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COMPONENT ANALYSIS FOR SEED YIELD ON SESAME IN ACID SOIL UNDER HIGH RAINFALL MID ALTITUDE CONDITIONS

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ABSTRACT

Path analysis of seed yield was done in two sesame (*Sesamum indicum* L.) varieties, JLT 26 and JLT 27 grown separately in acid soil (pH 4.0-5.5) under high rainfall mid altitude (1,000 m msl, 26°N and 92°E) conditions during the rainy (*kharif*) season of 1988. Seed yield was positively and significantly correlated with plant height, number of leaves, primary branches, length of main branch, number of capsules on main branch, number of capsules per plant, capsule length and seeds per capsule in both the varieties. Partitioning of total correlation coefficient of these characters with seed yield into the components of direct and indirect effects revealed that number of capsules per plant followed by seeds per capsule were the only two characters which contributed to seed yield directly. The direct contribution of rest of the traits was considerably low. However, their indirect contribution to seed yield through the number of capsules per plant was substantial. It is thus suggested that number of capsules per plant and seeds per capsule could be taken as indices while improving seed through selection.

KEY WORDS : Yield Components, Correlation Coefficients, Path Analysis

The knowledge of association is useful to the breeders in the improvement of complex characters like yield through selection. Sometimes selection is not much effective and the progress of improvement remains slow due to some other unknown factors acting behind to produce a given correlation. The relative importance of such causal factors and their direct and indirect contribution towards the total correlation could be ascertained with the help of path analysis. These informations in sesame are meagre under the agro-climatic conditions of north eastern hill region of the country. The region often meets an annual rainfall ranging from 200 to 1,000 cm. The present study, therefore, was conducted to determine the direct and indirect effect to various characters on seed yield in sesame under these situations.

MATERIALS AND METHODS

Two promising sesame varieties, JLT 26 and JLT 27, were grown during the rainy season (*kharif*) of 1988 in a terrace in two different plots adjacently keeping a distance of 30 cm between rows and 10 cm between plants within a row at the research farm of Indian Council for Agricultural Research Complex for North Eastern Hills Region, Barapani situated at the mid altitude (1,000 m msl). The soil of the experimental site was highly acidic (pH 4.0-5.5). The crop was maintained under the recommended cultural practices. From each variety, 102 plants were randomly selected to record observations on days to first flowering, plant height, number of leaves, primary branches, length of main branch, number of capsules on main branch, number of capsules per plant, capsule length, capsule width, capsule thickness, seeds per capsule, 1,000 seed weight and seed yield per plant.

Table 1. Direct and indirect effect of characters on seed yield in JLT-26 sesame

Character	Days to flowering	Plant height	Number of leaves	Primary branches	Length of main branch	Capsule number	Capsules on main branch	Capsule length	Capsule width	Capsule thickness	Seeds per capsule	1000 seed weight	Correlation with seed yield
Days to flowering	<u>0.01</u>	0.01	0.00	0.00	0.00	-0.17	0.00	0.00	-0.01	0.01	0.02	0.03	-0.10
Plant height	0.01	<u>-0.03</u>	0.01	0.01	0.01	0.55	0.00	0.00	0.00	0.00	0.03	-0.04	0.55**
Number of leaves	0.00	-0.01	<u>0.03</u>	0.01	0.01	0.61	0.00	0.00	-0.02	0.01	0.08	-0.04	0.68**
Primary branches	0.00	-0.01	0.02	<u>0.01</u>	0.00	0.43	0.00	0.00	-0.01	0.01	0.09	-0.04	0.50**
Length of main branch	0.00	-0.02	0.02	0.00	<u>0.01</u>	0.48	0.00	0.00	0.00	0.00	0.07	-0.02	0.54**
Capsule number	0.00	-0.02	0.02	0.01	0.01	<u>0.86</u>	0.00	0.00	-0.01	0.00	0.03	-0.09	0.81**
Capsules on main branch	0.00	-0.01	0.01	0.00	0.00	0.37	<u>0.00</u>	0.00	0.01	0.00	0.01	0.01	0.40**
Capsule length	0.00	-0.01	0.01	0.00	0.00	0.31	0.00	<u>0.01</u>	-0.02	0.01	0.15	-0.02	0.44**
Capsule width	0.00	0.00	0.01	0.00	0.00	0.11	0.00	0.00	<u>-0.06</u>	0.03	0.08	0.03	0.20*
Capsule thickness	0.00	0.00	0.01	0.00	0.00	0.09	0.00	0.00	-0.06	<u>0.04</u>	0.10	0.04	0.22*
Seeds per capsule	0.00	0.00	0.01	0.00	0.00	0.06	0.00	0.00	-0.01	0.01	<u>0.44</u>	0.01	0.52**
1000 seed weight	0.00	0.00	-0.01	0.00	0.00	-0.28	0.00	0.00	-0.01	0.01	0.01	<u>0.30</u>	0.02

Residual effect = 0.20

* and ** indicate significance at 5 and 1 per cent level respectively; Underlined values denote direct effects.

