

Table 2

Items	D.F.	Variances			
		Flowering time	Plant height	Leaf width	Leaf length
a	7	1.2239 ^{n.s.}	6.1603**	1.5498 ^{n.s.}	2.7192 ^{n.s.}
b	28	0.5884 ^{n.s.}	1.0686 ^{n.s.}	2.8156*	1.9041 ^{n.s.}
b ₁	1	0.4243 ^{n.s.}	0.2893 ^{n.s.}	2.0015 ^{n.s.}	0.5303 ^{n.s.}
b ₂	7	1.1204 ^{n.s.}	0.7141 ^{n.s.}	4.0483**	3.2292 ^{n.s.}
b ₃	20	0.4104 ^{n.s.}	1.2316 ^{n.s.}	2.4250*	1.5089 ^{n.s.}
c	7	1.6970 ^{n.s.}	2.0857 ^{n.s.}	2.7827*	2.3927 ^{n.s.}
d	21	2.2624 ^{n.s.}	2.0390 ^{n.s.}	2.3734	2.4011 ^{n.s.}
Total	63				

n.s. = not significant; * = significant ($P < 0.05$); ** = highly significant ($P < 0.01$); \bar{a} = additive variance; \bar{b} = unfixable variance; \bar{b}_1 = mean dominance; \bar{b}_2 = dominance variation between parents; \bar{b}_3 = dominance not ascribable to \bar{b}_1 or \bar{b}_2 ; \bar{c} and \bar{d} = variances due to differences between reciprocal crosses.

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1. Establishment of knob stocks.

Relatively few maize stocks are available with known knob constitutions. The purpose of this study was to establish stocks with many different combinations of distinctive knobs. Knobs at fifteen positions located on chromosomes 1 through 9 were available from the following Mexican races of maize, listed with their source identifications: Zapalote Grande (Chis. 236) and Harinoso de Ocho (Sin. 7) from Dr. E. C. Johnson; Zapalote Chico (Zapl x³-1-1-1-1) and Wilbur's Flint from Dr. W. L. Brown. Abnormal chromosome 10 was found to be segregating in Zapalote Grande but was not transmitted to the F_1 's used in this study.

The Mexican races were crossed with Wilbur's Flint (knobless) and the F_1 's were backcrossed to the knobless stock. Sporocytes were taken from

Table 1
Knob constitutions of the backcross progeny

Source of Knobs and Plant Numbers	Knob Positions ⁺														
	1S	2S	2L	3L	4T	4L	5S	5L	6p	6d	7T	7L	8p	8d	9T
Zapalote Grande									X	*	-	-	X	*	X
R-1034-1	X	-	-	-	X	-	-	-	X	*	-	-	-	-	-
R-1034-3	-	-	X	-	X	X	X	X	X	*	-	X	X	*	X
R-1034-6	X	-	X	-	-	X	X	X	X	*	-	-	-	-	-
R-1034-7	-	-	-	-	X	-	-	X	X	*	-	-	-	-	-
R-1034-12	-	-	X	-	X	X	-	X	X	*	-	X	X	*	X
R-1034-14	X	-	-	-	X	X	-	X	-	-	-	X	-	-	X
R-1034-15	X	-	-	-	-	-	-	-	X	*	-	-	X	-	-
R-1034-21	-	-	X	-	X	-	-	X	-	-	-	X	-	-	X
R-1034-24	X	-	X	-	X	-	-	X	X	*	-	-	X	-	-
R-1034-26	-	-	-	-	X	X	X	X	X	*	-	X	-	-	-
R-1034-29	X	-	-	-	X	-	X	-	X	*	-	X	X	*	X
R-1034-33	-	-	-	-	X	-	X	X	X	*	-	-	-	-	-
R-1034-36	-	-	X	-	-	X	X	-	X	*	-	X	-	-	-
R-1034-37	X	-	-	-	-	X	-	X	-	-	-	-	-	-	X
R-1034-40	X	-	X	-	-	X	-	X	-	-	-	X	X	*	-
R-1034-44	-	-	-	-	X	X	-	X	-	-	-	X	-	-	-
R-1037-2	-	-	-	-	X	X	X	-	-	-	-	-	-	-	X
R-1037-3	-	-	X	-	X	X	-	X	-	-	-	-	X	X	*
R-1037-14	X	-	X	-	X	X	-	X	-	-	-	X	X	*	-
R-1037-20	-	X	-	-	-	-	-	-	-	-	-	X	X	-	X
R-1037-23	-	X	X	-	-	-	-	-	-	-	-	-	-	-	X
R-1037-24	-	-	-	-	X	X	X	X	X	X	-	-	-	-	X
R-1037-26	-	X	-	-	X	-	-	X	X	X	-	-	X	*	-
R-1037-31	X	-	X	-	-	X	-	-	-	-	-	X	-	-	X
R-1037-32	-	X	X	-	-	-	-	X	X	X	-	X	X	*	-
R-1037-37	-	X	-	-	-	-	-	X	X	X	-	X	X	*	-

