

(3) There may be differential contraction of the arms. (4) Significant distortions occur in the cells with advanced prophase stages including apparent extrusion of material from the chromosomes and disturbance at the site of centromeres.

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1. Aging of pollen and gametic selection in Zea mays, L.

Competition of pollen tube growth is provided by the use of pollen mixtures consisting of equal components from yellow and white sources (M.G.C.N.L. 1958, 1959, 1960). Since the maternal parent is white seeded, as a result of xenia, the ratio of yellow to white seed resulting from the pollination with such mixtures would give an indication which of either Y or y pollen was the most successful in fertilization. In this investigation the effect of aging of pollen mixtures on the relative percentage of yellow and white seed produced was studied. The pollen mixtures used were sufficient to make 20 or more pollinations. The first pollinations were made within an hour of the shedding of the pollen, the balance was then stored for 24 hours in glassine paper bags at room temperature and then the second series of pollinations made. The third series of pollinations followed after 48 hours storage. A perfect set of seed resulted from the first pollination, and although surplus pollen was used, the set of seed after the second pollination was 12% - 30%, whereas after the third pollination only about 30 seeds were produced per ear. This would indicate a high mortality of pollen in the second and third pollinations.

Table 1. Percentage yellow seed on pollinated ears.

Pollen mixture	Immediate pollination	After 24 hours	After 48 hours
1	53	26	16
2	66	32	8
3	57	30	12
4	49	27	9
5	60	27	5
6	78	5	6
7	20	19	2
8	56	3	3
9	79	3	3

Referring to the table, numbers 1 to 5 were pollen mixtures made up from yellow and white single crosses. Numbers 6 to 9 were pollen mixtures made up from yellow and white inbreds. The maternal parent used was a white single cross producing large ears. The tabulated results represent the average percentage of yellow seed produced on the pollinated ears at each period. It is apparent that there is a fair and consistent agreement in the decline of the percentage yellow seed produced by the pollen mixtures with continued aging. It appears that the decline is more marked in the case of pollen mixtures consisting of inbreds (no's. 6-9). The greater decline of the longevity of yellow compared with white pollen must be mainly due to the action of the Y gene. This is confirmed by the fact that the different pollen mixtures must have differed widely with respect to their genic backgrounds. Since, in addition, a reduction in the seed set after 24 hours was observed, other genes must also be involved in this phenomenon. In many maize breeding programs the tassels are bagged a day previous to pollination, and if pollination should start the following day before the shedding of pollen has started actively, it would be expected that gametic selection resulting from the aging of pollen must be of importance. Whether the surviving gametes are also superior with respect to other qualities, only further tests will show.

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2. The effect of silk length on pollen tube competition in Zea mays, L.

In this study pollen mixtures as described previously (M.G.C.N.L. 1958, 1959, 1960) were used. The pollen used in the mixtures was obtained from yellow and white inbreds in order to reduce the genic variability within each component to a minimum. The maternal ears were from a white single cross. Fifty percent of the ears were pollinated according to the usual procedure, but the rest of the ears were cut back through the ear sheath until the tip of the small undeveloped ear was exposed; pollination was then done. The silks of the "normal" and "cut back" ears differed, after the operation, by approximately 6 to 9 inches in length. Hence, in the case of the former the pollen tubes had to cover a much longer distance to affect fertilization than in the latter. The pollen mixtures provided sufficient pollen to make 10 to 20 pollinations. Of the 16 pollen mixtures studied, 8 showed a significant increase of white seed produced on "cut back" ears compared with "normal" ears. In 6 cases, there was no significant difference between the two treatments. It is apparent that in a considerable number of cases the length of the silks may be of significance in pollen tube competition.

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