

Chromosome segments involved with hybrid vigor in maize (*Zea mays* L.)

--Salerno, JC; Kandus, MV; Boggio Ronceros, RE; Almorza, D

It is known that hybrid vigor (heterosis) expression in maize depends on the heterozygous condition of a portion of the genome. A method for studying the relative contribution of different chromosome segments to hybrid vigor is through balanced lethal systems that permit a heterozygous quasi-permanent condition of some chromosome segments, while the rest of the genome becomes homozygous by continuous selfing. In this way, balanced lethal systems were isolated in two lines of maize, and were evaluated in a yield trial using the public lines B14, B73, MO17 and N28 (Table 1). A randomized block design was used, with three replications in a plot of two rows of 3.50 meters for 1.40 meters. Seventy thousand plants were planted per hectare. Through the years, these balanced inbred lines showed a high yield with the public lines, suggesting the usefulness of genetic load in the maize population in a natural way. After 5 generations of backcrosses of these balanced lethal systems to the public lines mentioned before, grain yield trials were conducted to study the evolution of grain yield in the inbred lines with respect to the same lines per se. The grain yield of the backcrosses was higher than the respective original lines (Table 2). The manipulation of these genetic factors where genes important for yield are in heterozygous segments can give rise to high grain yield in the inbred lines that produce hybrids.

Table 1. Grain yield in kg/ha of the two balanced lethal system lines of maize, with the public lines B14, B73, MO17 and N28 as a check.

Lines	Generations					
	1	2	3	4	5	6
BLS 14	3967 A	3313 A	3685 A	4017 A	3852 A	1135 A
BLS1	3747 A	3243 A	3579 A	3537 A	3245 A	2469 A
N28	2240 B	1709 C	2252 B	2675 B	1652 BC	473 B
B73	2060 B	853 D	1976 B	2573 B	1580 BC	722 B
MO17	2007 B	1503 C	1776 B	2566 B	1864 BC	242 D
B14	1860 B	811 D	1718 B	2506 B	2156 B	294 D

Means with the same letter are not significantly different at 5%.

Table 2. Grain yield in kg/ha of the public lines after 5 generations of backcross, with the introgression of the two balanced lethal system lines of maize.

Backcross 5	Per se	BLS1A	BLS14
B73	722	1536*	3570*
B14	294	1237*	2252*
N28	473	1025*	1831*
MO17	242	1971*	2505*