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General Selection Indices in Italian millet [*Setaria italica* (L.) Beauv]

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ABSTRACT

General selection indices were constructed for two botanical groups at a time *viz.,* Indian *kharif* and Indian *rabi*, Indian *kharif* and exotic *kharif*, Indian *kharif* and exotic *rabi*, Indian *rabi* and exotic *kharif*, Indian *rabi* and exotic *rabi*, exotic *kharif* and exotic *rabi* for seven characters *i.e.,* days to 50% flowering, plant height, productive tillers per plant, ear length, ear weight, straw weight and 1000 grain weight. General selection indices study in 18 Indian and 34 exotic genotypes revealed that the major emphasis should be laid on selection process with increased number of productive tillers per plant coupled with more ear weight and ear length while aiming for improvement of grain yield in Indian and exotic genotypes of Italian millet irrespective of season.

Key words : Italian millet, General Selection Indices

Italian millet with a short growing period is grown extensively in diverse agro- climatic regions for grain and fodder. This crop is grown for human food in North Africa, Southeastern Europe, Japan and India. It is usually cooked whole or made into meal or into beer. It can also make useful for hay or silage. In addition Italian millet is consumed as stiff porridge called sargati, or as an leavened bread known as roti, after the dehulled grain has been milled into flour. It is known for its drought tolerance and is an indispensable crop of vast rainfed areas in semi-arid regions in India.

MATERIAL AND METHODS

The present investigation was undertaken at Agricultural College Farm, Bapatla, Andhra Pradesh with18 Indian and 34 exotic genotypes of Italian millet procured from All India Co-ordinated Small Millets Improvement Project (AICSMIP), Bengaluru. The studies were carried out separately during two consecutive seasons of 2008-2009, namely k*harif* 2008 and r*abi* 2005-2009. Both sets of genotypes were sown separately in Randomized Block Design with four replications. Each genotype was sown in four rows of 5 mts length spaced at 25 X 10 cm apart. Observations were recorded on ten randomly chosen plants from each replication and genotype for seven characters *i.e.,* days to 50% flowering (X_1), plant height(X_2), number of productive tillers per plant(X_3), ear length(X_4), ear weight(X_5), straw weight(X_6), and 1000 grain weight(X_7). General selection indices were computed as per Hanson and Johnson (1957). Caldwell and Weber (1965) reported that three steps are necessary for the construction of general selection indices(i)bi values were estimated from pooled information from various populations (ii) using bi values, correction factor for phenotypic and genotypic variances and covariances were developed (iii) a set of new bi values were then calculated using corrected pooled variances and covariances.

RESULTS AND DISCUSSION

Pooled data from two seasons *i.e., kharif 2008 and rabi* 2005-2009 was used to general selection indices were constructed for two botanical groups at a time *viz.,* Indian *kharif* and Indian *rabi*, Indian *kharif* and exotic *kharif*, Indian *kharif* and exotic *rabi*, Indian *rabi* and exotic *kharif*, Indian *rabi* and exotic *rabi*, exotic *kharif* and exotic *rabi* . Weighing coefficient values were calculated and presented in Table 1.

In the first pooled data Indian *kharif* and Indian *rabi* groups the discriminant function obtained was I= 0.67 X_1, II = 0.99 X_2, III = 1.24X3, IV = 1.10 X_4, V = 1.06X_5, VI = 0.97X_6 VII=1.07X_7. This indicated that prime importance should be given to number of productive tillers/ plant, ear length, 1000 grain weight and ear weight while making selection.

In the second pooled data Indian *kharif* and exotic *kharif* groups that discriminant function obtained was I= 0.81 X_1, II = 0.95X_2, III =2.07 X_3, IV = 1.04X_4, V = 0.86X_5, VI = 0.95X_6 VII=0.94X_7.

Table 1. Weighing coefficient (b_i) values for seven characters in six population pools in general selection indices in Italian millet [*Setaria italica(L.)Beauv*]

S.No	Character	I Pool	II Pool	III Pool	IV Pool	V Pool	VI Pool
1	Days to 50% flowering	0.67	0.81	0.80	0.76	0.82	0.81
2	Plant height (cm)	0.99	0.95	0.97	0.99	0.99	0.92
3	Number of productive tillers plant^{-1}	1.24	2.07	1.05	1.23	1.09	1.09
4	Ear length (cm)	1.10	1.04	1.07	1.01	1.01	1.05
5	Ear weight (g)	1.06	0.86	1.07	1.17	1.12	1.13
6	Straw weight (g)	0.97	0.95	1.00	0.96	0.98	1.00
7	1000 grain weight(g)	1.07	0.94	0.72	0.80	0.81	0.67

I Pool: *khari*f Indian group and *rabi* Indian group
II Pool: *kharif* Indian group and *kharif* exotic group
III Pool: *kharif* Indian group and *rabi* exotic group
IV Pool: *rabi* Indian group and *kharif* exotic group
V Pool: *rabi* Indian group and *rabi* exotic group
VI Pool: *kharif* exotic group and *rabi* exotic group

This indicated the prime importance should be given to number of productive tillers plant^{-1} and ear length while making selection

In the third pooled data Indian *kharif* and exotic *rabi* groups that discriminant function obtained was I=0.80X_1, II =0.97 X_2, III =1.05 X_3, IV = 1.07X_4, V =1.07 X_5, VI = 1.0 X_6 ,VII=0.72X_7 This indicated the prime importance should be given to ear length, ear weight and number of productive tillers plant^{-1} while making selection

In the fourth pooled data Indian *rabi* and exotic *kharif* groups the discriminant function obtained was I=0.76 X_1, II = 0.99X_2, III = 1.23 X_3, IV =1.01 X_4, V =1.17 X_5, VI =0.96 X_6 , VII=0.80X_7. This indicated that prime importance should be given to ear length, ear weight and number of productive tillers plant^{-1} while making selection

In the fifth pooled data Indian *rabi* and exotic *rabi* group the discriminant function obtained was I= 0.82 X_1, II = 0.99 X_2, III = 1.09X_3, IV = 1.01 X_4, V =1.12 X_5, VI =0.98 X_6 VII=0.81X_7. This indicated that prime importance should be given to ear weight, ear length and number of productive tillers plant^{-1} while making selection

In the sixth pooled data exotic *kharif* and exotic *rabi* groups the discriminant function obtained was I= 0.81 X_1, II = 0.92 X_2, III = 1.09 X_3, IV = 1.05X_4, V =1.13 X_5, VI =1.0 X_6 VII=0.67X_7. This indicated that prime importance should be given to ear weight, ear length and number of productive tillers plant^{-1} while making selection.

The construction of index was not easy without the use of matrix method particularly if there are more than two sources of information as reported by Henderson (1963).

Singh (1974) reported that general selection indices were as efficient as specific indices in rye and reported that when specific indices are used for selecting individuals from other populations, their efficiency will be greatly reduced.

Similar general selection indices were studied involving virginia bunch, virgina runner and spanish bunch types in groundnut (Venkateswarw Rao,1985 and Panduranga Rao *et al*.,1988).

Padmaja *et al*., (2006) reported that general selection indices studying thirty VMEC and fifty AICSMIP genotypes revealed that the diacriminant functions including ear weight per plant, yield per plant and 1000 seed weight should be given prime importance while making selection in finger millet.

When both Indian and exotic genotypes were considered together the major emphasis should be laid on selection process with increased

number of productive tillers per plant coupled with more ear weight and ear length while aiming for improvement of grain yield in Indian and exotic genotypes of Italian millet irrespective of season.

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