

The results show a clear association between ear-row number and semi-sterility when the T1-3i reciprocal translocation is employed, which was not the case for the other reciprocal translocations. Since chromosome 1 was employed in every case it would appear that the genes for ear-row number are concentrated mainly in Chromosome 3.

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1. Radiation induced modification of paramutation expression.

Experiments were designed to determine whether the paramutation inducing process has a radiosensitivity similar to gene mutational events. The source inducing the paramutation change (\underline{R}^{st} and \underline{R}^{mb}) and the site of action (\underline{R}^r) were each tested.

The experimental procedure was similar for all groups. Tassels were cut one day after they began to shed pollen and placed in flasks. They received 2000r from the gamma source and were then bagged for use the following day. The tassels were used to make individual crosses onto the appropriate tester (i.e. \underline{R}^r for \underline{R}^{st} tassel etc.). The hybrids were then crossed to $\underline{r}^g \underline{r}^g$ stock, using the $\underline{r}^g \underline{r}^g$ as female.

When the site for paramutation change was irradiated before crossing to \underline{R}^{st} or \underline{R}^{mb} , approximately 10% of the time (10 out of 107 ears) there is no apparent paramutation, (i.e. the testcross ears were 50% dark purple). In addition there is evidence that there is some alteration of the usual paramutation interaction in 15-20% of the rest of the ears. They appear to have either a reduced paramutational change or are segregating for paramutation alteration on the ear. Each ear traces back to a single irradiated pollen grain. Further tests are being conducted to determine more precisely which event has happened.

When the \underline{R}^{st} stock was irradiated prior to crossing to \underline{R}^r and then testcrossed, 64% of the time there was no apparent effect. There were no ears that were 50% dark purple (i.e. no paramutation). However 23% of the ears had light spotted and dark spotted seed predominantly with very few yellow and some dark purple kernels. There was a definite effect on the paramutation interaction but probably no instance of complete inactivation. The remainder of the ears are in a suspect category with light spotted predominant and some dark mottled or full purple seed, but very few yellow. The ears appear to be significantly different from the majority class which had predominantly light spotted and full yellow seeds.

The final group involved irradiation of the R^{mb} with subsequent testcrossing identical to R^{st} . Here there was 5% apparently complete inactivation of the paramutation interaction (i.e. ears were 50% dark purple). A reduced paramutation effect is more difficult to detect in the marbled induced change as the variability is greater. There was no effect on the paramutation interaction or perhaps some with reduced effect in 84% of the ears. The other 9% of the ears have what appears to be an increased paramutation expression. The seeds are predominantly yellow and light spotted with no very dark mottled and no full purple seed on the ears. The altered R^r seed appear very similar to the R^r from a R^{st} induced paramutation change. This would indicate that the R^{mb} source has some mechanism which inhibits full induction of the paramutation alteration.

These results indicate that paramutation has a radiosensitivity much greater than can be attributed to gene mutation changes. The effects seem more in line with an inactivation process. Further tests are being conducted to obtain additional information of the effects of radiation on paramutation.

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2. Survey of some South American races with variegated aleurones for paramutation induction ability.

From the collection of 37 races with marbled and/or stippled like aleurones successful evaluation for paramutation like induction ability was completed for 17 and partially completed for 6 others. The results are as follows:

Collection	Race	Marbled type	Stippled type	Paramutation Induction
Bolivia 596	-	X	X	yes
Bolivia 648	-	X	X	yes
Bolivia 648	-	X	-	yes
Bolivia 706	-	X	-	yes
Bolivia 733	-	X	X	yes
Bolivia 753	-	X	X	yes
Bolivia 646	-	-	X	yes
Bolivia 876	Huilcaparu	-	X	yes
Bolivia 320	Checchi	-	X	yes
Bolivia 833	Checchi	-	X	yes
Bolivia 967	-	X	X	yes
Peru 683	-	-	X	yes
Peru 1085	-	-	X	yes?
Bolivia 617	-	X	X	yes?
Bolivia 771	Huilcaparu	X	X	yes?