

a tassel for 48 hours in the mutagen solution, which was replaced periodically (6 hours interval), and collecting pollen from these tassels for pollination. For pollen treatment mineral oil was used for suspension of the chemicals. Concentrations and mutation frequencies are presented in Table 1 (see preceding page). NG appears to be the best treatment in these studies.

J.K.S. Sachan and K.R. Sarkar

Interesting chlorophyll mutants — In the course of our mutagenesis studies, we came across two interesting chlorophyll mutants. The first one was luteus type, having fine green spots on shining lemon yellow leaves. It originated from 15 Kr gamma ray seed treatment. The spots were sharp and present in all leaves, and the mutants survived up to the 4 to 5 leaf stage only. Number of green spots per leaf varied from 5 to 15. The mutant segregated in a 3:1 ratio in M₂ (116 normal:34 mutant seedlings) and was maintained in heterozygous condition. In M₃ and M₄ families this mutant also appeared, but in addition to the spotted-luteus (1*-sp) types, luteus (no spots) and albino seedlings were also obtained. This may be a case of an unstable gene under the influence of controlling elements. In an attempt to locate this mutant, crosses with waxy translocation lines were made. Linkage indications with Wx were obtained in crosses involving T4-9g, T5-9a and T6-9 4505.

We called the second mutant "yellow virescent," as it differed from yellow-green and virescent. In M₂, it was very weak with narrow leaves, unbranched tassels and no silk. There was 50% mortality before flowering, but the appearance and performance improved in M₃ and M₄. This mutant was crossed with the waxy translocation series and linkage data showed significance in crosses with T4-9c, T4-9b and T9-10b.

J.K.S. Sachan and K.R. Sarkar

Pollen grain diameter in maize — Studies on the pollen grain size in a number of inbred lines of maize revealed some interesting findings. Fully mature anthers which would shed pollen in an hour's time were collected from the main axis of the tassel on the second day of pollen shedding and preserved in 70% alcohol. Pollen samples from ten anthers from a tassel were stained in acetocarmine, and 25 random grains were measured. Thus, means of 50 observations from two plants constituted the pollen grain size of each inbred. Mean pollen diameter in two separate sets of inbreds, the first set comprising 41 lines grown in the summer at Delhi and the second set of 73 inbreds grown in the winter at Hyderabad, showed wide and significant line-to-line differences. Pollen diameter in these lines ranged from 81.9 to 114.1 micra. The frequency distribution was quite normal.

There was no significant difference in pollen size measurements of fresh pollen and pollen from anthers stored in 70% alcohol for 3 months and measured at fortnightly intervals. Plant-to-plant differences within the same inbred were not significant. There was no statistically significant difference in pollen size for samples collected from the same plant on subsequent days of shedding or from different branches of the same tassel. These results contradict an earlier report on pollen size in maize (Banerjee and Barghoorn, MNL 45:244-45). However, the influence of environmental factors on pollen size was confirmed in a study where 8 inbreds were grown in two locations and for two years in each location. Analysis of variance of the data showed that variations due to lines and years were significant at the 1% level and those due to location were significant at the 5% level. These suggest that pollen size in maize is controlled by both genotype and environment.

Crosses between large and small pollen inbreds were studied in F_1 and F_2 . Within-plant variability in both generations was not significant, whereas plant-to-plant variability for pollen diameter was significant in F_2 but not in F_1 . These results would suggest that the pollen grain size is determined by the genotype of the mother plant (sporophytic control) and not by the gene content of the haploid pollen nuclei (gametophytic control). Pollen size of the F_1 plants was not always intermediate between the two parents, but F_2 plants in general had smaller pollen diameter than in F_1 . F_1 's between small and large pollen parents, when backcrossed to small and large pollen parents, produced progeny with, respectively, smaller pollen and larger pollen than the F_1 plants.

D. Kumar and K.R. Sarkar

Inheritance of pollen grain size in maize — Two sets of diallel crosses were made from the two groups of inbred lines mentioned in the preceding report. The first set of 8x8 diallel included the inbred parents and the F_1 's, grown in two locations with two replications. The second set of 9x9 diallel included parents, F_1 crosses and reciprocals, grown in only one location with two replications. Five random plants from each plot and 50 measurements for pollen size from each plant were taken for each entry.

Analysis of variance for general and specific combining ability indicated highly significant differences among the parents for both general and specific combining ability effects for both the locations in the 1st diallel. Similar results were obtained in the 2nd diallel. The analysis for the 2nd diallel is summarized in Table 1.