.494**	0.306**	0.375**	0.330**	0.315	-0.129	0.207*	-0.097	0.020	0.504**	-0.398**	-0.337**	-0.200	-0.015
2.	Plant height upto main umbel (cm)		1.000	0.593**	0.028	-0.044	-0.332**	-0.092	-0.210*	-0.009	-0.349**	0.297**	-0.029	-0.030	0.375**	-0.333**	0.382**	0.486**	0.484**	0.375**
3.	Plant height upto top of plant (cm)			1.000	0.288**	0.296**	0.117	0.258*	0.242*	0.236*	-0.212*	0.312**	0.180	-0.196	0.454**	0.077	0.199	0.358**	0.357**	0.446**
4.	Number of primary branches				1.000	0.657**	0.319**	0.156	0.209*	0.250*	-0.184	0.129	0.148	-0.623**	0.277**	0.346**	-0.109	0.079	0.270**	0.290**
5.	Number of secondary branches					1.000	0.668**	0.220*	0.299**	0.251*	0.068	0.047	0.174	-0.446**	0.303**	0.662**	-0.334**	-0.163	0.075	0.303**
6.	Number of effective branches						1.000	0.367**	0.450**	0.314**	0.389**	-0.187	0.194	-0.141	0.101	0.881**	-0.514**	-0.415**	-0.206*	0.086
7.	Duration of complete anthesis in main umbel							1.000	0.900**	0.812**	0.185	0.013	0.186	-0.023	-0.134	0.302**	-0.102	-0.039	0.024	-0.140
8.	Days to 50 percent flowering								1.000	0.740**	0.246*	0.027	0.218*	-0.158	-0.116	0.414**	-0.195	-0.065	0.027	-0.128
9.	Duration of 75 percent maturity in main umbel									1.000	0.031	0.022	0.121	-0.103	-0.075	0.255**	-0.121	0.051	0.188	-0.099
10.	1000 Seed weight (gm)										1.000	-0.333**	0.084	0.339**	-0.134	0.374**	-0.441**	-0.513**	-0.423**	-0.148
11.	Diameter of main umbel (cm)											1.000	0.081	-0.187	0.185	-0.209*	0.313**	0.323**	0.207	0.168
12.	Size of leaf sheath (cm)												1.000	-0.089	0.142	0.232	-0.016	0.069	-0.007	0.159
13.	Length of first internode (cm)													1.000	-0.171	-0.111	0.019	-0.190	-0.294**	-0.196
14.	Seed yield per plant (gm)														1.000	0.146	0.199	0.308**	0.369**	0.982**
15.	Number of umbel per plant															1.000	-0.492**	-0.386**	-0.163	0.129
16.	Number of umbellate per umbel																1.000	0.805**	0.440**	0.219*
17.	Number of fruits per umbel																	1.000	0.755**	0.324**
18.	Number of fruits per umbellate																		1.000	0.364**
19.	Yield (quintals per hectare)																			1.000

98 **** Significant at 1 % level of probability**
99 *** Significant at 5 % level of probability**