

Hybrid Vigour in Pop Corn

By

R. APPADURAI¹ and R. NAGARAJAN²

ABSTRACT

Fifty seven single crosses produced from among forty two inbreds were tested in a replicated trial. The degree of heterosis exhibited by the different combinations over their respective greater parents, for six traits was studied. Twenty combinations recorded increased grain yields of more than 100 per cent over their respective greater parents. The grain weight per cob and the number of grains per row appeared to determine the grain yield, while the row number did not seem to much influence the yield.

INTRODUCTION

Maize as a grain crop is gaining popularity in Tamil Nadu. A variety of maize which is exclusively used for popping, known as the pop corn has considerable commercial value. However very little work has been done in India on the improvement of the yield of this crop. Pop corn forms a snack, and has good potentiality for rapid spread among cultivators if the per acre production is improved along with quality. In this variety only single crosses are of commercial value as uniformity is of prime importance. To explore the possibility of introducing useful single cross hybrids in this variety, hybridization was taken up among chosen inbreds and the results are presented hereunder.

MATERIALS AND METHODS

The material consisted of forty two inbreds and fifty seven single cross hybrids effected among the inbreds

during 1972 summer at the Millet Breeding Station, Tamil Nadu Agricultural University, Coimbatore.

The fifty seven hybrids along with their parents were raised in randomized single rows of five meter length replicated four times. A spacing of 60 cm between rows and 22 cm between plants was adopted. Observations were recorded on the following characters.

1. Height of the plant
2. Number of days to flowering (silking)
3. Number of rows per cob
4. Number of seeds per row
5. Grain weight per cob
6. Yield of grain per plot

RESULTS AND DISCUSSION

The data were analysed and the degree of heterosis has been presented

1. Associate Professor, Agricultural Botany, Agricultural University, Coimbatore-641003.

2. Research Assistant, Tamil Nadu

TABLE 1. Percentage increase recorded by the hybrids over their respective greater parental values

S. No.	Combination	Height of plant	Number of days to silking	Number of rows per cob	Number of seeds per row	Grain weight per cob	Yield of grain per plot
1	2	3	4	5	6	7	8
1.	B x 2406	0	-3.6**	0	18.8**	-11.8**	13.4
2.	B x 2410	3.6	-3.6**	0	22.6**	79.4**	111.8**
3.	B x 2411	-11.0**	-5.5**	14.3**	13.2**	3.9	46.3**
4.	B x 2414	3.6	-7.3**	14.3**	25.8**	55.9**	74.8**
5.	B x 2415	4.6*	-5.5**	14.3**	22.6**	44.1**	82.9**
6.	B x 2416	5.7**	0	14.3**	25.8**	29.4**	37.5**
7.	B x 2418	8.7**	-3.6**	14.3**	19.4**	67.6**	91.8**
8.	B x 2419	-3.1	-5.7**	0	29.0**	67.6**	101.4**
9.	B x 2423	2.6	-3.6**	0	32.3**	52.8**	60.2**
10.	B x 2424	5.2**	-5.6**	14.3**	8.8	30.8**	89.1**
11.	B x 2425	8.3**	-7.3**	0	38.7**	67.6**	154.0**
12.	B x 2426	7.1**	0	0	24.2**	100.0**	121.8**
13.	B x 2427	7.3**	-5.6**	0	19.4**	47.1**	47.8**
14.	B x 2428	7.8**	0	-12.5*	12.1**	-6.1	34.2**
15.	B x 2432	5.2**	-1.9	0	19.4**	32.4**	18.8
16.	B x 2433	3.6	2.0	0	15.2**	20.6**	50.9**
17.	B x 2434	4.7*	-1.9	0	12.1**	79.4**	109.3**
18.	B x 2436	4.1*	0	-25.1**	0	-8.9**	57.2**
19.	B x 2438	12.4**	0	0	19.4**	58.8**	57.7**
20.	B x 2439	-1.5	1.9	0	22.2**	50.0**	93.0**
21.	B x 2447	-3.4	-7.4**	14.3**	14.3**	27.5**	29.5**
22.	B x 2448	-2.1	-1.9	0	25.8**	20.6**	17.5
23.	B x 2452	-2.6	0	0	17.6**	67.6**	65.4**
24.	B x 2455	8.8**	0	0	2.6	47.4**	50.7**
25.	Super	5.7**	-1.9	14.3**	27.3**	0	52.0**
26.	2435 x 2409	0.5	-5.5**	0	14.3**	-9.8**	38.3**
27.	2435 x 2410	-0.9	-12.1**	0	29.0**	129.0**	252.4**
28.	2435 x 2416	-4.2*	-3.7**	14.3**	16.1**	25.8**	86.1**
29.	2435 x 2418	0.5	-12.1**	0	6.5	81.8**	71.2**
30.	2435 x 2419	-5.2**	-3.7**	0	-9.1	9.7	51.4**

