

Peroxidase Px 8 is observed convincingly only in root tissues, although very low concentrations may occur in leafy tissues, and is often seen as two closely-paired isozymes. It shows high activity on eugenol and appears unrelated to other maize peroxidases. No genetic polymorphisms have been discerned in the limited materials studied.

Peroxidase Px 9, like Px 8, stains intensely in root extracts, although it is observed variably in the cob. It stains intensely on guaiacol, unlike most other peroxidases of maize. Genetic polymorphisms have not been observed.

Peroxidase Px 10 stains intensely in the coleoptile, mesocotyl, and ear, but is absent from leaf, silk, pollen, and other tissues. Two bands and a probable third have been observed in this region but have not yet succumbed to genetic analysis.

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2. Genetic marker stocks in tropical flint background.

Through the years, we have been introducing various genetic markers, especially those affecting the endosperm, into a vigorous tropically-adapted stock to facilitate our breeding and academic studies (Brewbaker, M.N.L. 42:37-8). Despite the vigor and generally wide adaptability of stocks maintained by the Maize Cooperative, they lack resistance to several major tropical pests, and often require rather careful handling in the tropics.

The line chosen for these conversions was CM104, an inbred recognized to have high combining ability from the Coordinated Maize Improvement Scheme of India. CM104 was derived largely by sibbing from the Colombian yellow flint variety, Amarillo Theobromina, pedigree A THEO 21 (B)-6#-15-7#. It has been converted in Hawaii to Mv (resistance to maize mosaic virus I or "corn stripe"), and most marker stocks now carry this resistance. Conversions to Rp₁ (P. sorghi resistance) and Ht₁ (H. turcicum resistance) are nearing completion, and will be used for future backcrosses.

A brief description of CM104 follows:

Seeds: Hard yellow flint, C^I r pr and P^{WR} (red cob, colorless pericarp); high weevil resistance.

Plant: 60 + 70 days (winter) to silk, i.e., mid-late in tropics; 15 leaves, 5.5 feet tall with high ear at 3 feet (leaf 10); internodes above ear dwarfed to 5 cm.; highly resistant to stalk diseases, borers, and many leaf diseases; large tassel; green plant with purple anthers, glumes and brace roots, evidently A b Pl . Tillers rare.

Ear: 5" long, 14 rows, with tight husks and high earworm resistance; high ear and seed rot resistance.

The following is a list of available marker stocks. As noted, many stocks are kept as segregating lines. Few conversions have been carried past BC_4 , as vigor has been favored over a high degree of inbreeding or homogeneity in the material. All lines are grown at least twice a year in our breeding nurseries; therefore, alternative stocks, multiple marker crosses, etc., are also available.

Mutant Gene(s)	Description	Map Position	Best Current Seedstock
ACR	Red aleurone	--	71-1019 ₁ x CMMR (segr C^I)
ACRPr	Purple aleurone	--	71-951S (segr C^I)
ABPl CRPr	Purple plant, aleurone	--	71-949x-1014 (segr)
a_1 ; Dt_1	anthocyaninless	3:111	70-674#
ad_1	adherent tassel	1:(108)	71-126# (3:1)
ae wx	amylose extender-waxy	--	71-960#
B ; AP1	Booster	2:49	71-1014 x CM (1:1)
ba_1	barrenstalk-1	3:72	71-990# (3:1)
ba_2	barrenstalk-2	2:--	71-991# (3:1)
Bf_1	blue-fluorescent	9:134	71-1026 x CM (1:1)
bk_2	brittlestalk-2	9:79	71-979# (3:1)
bm_2	brown midrib-2	1:161	71-968 bm #
br_1 ; f_1 su_1	brachytic-1	1:81	71-133#
br_2	brachytic-2	--	71-964#
bt_1	brittle endosperm-1	5:22	71-963#
bt_2	brittle endosperm-2	4:71+	71-969#bt

Mutant Gene(s)	Description	Map Position	Best Current Seedstock
Ccms Rf/rf	C cytosterility	--	71-1046 x CM
Ch	Chocolate pericarp	2:155	71-1045Ch x CM
Cg	Corngrass	3:31	71-8670P (segr)
Cg; Rp ₁ ^d	"	3:31	71-837x-881 (1:1)
cr ₁	crinkly leaf	3:0	71-141# (3:1)
d ₁	dwarf-1	3:18	71-972# (3:1)
d ₁ ^{tn}	dwarf-tiny	3:18	70-676x-678 (3:1)
D ₈	Dwarf-8	1:--	71-208 x CM
du	dull endosperm	10:33	71-967#du
f ₁	fine stripe	1:86	71-959f ₁ #
fl ₁	floury-1 endosperm	2:68	71-1041 x CM (+/f1)
fl ₁ ; y	"	2:68	71-978#
fl ₂	floury-2 endosperm	4:63	71-1027 x CM (1:1)
el	elongate	--	71-987S el/el
et	etched endosperm	3:122	70-656#et
gl ₁	glossy-1	7:36	71-998# (3:1)
gt	grassy tiller	--	71-965# (3:1)
h	soft starch	--	71-968#h
Ht ₁	Resis. to <u>H. turcicum</u>	2:121	71-837xCM
j ₁	japonica	8:21	71-140# (3:1)
Kn	Knotted	1:127	69-746# (segr)
lg ₁	liguleless-1	2:11	70-642lg#
lg ₂	liguleless-2	3:83	71-139# (3:1)
Lg ₃	Liguleless-3	3:(46)	71-1039 x CM (1:1)
lw ₁	lemon white	1:(128)	71-1023S
mn	miniature seed	2:--	71-950S
ms ₈	male-sterile-8	8:14	71-977# (3:1)
ms-si	male sterile-silky	6:(19)	71-127# (3:1)
Mv	resis. to Maize Mosaic Virus I	--	CM-MR2 (1:1)
na ₁	nana-1	3:(86)	71-992# (3:1)
na ₂	nana-2	--	71-982# (3:1)

