

FORMULATION OF SELECTION INDICES IN FINGER MILLET (*ELEUSINE CORACANA* GAERTN.)

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ABSTRACT

Nonsignificant association and low heritability for grain yield in two intervarietal crosses of finger millet suggested that the selection based on grain yield in early generations is not advantageous. Selection indices formulated in F₃ populations including plant height and number of productive tillers in the cross HR-911 x Indaf-9; ear weight, straw weight and harvest index in the cross Indaf-8 x HR-41-2 were the best indices for indirect selection for grain yield.

Key words: Selection indices, relative efficiency, finger millet.

Selection indices are useful in understanding the extent of improvement that can be effected in yield by combination of characters. It forms the basis in considering the correlated characters for higher efficiency in selection for yield [1]. Studies on selection indices in finger millet have been carried out earlier [2–4]. The present investigation was carried out to estimate intergeneration correlations and narrow sense heritability between F₂ and F₃ generations and to formulate selection indices in F₃ populations.

MATERIALS AND METHODS

The F₂ and F₃ generations of two intervarietal crosses, viz., HR-911 x Indaf-9 and Indaf-8 x HR-41-2, were grown during kharif 1988-89 and 1989-90 in Bangalore. In F₂, 90 plants from each cross were randomly selected and observations were recorded. In F₃, 20 families in each cross were grown in two rows of 2.5 m length with three replications in randomized block design. Ten plants in each progeny were randomly selected for recording the observations on plant height, number of productive tillers, length of ear, number of fingers per ear, ear weight, straw weight, grain yield and harvest index.

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Selection indices were constructed for the highly correlated characters viz., plant height, number of productive tillers, ear weight, straw weight, harvest index and grain yield. Grain yield was considered as the dependant variable with a relative efficiency of 100 per cent. Expected genetic advance and relative efficiencies were estimated as per standard procedures [5, 6].

RESULTS AND DISCUSSION

Correlations between F₂-F₃ generations were nonsignificant in both the crosses (0.12 and 0.09) for grain yield (Table 1). This confirms that selection of plants based on yield in early generation is not advantageous. Significant correlations observed for length of ear (0.92 and 0.78) and number of fingers per ear (0.46 and 0.45) in both the crosses; for plant height (0.71) in the cross HR-911 x Indaf-9 and for number of productive tillers (0.50) in the cross Indaf-8 x HR-41-2 suggested the dependance of F₃ performance on F₂ value for these attributes. Similar positive correlations for plant height and number of fingers have also been reported [7].

Table 1. Intergeneration correlation coefficients (*r*) and narrow sense heritabilities (*h*²) between F₂-F₃ generations for yield and yield components in two crosses of finger millet

Characters	HR-911 x Indaf-9		Indaf-8 x HR-41-2	
	<i>r</i>	<i>h</i> ²	<i>r</i>	<i>h</i> ²
Plant height	0.71**	80.6	0.32	31.4
Productive tillers/plant	0.28	49.8	0.50*	10.1
Length of ear	0.92**	60.2	0.78**	55.3
Number of fingers per ear	0.46*	47.2	0.45*	27.3
Ear weight per plant	0.08	2.0	0.07	1.7
Straw weight per plant	0.10	3.2	0.26	7.3
Harvest index	0.21	10.9	0.14	3.5
Grain yield per plant	0.12	3.4	0.09	2.0

**Significant at 5% and 1% levels, respectively.

Heritability estimates for grain yield in narrow sense were low in both the crosses (3.4 and 2.0). Besides yield, ear weight, straw weight and harvest index also exhibited low heritability estimates, suggesting the difficulty in improving these characters through selection. However, high heritability estimates for plant height (80.6), number of productive tillers (49.8), length of ear (60.2) and number of fingers per ear (47.2) in the cross HR-911 x Indaf-9; high heritability for length of ear (55.3) and moderate for plant height (31.4) and number of fingers per ear (27.3) in the cross Indaf-8 x HR-41-2 suggested the effectiveness of selection for these characters.

Table 2. Discriminant functions, their genetic advance (GA) and relative efficiency (RE) over straight selection for grain yield in two crosses of finger millet

Content of index	HR-911 x Indaf-9		Indaf-8 x HR-41-2	
	GA	RE	GA	RE
X ₆	2.52	100.0	1.18	100.00
X ₁	2.26	89.7	0.47	39.4
X ₂	1.69	67.1	0.59	50.3
X ₃	1.02	40.4	0.50	42.2
X ₄	0.08	3.2	0.44	37.0
X ₅	0.82	32.5	0.21	17.6
X ₁ + X ₂	3.11	123.8	0.75	63.7
X ₁ + X ₃	2.54	100.8	0.65	55.5
X ₁ + X ₄	2.47	97.9	0.63	53.7
X ₁ + X ₅	2.26	89.7	0.55	46.8
X ₂ + X ₃	1.70	67.3	0.62	52.4
X ₂ + X ₄	2.09	82.9	1.06	90.1
X ₂ + X ₅	1.96	77.7	0.65	55.3
X ₃ + X ₄	1.32	52.4	1.02	86.5
X ₃ + X ₅	1.19	47.2	0.61	51.5
X ₄ + X ₅	0.85	33.7	0.62	52.8
X ₁ + X ₂ + X ₃	3.13	124.1	0.76	64.6
X ₁ + X ₂ + X ₄	3.12	123.4	1.15	97.6
X ₁ + X ₂ + X ₅	3.11	123.4	0.83	70.7
X ₁ + X ₃ + X ₄	2.57	101.7	1.08	91.7
X ₁ + X ₃ + X ₅	2.56	101.2	0.78	66.2
X ₁ + X ₄ + X ₅	2.49	98.7	0.83	71.0
X ₂ + X ₃ + X ₄	2.11	83.7	1.20	101.6
X ₂ + X ₃ + X ₅	2.04	81.0	0.70	59.1
X ₂ + X ₄ + X ₅	2.17	86.0	1.44	122.1
X ₃ + X ₄ + X ₅	1.33	52.6	1.84	155.7
X ₁ + X ₂ + X ₃ + X ₄	3.13	124.1	1.26	106.6
X ₁ + X ₂ + X ₃ + X ₅	3.15	124.7	0.86	73.1
X ₁ + X ₂ + X ₄ + X ₅	3.12	123.5	1.59	133.6
X ₁ + X ₃ + X ₄ + X ₅	2.57	101.7	1.94	164.5
X ₁ + X ₂ + X ₃ + X ₄ + X ₅	3.15	124.8	2.19	185.7

X₁—plant height, X₂—productive tillers/plant, X₃—ear weight/plant, X₄—straw weight/plant, X₅—harvest index, and X₆—grain yield/plant.

The relative efficiency of selection index increased with increase in the number of component characters. Amongst the indices formulated the one containing all the component characters gave highest relative efficiency of 124.8 and 185.7 % in the crosses HR-911 x Indaf-9 and Indaf-8 x HR-41-2, respectively. But the maximum relative efficiency of 123.8% for the combination of plant height and number of productive tillers in the cross HR-911 x Indaf-9 and 155.7% for the combination of ear weight, straw weight and harvest

index in the cross Indaf-8 x HR- 41-2 were the best indices over direct selection for grain yield. These results are in conformity with [2-4] and confirmed the expected superiority of selection indices over direct selection for grain yield in finger millet.

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