1	2	3	4	5	6	7	8
31.	2418 x 2406	2.6	-10.3**	0	18.8**	60.6**	108.3**
32.	2418 x 2407	1.5	-8.6**	0	-6.5	-8.8**	160.9**
33.	2418 x 2409	12.3**	-8.6**	0	20.0**	19.6**	110.7**
34.	2418 x 2410	12.3**	-8.6 *	-12.5**	35.5**	145.5**	219.1**
35.	2418 x 2411	-3.4	-6.9**	14.3**	-7.9	-9.8	19.1*
36.	2418 x 2412	10.3**	-10.3**	-12.5**	0	-23.5**	50.6**
37.	2418 x 2414	6.2**	-10.3**	0	6.5	57.6**	84.7**
38.	2418 x 2415	5.1	-12.1**	0	9.7	27.3**	73.5**
39.	2418 x 2416	8.2**	-8.6**	0	16.1**	63.6**	107.2**
40.	2418 x 2419	5.6**	-12.1**	0	9.1	24.2**	58.9**
41.	2418 x 2423	-1.0	-12.1**	14.3**	22.6**	60.6**	111.9**
42.	2418 x 2424	5.1**	-10.3**	14.3**	8.8	43.6**	134.2**
43.	2418 x 2425	13.8**	-10.3**	0	35.5**	48.5**	158.4**
44.	2418 x 2426	61.6**	-10.3**	12.5**	15.2**	90.9**	112.2**
45.	2418 x 2427	7.2**	-12.1**	0	19.4**	45.5**	76.9**
46.	2418 x 2428	9.7**	-17.2**	0	0	10.2**	12.7**
47.	2418 x 2430	10.3**	-12.1**	0	29.0**	84.8**	112.4**
48.	2418 x 2432	11.3**	-12.1**	0	22.6**	72.7**	148.3**
49.	2418 x 2435	-1.4	-12.1**	14.3**	9.7	9.1	71.2**
50.	2418 x 2436	8.2**	-8.6**	0	-5.0	3.6	56.3**
51.	2418 x 2438	13.8**	-10.3**	0	25.8**	81.8**	162.2**
52.	2418 x 2439	1.5	-12.3**	0	5.6	54.5**	95.0**
53.	2418 x 2440	5.1**	-13.8**	0	12.9**	54.3**	66.7**
54.	2418 x 2448	1.5	-8.6**	14.3**	22.6**	72.7**	91.5**
55.	2418 x 2452	1.0	-12.1**	14.3**	20.6**	63.6**	125.2**
56.	2418 x 2454	6.7**	-3.8**	14.3**	38.7**	75.0**	158.4**
57.	2418 x 2455	1.0	-3.8**	14.3**	7.9	71.1**	84.7**

*, ** — Significant at 0.05 and 0.01 probability levels respectively,

as percentage increases in the expressions of the attributes over the respective better parents (Table 1).

1. Height of plants

The extent of heterosis over the taller parent for this character ranged from -11.0 to + 61.6 per cent. The maximum increase of 61.6 per cent was exhibited by the hybrid combination 2418 x 2426 followed by the combi-

nations 2418 x 2425 and 2418 x 2438. Out of the fifty seven hybrids tested, thirty three showed significant heterosis. Seventeen among the heterotic combinations involved 2418, while fourteen had Bangalore (B) and two had 2435 as the seed parent.