Mutant Gene(s)	Description	Map Position	Best Current Seedstock
o_1	opaque-1	4:--	71-954#o
o_2	opaque-2	7:16	71-958#o, 70-621#o
$o_2; y$	"	7:16	71-660#
$o_2; r_2 v_5$	"	7:16	71-961#o
p^{mo}	mosaic pericarp	1:26	71-994P ^{mo} #
p^{rr}	red pericarp	"	71-1040P ^{rr} xCM (1:1)
p^{vv}	variegated pericarp	"	70-723P ^{vv} x CM (1:1)
$pl; A, b$	plant color	6:48	71-973#Abpl
Px_3^4	Peroxidase-3	--	71-1331-12 x CM
Px_3^5	"	--	71-1293 X 71-847-5
py	pigmy	6:68	71-989# (3:1)
$r^g; su$	colorless	10:57	71-953S
R^{nj}	Navajo aleurone	10:57	71-952S (segr)
$ra_1; v_5 o_2$	ramosa-1	7:32	71-961#
ra_2	ramosa-2	3:26	71-997# (3:1)
ra_3	ramosa-3	4:--	71-998# (3:1)
Rp_1^d	Resis. to <u>Puccinia sorghi</u>	10:0	71-1780 x CM
$sh_1; ACR$	shrunken endosperm	9:29	71-983#sh
sh_2	shrunken-2	3:111.2	71-967#
$Tcms Rf$	T cytoplasmic male sterility	--	71-1036TmsRf x CM
$ts_2; bm_2$	tassel seed-2	1:24	71-119# (3:1)
ts_4	tassel seed-4	3:55	71-974# (3:1)
Ts_5	Tassel seed-5	4:56	71-1020 x CM (1:1)
vp_5	viviparous	5:18	71-145# (segr)
wi	wilted	6:--	71-984# (3:1)
$wx; y$	waxy endosperm	9:59	71-975# y wx
y_1	yellow/white endosperm	6:17	71-1052 x CM (= +/y)
$y_1; fl_1$	"	6:17	71-978#yfl
zn	zebra necrotic	10:35	71-995# (3:1)

Genotype Unknown (Origin in parenthesis):

Hairy sheath (Mexican composites)	71-1035 x CM (segreg)
Hoya arrugada, rugose leaf (Chalqueno)	71-971# (segreg)
Low ear position (Oh 43)	71-966# (segreg)
Normal internode elongation above ear	71-873 P x CM (segreg)
Square stalk (Roque 47 Y#, R/F Mexico)	71-1000S (segreg)
Zebra leaf	71-955# (segreg)

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1. ACR genotype of Illini Xtra-Sweet and Early Xtra-Sweet hybrids.

Most corn varieties are of the genotype of $\underline{A_1A_2cr}$, with some varieties $\underline{A_1A_2Cr}$.

In 1970 an F_1 cross of $\underline{a_1A_2CRy_1}$ x $\underline{A_1A_2CRy_1}$ was planted to produce ears which would express the phenotypic ratio of 3 purple to 1 white. This cross was planted adjacent to the Illini Xtra-Sweet variety expecting the timing and the wind would favor a minimum of contamination. Both the silking and the wind were such that pollination of some $\underline{A_1a_1y_1y_1}$ silks with Illini Xtra-Sweet pollen occurred.

It was anticipated there would be an excess of purple kernels in the cases of cross pollination. The sibbed ears were expected to express a 3 purple to 1 white seed color ratio. At harvest it was promptly noted many ears appeared to have both white and yellow seeds, as well as, the purple kernels. Some ears on the $\underline{A_1a_1}$ rows immediately adjacent to the Illini Xtra-Sweet had only yellow and purple kernels, which appeared to be segregating on a 1:1 basis.

Dr. Earl Patterson, University of Illinois, called it to our attention that $\underline{a_1}$ and $\underline{sh_2}$ are closely linked on chromosome 3. In the conversion of stocks from $\underline{su_1}$ to $\underline{sh_2}$, $\underline{a_1sh_2}$ stocks must have been used in the conversion program with the $\underline{a_1sh_2}$ linkage not being broken.

Subsequently in 1971, $\underline{A_1a_1y_1y_1}$ stocks were crossed, by hand pollination, by both Illini Xtra-Sweet and Early Xtra-Sweet. At harvest it