Table 2. Direct and indirect effect of characters on seed yield in JLT-27 sesame

Character	Days to flowering	Plant height	Number of leaves	Primary branches	Length of main branch	Capsule number	Capsules on main branch	Capsule length	Capsule width	Capsule thickness	Seeds per capsule	1000 seed weight	Correlation with seed yield
Days to flowering	<u>-0.04</u>	0.01	0.00	-0.01	0.01	-0.05	-0.01	-0.01	0.00	0.00	-0.01	-0.01	-0.12
Plant height	0.01	<u>-0.03</u>	0.01	0.02	-0.01	0.53	0.06	0.01	0.01	0.00	0.01	0.02	0.64**
Number of leaves	0.01	-0.02	<u>0.02</u>	0.03	0.00	0.55	0.04	0.01	0.01	-0.01	0.02	-0.01	0.64**
Primary branches	0.00	-0.01	0.01	<u>0.05</u>	0.00	0.56	0.02	0.00	0.00	0.00	0.03	0.01	0.67**
Length of main branch	0.01	-0.02	0.01	0.02	<u>-0.02</u>	0.52	0.06	0.01	0.01	-0.01	-0.01	-0.01	0.57**
Capsule number	0.00	-0.02	-0.01	0.03	-0.01	<u>0.82</u>	0.06	0.01	0.00	0.00	0.00	-0.03	0.87**
Capsules on main branch	0.00	-0.02	0.01	0.01	-0.01	0.57	<u>0.09</u>	0.01	0.00	-0.01	-0.05	-0.03	0.67**
Capsule length	0.01	-0.02	0.01	0.01	-0.01	0.18	0.03	<u>0.03</u>	0.00	-0.01	0.00	0.02	0.25**
Capsule width	0.00	-0.01	0.01	0.00	-0.01	0.11	0.02	0.01	<u>0.03</u>	-0.01	-0.06	0.05	0.14
Capsule thickness	0.00	-0.01	0.01	0.00	0.00	0.11	0.02	0.01	0.02	<u>-0.02</u>	-0.05	0.06	0.15
Seeds per capsule	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	-0.01	0.00	<u>0.41</u>	-0.05	0.36**
1000 seed weight	0.00	0.00	0.00	0.00	0.00	-0.10	-0.01	0.00	0.01	-0.01	-0.09	<u>0.25</u>	0.05

Residual effect = 0.20

** Significant at 1 per cent level Underlined values denote direct effects.

Correlation coefficients between seed yield and other characters based on single plant value (Al-Jibouri *et al.*, 1958) and path analysis (Dewey and Lu, 1959) were calculated.

RESULTS AND DISCUSSION

The seed yield exhibited a positive and significant correlation with plant height, number of leaves, primary branches, length of main branch, number of capsules per plant, number of capsules on main branch, capsule length and seeds per capsule in both the sesame varieties (Tables 1, 2). Similar findings on the association of seed yield with plant height (Ramachandran *et al.*, 1972; Krishnadoss and Kadambavanasundaram, 1986; Ramakrishnan and Soundarapandian, 1990), primary branches (Ramachandran *et al.*, 1972; Krishnadoss and Kadambavanasundaram, 1986, number of capsules per plant (Dixit, 1975; Gupta and Gupta, 1977; Krishnadoss and Kadambavanasundaram, 1986; Rong and Wu, 1989; Ramakrishnan and Soundarapandian 1990), length of main branch number of capsules on main branch (Dixit, 1975), capsule length, and seeds per capsule (Ramachandran *et al.*, 1972; Gupta and Gupta, 1977) have also been reported.

When several characters are influencing a given character, splitting of total correlation coefficient into direct and indirect effects of cause would provide a more meaningful interpretation to the actual causes of association. Hence, the path analysis was done to ascertain the real components of seed yield. The estimates of direct and indirect effects of various characters on seed yield are given in Table-1 and 2. The analysis showed that the number of capsules per plant had the greatest positive direct effect on seed yield. The importance of high positive direct effect of this character on seed yield has also been recorded by Gupta and Gupta (1977) and Rong and Wu (1989). The next highest positive direct effect was of seeds per capsule which confirmed the findings of Gupta and Gupta (1977). Capsule number and seeds per

capsule did not contribute to seed yield indirectly through any of the components. The direct contribution of plant height, number of leaves, primary branches, length of main branch, capsules on main branch and capsule length was nearly zero. But their indirect effects on yield *via* number of capsules per plant were quite substantial. This suggested that a weightage must be given to the number of capsules per plant while improving seed yield by selection based upon any of the component traits. The residual effect in the path analysis was of lower order (0.20) which indicated that most of the seed yield attributing characters were included in the present investigation. It is, thus, concluded from the study that number of capsules per plant and seeds per capsule were the most important seed yield attributing characters in sesame.

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