2. Number of days to silking

The increase in the number of days to silking, as measured from the earlier

parent ranged from - 17.2 to + 2.0 per cent. The combination 2418 x 2428 recorded the maximum reduction from its earlier parent *viz.*, 2428, the percentage of reduction in the number of days to silking being 17.2. In all, forty four hybrids were significantly earlier than their corresponding earlier parents. These included all the five combinations involving 2435, all the 27 combinations involving 2418 and twelve combinations involving Bangalore, as the seed parents. Earlier silking of the hybrids has been reported earlier in maize (Swamy Rao *et al.*, 1970).

3. Number of rows per cob

The range of heterosis for this character was from - 25.00 to + 14.3 per cent. Eighteen hybrids exhibited significant increase in the number of rows of kernels over that of the greater parent. In seventeen combinations the percentage increase was 14.3 and in one case it was 12.5.

4. Number of seeds per row

The increase in the number of seeds over the greater parents ranged from - 6.5 to + 38.7 per cent. The highest increase of 38.7 per cent over the greater parent was exhibited by Bangalore x 2425, and 2418 x 2454 followed by 2418 x 2410 and 2418 x 2425, both recording an increase of 35.5 per cent. In all, forty hybrids exhibited significant heterosis. Variety Bangalore figured as the seed parent in twenty two of the heterotic combinations, while fifteen combinations involved 2418 and three combinations involved 2435, as the seed parents.

5. Grain weight per cob

The increase in grain weight exhibited by the hybrids over their better parents ranged from - 23.5 to + 145.5 per cent. Twenty out of twenty five combinations involving Bangalore, twenty two out of twenty seven involving 2418 and three out of five involving 2435, as seed parents exhibited significant increase for seed weight per cob. The maximum increase in seed weight per cob over the greater parent was recorded by the combination 2418 x 2410.

6. Yield of grain per plot

The percentage increase in grain yield recorded by the hybrids over their respective better parents ranged from + 12.7 to + 252.4 per cent. Fifty three hybrids exhibited significant heterosis, which included all the five combinations that involved 2435 as the seed parent. Twenty two of the twenty five combinations involving Bangalore B and twenty six of the twenty seven involving 2418 as the seed parents exhibited significant heterosis for grain yield. All the three combination involving inbred 2410 as the pollen parent recorded more than 100 per cent yield increase over their respective greater parents. The greatest increase in yield of 252.4 per cent over the greater parent was recorded by the combination of 2435 x 2410 while the greatest absolute yield of 1.42 kg/plot was recorded by the combination 2418 x 2410.

Increased yields of the maize F_1 hybrids over their parents have been reported by several early workers such

as Tavcar (1937), Capinpin and Nakorthap (1939) in Lagtitan corn, Capinpin and Rollan (1939) in Cebu corn and Singleton (1941) in sweet corn. Brunson (1955) has discussed the superiority and usefulness of the pop corn hybrids. The results of the present investigation has amply brought out the superiority of the pop corn hybrids over their respective greater parents in almost all the combination tested for yield.

It may be noted from the table 1 that in general the combinations which exhibited a very high degree of heterosis for grain yield (over 100 per cent) showed considerable increase in the weight of grain per cob and number of seeds per row, while there was no increase in the number of rows in many of these hybrids, one combination even showing a significant reduction in the number of rows of kernels. All these combinations were earlier to their respective earlier silking parents. The above observations suggest that it is the number of seeds per row and the weight of seeds per cob, rather than the number of rows that determine the total grain yield and that earliness accompanies vigour in the hybrids.

REFERENCES

- BRUNSON, A. H. 1955. Pop Corn. *Corn and Corn Improvement*. Ed. G. F. Sprague Academic Press, New York. 423-40.
- CAPINPIN, J. M. and A. NAKORTHAP. 1939. The value of first generation hybrid seed of some regional strains of Lagtitan corn. *Philipp. agric.* 28: 271-85.
- CAPINPIN J. M. and A. O. Rollan. 1939. Hybrid vigour in the first generation crosses between strains of Cebu corn. *Philipp. agric.* 28: 491-503.
- SINGLETON, W. R. 1941. Hybrid and its utilization in sweet corn breeding. *Amer. Nat.* 75: 48-60.
- TAVCAR, A. 1937. Heterosis of the roots of young maize plants and the yield of the grain of the F1 generation. *Arhiv Minist. Poljoprivrede Beograd.* 4: 19.