III. REPORTS FROM COOPERATORS

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1. Heterosis of the yield components in sister-line hybrids of lines related to B 14.

We studied the heterosis of the yield components of lines related to B 14 and their sister-line crosses. The rate of heterosis was expressed by "heterosis index," which is the ratio of the yield component in a sister line hybrid to the average yield components of both parents. A sample of 15-20 ears per entry was collected and those were evaluated individually.

The inbred lines related to B 14 studied were American A 632, A 635, A 636, donors: Mt 42 and Nd 203, France F 522, F 542, F 546, donors: Ic 201, F 47 and 11 Hungarian lines including H Mv 1327, H Mv 1329 and others, in which the donor was: O1 early dent Hungarian line. Yield components and yielding ability of these inbred lines as well as the recurrent parent and the donor are summarized in Table 1. Beside the yielding ability of B 14 relatives, it is remarkable that they are 11-20 days earlier than the original B 14.

Table 2 contains the heterosis index values of the diallel sister-line hybrids of A 632, A 635 and A 636 and the same 14-14 sister-line hybrids, produced by two tester lines: A 632 and A 636. From Table 2 it can be seen that the heterosis index values of 28 sister-line hybrids practically are the same or are better than the corresponding mean values of the diallel group, respectively. These data indicate that the parent lines of the 28 sister-lines and the diallel group are genetically close to each other. At the same time it can be stated that the sister line hybrid produced on A 632 and A 636 tester lines gave a 21.2% higher yield and was three days earlier (4.8%) than the hybrids of the diallel group.

Table 1. Yield components, yielding ability and earliness of inbred lines related to B 14

Lines	Ear length cm	Number of rows	Number of kernels per row	Kernel length mm	Thousand grain weight g	Shelling per-centage	Yield per plant g	Days to mid-tas-seling
A 632	14.9	15.4	22.8	7.3	263.9	80.9	73.5	86
A 635	12.1	13.2	17.0	6.0	226.1	80.1	43.4	86
A 636	14.8	13.2	22.0	4.0	256.9	76.4	69.1	87
F 522	18.8	18.2	33.4	5.5	229.6	82.5	127.5	82
F 542	18.4	12.3	22.5	4.5	304.9	77.3	78.7	87
F 546	16.7	13.0	23.3	4.0	298.8	71.8	59.4	83
H Mv 1327	14.7	14.3	29.7	7.8	264.3	87.5	96.9	81
H Mv 1327-2	14.3	15.1	29.8	7.0	221.6	86.3	87.6	81
H Mv 1329	13.8	15.8	26.3	6.5	212.7	87.1	75.9	80
H Mv 1329-4	11.6	12.7	24.8	7.6	218.6	89.3	62.9	78
H Mv 1331	15.0	15.8	25.6	8.0	230.0	81.0	71.7	78
H Mv 1331-1	14.2	14.6	25.0	6.0	189.7	85.5	73.4	78
H Mv 1331-2	12.4	18.0	24.4	7.0	177.8	84.6	73.1	72
H Mv 1331-3	14.0	16.3	30.9	7.5	159.5	83.2	69.5	74
H Mv 1331-4	14.5	15.1	19.3	5.5	210.2	81.4	65.1	74
H Mv 1331-5	14.8	17.6	28.3	6.0	222.6	83.4	94.7	73
H Mv 1331-6	15.7	17.0	31.8	6.0	197.8	82.2	70.5	73
B 14	15.9	14.8	23.4	7.1	234.6	70.8	76.1	92
O1	14.2	14.7	22.4	7.2	217.9	88.3	49.0	75
Mean	14.7	15.1	25.7	6.2	228.5	82.4	76.0	79.5

Table 2. Yield components, yielding ability and earliness of the sister-line hybrids produced from lines related to B 14

Sister-line hybrids	Ear length cm	Number of rows	Number of kernels per row	Kernel length mm	Thousand grain weight g	Shelling per-centage	Yield per plant g	Days to mid-tas-seling
A 632 x A 636	16.8	14.5	30.4	5.8	268.2	81.0	112.4	81.0
Heterosis index value	113.1	101.4	135.7	102.1	103.0	103.0	157.6	93.6
A 632 x A 635	18.4	15.9	33.6	6.5	258.2	84.4	131.5	81.0
Heterosis index value	136.3	111.2	168.8	97.7	105.4	104.8	225.0	94.2
A 635 x A 636	16.8	13.8	28.2	5.5	273.6	81.5	95.4	81.0
Heterosis index value	124.9	104.5	144.6	110.0	113.3	104.2	169.6	93.6
Mean	17.3	14.7	30.7	5.9	266.6	82.3	113.1	81.0
	124.8	105.7	149.7	103.2	107.2	104.0	184.0	93.8
A 632 x B 14 relatives (14)	18.4	16.4	34.6	8.0	275.8	85.4	147.3	79.0
Heterosis index value	123.9	106.1	140.4	118.2	120.4	104.1	194.5	96.3
A 636 x B 14 relatives (14)	17.0	16.0	33.6	6.2	263.3	83.0	127.0	77.0
Heterosis index value	118.5	112.3	138.4	120.6	109.6	103.0	172.9	94.1
Mean	17.7	16.2	34.1	7.1	269.5	84.2	137.1	78.0
	121.2	109.2	139.4	119.4	115.0	103.6	183.7	95.2
Ratio of the yield components in the percentage of the diallel group	102.3	110.2	111.1	120.3	101.1	102.3	121.2	96.2

With the presented A 632' and A 636' sister-line crosses, the following correlations were ascertained between the same yield component of B 14 relative line and its hybrid:

Number of kernels per row: $r = 0.9164^{+++}$

Kernel length: $r = 0.6427^{+++}$

Shelling percentage: $r = 0.6550^{+++}$

Thousand grain weight: $r = 0.6539^{+++}$

Ear length: $r = 0.5461^{++}$

Dry grain yield: NS, but significant at 10 per cent level

Row number: NS

+++ = Significant at 0.1 per cent level

++ = Significant at 1 per cent level

\+ = Significant at 5 per cent level

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1. Synaptonemal complex in teosinte.

A study on the chromosome fine structure of maize and teosinte was continued last year. Anthers of diploid Michrona teosinte (Mexico) were fixed in glutaraldehyde and post fixed with osmium tetroxide. Then they were dehydrated by following alcohol series and embedded in Epon. The sections were generally 1000 A° in thickness. Stainings were made with both uranyl acetate (0.5%) and Reynolds lead citrate. The determination of division stages of the anthers for electron microscopy was made by following the standard aceto-carmine squash techniques by which one of the three anthers in each floret was fixed in aceto-alcohol fixative.

Particular attention was paid to the fine structure of pachytene chromosomes. At this stage, the synaptonemal complex was consistently observed. Three elements of this complex, two lateral elements and a central element, were clearly shown. The lateral elements measured about