+ S, L, T, p, and d denote the short arm, long arm, terminal end of the short arm, proximal, and distal, respectively.
x, -, and * denote the presence or absence of a knob or the presence of a prominent chromomere, respectively.

(continued)

Table 1 (continued)

Source of Knobs and Plant Numbers	Knob Positions											8d	8a	9T	
	1S	2S	2L	3L	4T	4L	5S**	5L	6p	6d	7T				7L
R-1037-42	x	-	-	-	-	-	x	x	x	x	-	-	x	*	-
R-1037-47	-	x	-	-	-	-	-	x	-	-	-	x	-	-	x
R-1037-49	-	-	x	-	x	x	x	x	x	x	-	-	-	-	x
R-1040-1	x	x	-	-	x	x	x	x	x	x	-	-	-	-	x
Zapalote Chico	-	-	x	x	x	-	-	-	x	x	-	-	*	*	-
R-1043-31	-	-	-	-	-	-	-	-	-	-	-	-	*	*	x
R-1044-8	-	-	x	x	x	-	x	-	-	-	-	-	*	*	-
R-1044-13	-	-	x	-	x	-	-	-	-	-	x	-	-	*	-
R-1044-15	-	-	x	-	-	-	x	-	-	-	x	x	-	-	-
R-1044-27	x	x	x	-	x	x	-	x	-	-	-	-	-	-	x
R-1044-32	x	-	x	x	x	x	-	x	-	-	-	-	-	*	x
R-1044-33	x	-	x	-	x	-	-	x	-	-	-	-	-	*	x
R-1046-20	-	-	x	-	x	-	x	x	-	-	-	-	-	*	x
R-1047-4	-	-	x	-	x	-	x	x	-	-	-	-	-	*	-
Harinoso de Ocho	x	-	x	x	-	x	-	-	*	x	-	-	x	*	-
R-1049-5	-	x	-	-	x	-	-	-	*	x	-	-	x	*	x
R-1049-6	-	-	x	-	-	x	-	-	-	-	-	-	-	-	x
R-1049-9	-	-	x	-	-	-	-	-	-	-	-	-	x	*	x
R-1049-10	-	-	-	x	-	-	-	-	*	-	-	-	x	*	-
R-1049-11	-	-	x	-	-	x	-	-	x	x	*	-	x	*	-
R-1049-16	-	-	-	-	-	-	-	-	x	-	-	-	x	*	x
R-1049-22	x	-	-	-	-	-	-	-	x	*	x	-	-	x	-
R-1049-25	-	-	x	-	-	-	-	-	-	-	-	-	-	x	*
R-1049-27	x	-	x	-	-	x	-	-	-	-	-	-	-	x	*
R-1049-28	x	-	x	-	-	-	-	-	-	-	-	-	-	x	*

tillers of the backcross progeny while the main stalk was selfed and backcrossed to the knobless stock again. Cytological determination of the knob constitution of 49 plants was made with aceto- or propiono-carminic smears. Table 1 lists which knobs were present in each of these plants. When only one knob was present on chromosome 5 in plants from crosses involving Zapalote Grande or Zapalote Chico, the placement of the knob in 5S or 5L may not be correct. When both knobs are present, it is apparent that the knob in 5S is not as close to the end of the chromosome as is the one in 5L.

Seed from self-pollinations and backcrosses to the knobless stock is available from the Department of Agronomy and Plant Genetics, University of Minnesota.

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