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2. ## Variegation associated with controlling element systems in tribal maize from Colombia.

The appearance of color variegated kernels in accessions of maize conjures up visions of r-mottling, B-B-F, and controlling element systems. Such variegation appeared in an accession of maize grown by the Cuna Indians from the remote village of Unguia in the western part of Colombia, S.A. Some preliminary findings will be reported on crosses with this Colombia line.

Hypothesis for r-allele-factor interaction: For purposes of adapting these lines to North American conditions, plants arising from variegated kernels were crossed to an early maturing A_1 et/A_1 et stock. The F_1 was pollinated by all the color testers (rr; cc; a_1a_1; a_2a_2). Plants resulting from the series of crosses to the r tester were subsequently backcrossed to r/r; five ear cultures were obtained and the kernels classified as variegated and non-variegated (Table 1). The non-variegated kernels contained both colorless and a subclass designated incomplete color.

It is hypothesized that variegation is dependent on a factor (temporarily designated, F-co*) segregating independently of the r locus, which acts on the Colombia line r allele that has been designated r-co. In the absence of the factor the r-co allele gives rise to the incomplete color subclass previously alluded to. This subclass contains kernels ranging from very faintly colored to possibly completely colorless.

A x^2 test was done for each of the crosses to test the hypothesis of the r-co, F-co interaction. None of the x^2 values was significant at the 0.05 level of probability. Since the x^2 test for heterogeneity was not significant, the data were pooled over all crosses and a non-significant x^2 value of 0.007 was obtained.

r-co + F-co = variegation r-co + f-co = colorless

Table 2

Number of kernels of each of five phenotypic classes arising from the cross:

$$\underline{Dt}, \quad \frac{a_1^{m(r)} \quad \underline{Sh}_2}{a_1^{dt} \quad \underline{sh}_2} \quad \times \quad \frac{a_1^{m(r)} \quad \underline{Sh}_2}{a_1^{m-1} \quad \underline{sh}_2}$$

Phenotype - - - - Sectored - - - - - Pale

Cross	round ($\underline{Sh}_2$)			shrunken ($\underline{sh}_2$)	Total	x^2 **
	Pale	Colorless	Dotted	Pale*		
3 0341-1x115	97	146	61	130	434	6.82 ns
3 0341-2x527	87	148	42	81	358	2.38 ns
3 0341-3x704	120	195	61	146	522	2.09 ns
3 0341-4x531	104	120	51	89	364	2.70 ns
3 0336-1x702	114	170	45	105	434	2.01 ns

* In this category are also included shrunken kernels with dots in a pale background.

** A x^2 test for each cross was made on the hypothesis that there was one $\underline{Dt}$ segregating independently of the $\underline{A}_1$ locus and effecting the sectoring on the a_1^{dt} allele.

Table 1

Aleurone color segregation in crosses of $(\frac{r-co}{r})$, $\underline{F}$-co* x $\underline{r}$ $\underline{r}$.

(The $\underline{r}$ $\underline{r}$ tester was $\underline{wxwx}$).

Cross	Non-variegated	Variegated	Total	X^2
3 0334-1 x 808	350	107	457	0.61 ns
3 0334-2 x 515	278	105	383	1.19 ns
3 0334-3 x 516	282	78	360	2.13 ns
3 0334-4 x 511	204	80	284	1.52 ns
3 0334-5 x 921	277	93	370	0.00 ns

Test for relation to the En system: In another series of crosses, variegated kernels of the Colombia line were crossed to $a_1^{m(r)}/a_1^{m-1}$ $\underline{sh}_2$, an $\underline{En}$ tester stock (Peterson, 1965, Amer. Nat. $\underline{99}$:391). The resulting F_1 was testcrossed by a_1^{dt} $\underline{sh}_2/a_1^{dt}$ $\underline{sh}_2$ (a_1^{dt}, an allele that responds to $\underline{Dt}$ producing colored dots on a colorless background; $\underline{sh}_2$ is a recessive allele conditioning shrunken endosperm and is very closely linked to the $\underline{A}_1$ locus). Kernels with colored spots or sectors were obtained and the resulting plants were backcrossed to $a_1^{m(r)}/a_1^{m-1}$ $\underline{sh}_2$; the kernels on each of five ears obtained from the above cross were counted and grouped according to their phenotypic appearance (Table 2).

None of the X^2 values was significant at the .05 level of probability. Since the heterogeneity X^2 (14.61) was not significant, the data were pooled over all crosses and a non-significant X^2 value of 1.34 was obtained.

Tests to determine whether $\underline{F}$-co is a $\underline{Dt}$ allele are presently in progress.

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3. T-cytoplasm mitochondrial membrane activities.

In view of the striking effect reported by Miller and Koeppe (1971) of Helminthosporium maydis race T toxin in causing the immediate uncoupling of oxidative phosphorylation and irreversible swelling in KCl