7x7 tests the restorer inbred line had at least five backcross generations.

The data indicate that although general performance is quite comparable between normal and restored versions, more than five or six backcross generations are needed for adequate conversion to the recurrent parent.

Details on fertility restoration of commercial hybrids under different environmental conditions will appear in later editions of M. G. C. N. L.

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1. Chromosome knob frequency distribution and frequencies of B-chromosomes in races of maize in Peru.

Progress has been made during the past year on these studies which are almost completed at this time. They will be reported in detail elsewhere.

Table 1 gives a summarized account of the studies on knob frequency distribution and ranges of B-chromosomes in the several races. Additional information is available on size, relative position, and on homo- or heterozygosity of knobs. These data represent an average of three plant samples of pollen mother cells, over a number of collections ranging from 2 to 17 per race.

Two distinct groups of coastal races are obtained on the basis of chromosome knob frequencies: those with high knob numbers, ranging from 4 to 14 knobs per 10 chromosome pairs, such as Alazán, Perla, Jora, Arizona, and Rienda, which can be shown to be either exotic introductions or introgressed with exotic fore-races, and those with low knob numbers: Chancayano, Huachano, Pagaladroga, Mochero, Chaparreño, Arequipeño, which are likely to be races, whose precursors descended from the Peruvian highlands.

The position of the knobs is primarily on chromosome 7, and secondarily in races with high knob numbers, on chromosomes 9, 8, 6, 4, 3, 2, 1, 5, in that order. Race Jora exhibits an extraordinary high frequency of abnormal-10 chromosomes.

The highland races are all low in knob numbers, ranging from 0 to 3 per ten chromosome pairs. Chromosome 7 had a small sub-terminal knob on its long arm in almost all of the plants of this group of races, that were studied. Some definitely lacked it. The second most common position was that of a small sub-terminal knob on the long arm of chromosome 6.

Consistent with previous reports, is the observation reported here that in races with high knob number the frequency of B-chromosomes tends to be low, while the reverse situation of high number per plant cell, and high frequency of B-chromosomes in races with low average knob number, is also true, regardless of geographical altitude distribution range.

The results of these studies suggest that high or low chromosome knob numbers in maize are not associated with respective low or high geographical altitude distributions, as is implied in previous reports. Races of the coastal region derived from highland races, and which have been prevented from

TABLE 1. Summary of data on frequencies of chromosome knobs and B-chromosomes of races of maize in Peru.

Race	Range in knob No.	Frequency of chromosomes with knobs (percent)										Range in No. of B chromosomes per 10 ps.
		1	2	3	4	5	6	7	8	9	10	
A. Coastal												
1. Alazán	9-14	57	35	57	57	43	64	64	35	64	0	0-1
2. Perla	6-13	35	50	45	60	25	75	80	65	80	5	0
3. Jora	4-10	20	60	60	60	0	60	100	100	80	40	0
4. Arizona	6-8	43	43	14	71	29	86	86	29	86	0	0
5. Rienda	6-?	25	25	25	50	25	50	50	50	75	0	0
6. Chancayano Bl.	1-3	0	0	0	0	0	50	50	50	50	0	0-4
7. Chancayano Pn.	1-2	0	0	0	50	0	0	100	0	0	0	0
8. Huachano	0-2	2	0	0	0	0	0	33	0	50	0	0-2
9. Pardo	0-2	0	0	0	0	22	0	89	0	0	0	0
10. Pagaladroga	0-1	0	0	0	0	0	0	67	0	0	0	0
11. Mochero	0-3	0	0	0	12	0	0	66	0	18	0	0-1
12. Chaparreño	0-2	0	0	0	0	0	0	67	0	0	0	0-2
13. Arequipeño	0-1	0	0	0	0	0	0	25	0	25	0	0-2
B. Highland (Sierra)												
14. Cuzco	0-2	0	0	29	0	0	0	43	0	0	0	0-1
15. Cuzc. Crist. Am.	-	0	0	0	0	0	0	50	0	50	0	-
16. Ancashino	0-3	0	0	0	0	0	22	77	0	0	0	0-4
17. Huayleño	1-2	0	0	0	0	0	14	72	0	0	0	0-2
18. Paro	0-1	0	0	0	0	0	0	57	0	0	0	0-3
19. Confite Puntiag.	0-2	0	0	0	25	0	8	50	8	8	0	0-2
20. Confite Morocho	1-2	0	0	0	0	0	50	100	0	0	0	0

TABLE 1. (Continued)

Race	Range in knob No.	Frequency of chromosomes with knobs (percent)										Range in No. of B chromosomes per 10 ps.
		1	2	3	4	5	6	7	8	9	10	
B. Highland (Sierra) (continued)												
21. Morocho	0-2	0	0	0	17	0	0	58	0	0	0	0-4
22. Chullpi	0-2	0	0	0	0	0	22	55	0	0	0	0
23. Kculli	1-2	0	0	0	13	0	13	87	0	0	0	0-5
24. Granada	1-2	0	0	0	0	0	13	87	0	0	0	0-2
25. Sarco	1	0	0	0	0	0	0	100	0	0	0	0
26. Shajatu	1-2	0	0	0	0	0	12	100	0	0	0	0-3
27. Rabo de Zorro	1-3	0	0	0	0	0	29	71	0	0	0	0-4
28. Marañón	0-2	0	0	22	0	0	0	55	0	0	0	0-2
C. Jungle												
29. Chuncho	5-11	33	33	33	33	0	44	55	44	22	0	0
30. Piricinco	0-2	0	14	0	29	0	0	71	14	14	0	0-2

outcrossing to high-knob lowland races by both human and natural selective mechanisms, have retained the characteristics of both low knob numbers and relatively high frequencies of B-chromosomes.

Piricinco, one of the most widely distributed races in the Amazonian basin, although showing considerable tripsacoid influence is low in knob number. This situation is easily explained if it is accepted that the tripsacoid influence in Piricinco originates with knobless Tripsacum australe, whose southern, northern, and eastern distribution ranges overlap those of Piricinco.

Chuncho, another jungle lowland race, but with high knob number, can be shown to have originated in an area where high knob numbers are prevalent among the regional races.

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1. Identification of independent isolations of cytoplasmic male sterility.

A number of independent isolations of cytoplasmic male sterility have been checked for similarity to $[\underline{ms_2}]$ -type male sterility.

The following symbolism is being used for discussing genetic work with cytoplasmic male sterility.

$[\underline{ms}]$ - Cytoplasmic male sterile factor

$[\underline{ms_1}]$ - T or Texas type

$[\underline{ms_2}]$ - S or U. S. D. A. type

$[\underline{ms_x}]$ - other type (A letter is used until it has been definitely shown to be different from other known types; i. e., at present, $[\underline{ms_1}]$ and $[\underline{ms_2}]$.)

$\underline{Rf}^1$ - restorer for $[\underline{ms_1}]$

$\underline{Rf}^2$ - restorer for $[\underline{ms_2}]$

A genotype includes the residual chromotype. The superscript to the residual chromotype designates the number of backcrosses to that chromotype since the last "outcross."

Missing symbols in a genotype infer "wild" or "normal" for that "gene" (plasmagene or chromogene).

The sources checked were:

$[\underline{ms_A}]$ - A yellow flint dent from Turkey.