

THE DEFIANCE COLLEGE
Defiance, Ohio

1. Selection for different states of the R gene in pollen.

In Vol. 38 of MGCNL we reported the results of selecting the lightest and darkest aleurone phenotypes among kernels of selfed ears. Such kernels had three doses of \underline{R} which had undergone paramutation with \underline{R}^{Sc} for six generations. Plants from the lightest and darkest seed selections, when selfed, gave similar ear-mean pigment scores in the following generation.

In 1964 light and dark seed selections were made from testcross ears where paramutated \underline{R} , introduced through pollen, was present in one dose. Testcrosses in 1965 show that those seeds which showed least pigment produced plants which still showed the least pigment in 1965 testcrosses. In Table 1 no overlap is found when comparing ear means of testcrosses from plants of lightest and darkest seed selections. It may be concluded that in testcrosses where paramutated \underline{R} is introduced through the male, all kernel to kernel pigment differences may represent genetically different states of the \underline{R} gene.

Table 1
1965 pigment scores showing persistence of light and dark phenotypes in testcrosses of plants grown from seeds selected from two different testcross ears of plants grown in 1964.

Dark Selections	Light Selections	Dark Selections	Light Selections
20.08	13.56	18.58	12.50
20.12	14.80	15.60	9.66
18.80	16.78	20.84	15.50
18.38	11.60	17.68	9.40
18.24	9.38	19.92	8.38
pooled \bar{X} 19.12	13.22	18.52	11.09

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2. Genetic differences for R expression from tassels of a single plant.

In Vol. 39 of MGCNL polarized sectors were reported for \underline{R} pigmentation. In corn grass background in \underline{RR}^{Sc} heterozygotes, variation in paramutated \underline{R} expression could be correlated with the day that pollen was collected from a single tassel.

Earliest collections which came from the upper part of the tassel tended to give the lightest pigment values. Seeds whose pigment had been scored in 1964 were grown out in 1965 to see if the differences in pigment scores persisted in the testcrosses of the following generation. Table 2 shows that the differences observed in 1964 are carried over into the results of 1965. It can be concluded that the pigment differences noted in different pollen samples represent different states of R pigmentation which can be carried over from one generation to another through the male gamete. Such pollen samples represent genetically distinct sectors in a tassel (or between tassels of a single plant) where the R gene is "more or less turned on". What is remarkable is that the partial "on-or-off" state can be transmitted so faithfully, that is, the darkest seeds still retain the dark phenotype in the following generation even though considerable reversion has taken place in paramutated R.

Table 2
Comparison of testcross scores of kernels in 1964 and progeny from these kernels in testcrosses of 1965.

Year	Testcross Pigment Scores			Pollen Source in 1964
*1964	6.28	8.90	11.06	Same plant, different tassels, same day
1965 pooled \bar{X} (4 plants ea.)	13.38	17.16	18.88	
1964	6.14	13.80		Same plant, different tassels, different days
1965 pooled \bar{X} (5 plants ea.)	14.62	19.07		
1964	3.34	5.28		Same tassel, different collections (5 days apart)
1965 pooled \bar{X} (6 plants ea.)	4.77	10.08		
1964	6.58	6.94		Same plant, different tassels, same day
1965 pooled \bar{X} (6 plants ea.)	6.13	6.55		

*scored seed source for plants grown in 1965

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