

## 5. An indication of genic interaction in maize.

In the local hybrid maize breeding program an effort was made to test all possible crosses of the elite white lines. As these single crosses were tested over a period of four years, each trial contained approximately 30% duplications from other seasons in order to standardize the results.

This method gives rise to some inaccuracy due to gene-environment interaction, but, as the main purpose was a preliminary screening of possible double hybrids, it was felt that the method would be adequate for our needs.

Two complete diallels were compiled from the available data: (1) a 19 x 19 diallel consisting only of lines derived from the variety Pretoria Potchefstroom Pearl and (2) a 23 x 23 diallel containing the above lines together with lines from other sources.

The expected yields of the single crosses according to an additive scheme were calculated as  $1/2$ (average of all the single crosses + the sum of the average effects of the two parents).

If the genic effects are predominantly additive, the distribution of the deviations from the expected yields should not differ significantly from a normal curve. As the deviation from a normal distribution was significant in both cases, P being between .02 and .05 in the first case and smaller than .01 in the second case, it would seem that genic interaction (either intra- or inter-allelic or both) is important in breeding for yield in maize.

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## 1. Experiments utilizing radiation in a paramutation program.

A series of experiments have been started to investigate the pre-paramutant and postparamutant effects of radiation. Alterations of the ( $R^r$ ) paramutant types and the ( $R^{st}$ ,  $R^{mb}$ ) types that induce paramutation are being studied. The induction of mutations of  $R^{st}$  by gamma and neutron irradiation is also being done and the spectrum of alterations of paramutability will be determined.

A collection of South American races which have variegated aleurones has been made for inclusion in a paramutation program being initiated. The original seeds have been classified for the type of pattern they exhibited using the stippled ( $R^{st}$ ) and mottled ( $R^{mb}$ ) types as the code. The following races included seeds of one or both patterns:

Collection	Race	Marbled type (Rmb)	Stippled type (Rst)
Bolivia 491	Altiplano	X	-
Bolivia 663	Altiplano	-	X
Bolivia 905	Altiplano	X	-
Bolivia 591	Huilcaparu	X	X
Bolivia 771	Huilcaparu	X	X
Bolivia 768	Huilcaparu	-	X
Bolivia 876	Huilcaparu	-	X
Bolivia 623	Huilcaparu Moteado	X	X
Bolivia 666	Huilcaparu Moteado	X	X
Bolivia 718	Paru	X	-
Bolivia 724	Paru	X	-
Bolivia 308	Checchi	-	X
Bolivia 320	Checchi	-	X
Bolivia 532	Checchi	X	X
Bolivia 715	Checchi	X	X
Bolivia 833	Checchi	-	X
Bolivia 840	Checchi	-	X
Bolivia 928	Checchi	X	X
Bolivia 454	Cuzco Boliviano	-	X
Bolivia 596	-	X	X
Bolivia 617	-	X	X
Bolivia 621	-	-	X
Bolivia 643	-	X	X
Bolivia 646	-	X	X
Bolivia 648	-	X	X
Bolivia 706	-	X	-
Bolivia 723	-	X	X
Bolivia 733	-	X	-
Bolivia 753	-	-	X
Bolivia 766	-	-	X
Bolivia 967	-	X	X
Chile 434	Capio Grande	-	X
Chile 443	Capio Grande	X	-
Chile 432	-	-	X
Peru 683	-	-	X
Peru 1085	-	-	X
Peru 1094	-	X	X

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