

Seedlings of twenty inbred lines were examined qualitatively for the presence of the cyclic hydroxamate or its 2-glucoside; all were found to contain it. Selections by Dr. George Gorsline of an open pollinated synthetic, Gehn Yellow Dent, were inbred in 1959 and 1960 at Pennsylvania State University. One 1959 ear was found to be segregating (208 + to 59 -) for presence and absence (a trace present if pooled seedlings were extracted) of the cyclic hydroxamate. The open pollinated variety contained the cyclic hydroxamate (36+). One ear of the segregating 1959 population was selfed in 1960 and two ears were selected. One was all minus (33-) while the other ear was segregating (37+ to 8-).

R. H. Hamilton

2. Genetic iron-deficiency chlorosis in maize.

A. The yellow-stripe phenotype displayed by ys_3/ys_3 plants (MNL 35:111) is another iron-deficiency chlorosis. Plants of genotype ys_3/ys_3 have been grown in nutrient-solution, sand and soil cultures for a physiological comparison with ys_1/ys_1 plants similarly cultured. Seedlings of either genotype produced completely green leaves when sprayed with aqueous solutions of ferrous or ferric salts or when iron chelated as Fe-HEDTA (ferric chelate of N-hydroxyethylethylenediaminetriacetic acid) was incorporated into the rooting medium.

The metabolic lesion associated with the ys_1 locus appears to be localized to the absorbing areas of the roots. (Bot. Gaz. in press). When phosphate was deleted from the nutrient medium, ys_1/ys_1 plants produced fully green leaves. Chlorotic ys_1/ys_1 plants showed noticeable greening within 48 hours following an iron spray treatment, the addition of Fe-HEDTA to the culture medium, root tip removal in solution culture where iron was available to $+/ys_1$ but not to ys_1/ys_1 plants, or phosphate deletion.

In contrast, ys_3/ys_3 plants did not green rapidly when treated to correct the ys_1 -type chlorosis. A period of approximately six days elapsed following a foliar spray of aqueous $FeSO_4$ before correction of the ys_3 -type chlorosis was detected. When grown adjacently in a greenhouse soil bed of pH 5.5, ys_1/ys_1 plants remained yellow-striped whereas ys_3/ys_3 seedlings gradually greened. The metabolic lesion associated with the ys_3 locus appears to be more in the translocation or utilization of iron than in uptake. These alleles are being converted to a common background for a more definitive evaluation of these responses.

B. Approximately ten new selections of iron-deficiency chlorosis in maize have been observed and collected this past season; leaves of these yellow-striped plants responded by greening locally following spraying with an aqueous solution of $FeSO_4$ in the field or in the greenhouse. Of four selections grown in sand culture, all responded as did ys_1/ys_1 seedlings; Fe-HEDTA supplied in the applied nutrient solution induced full leaf greening. Seedlots yielding plants displaying this chlorosis were found in plant introductions grown by Dr. Roy Creech (P.I. 177591, 179561, 196127, 200296, 217461, and 231738), two inbred lines of Dr. C. C. Wernham and in an Italian flint inbred selected and supplied by Dr. Angelo Bianchi.

An acute yellow stripe appeared to be lethal in the field (3 plants perished with only scant greening). Two other chlorotic seedlings from the same row (16 green:5 chlorotic) greened completely after transfer from the field to sand culture with Fe-HEDTA in the greenhouse.

William D. Bell

3. Nutritional factors of maize mutants involving factors other than iron metabolism.

Tightly rolled leaves of adherent seedlings and plants have responded to foliar applications of a nutrient solution (Hoagland and Arnon's #1 minus iron). A 0.005 M CaCl_2 solution poured into the leaf rolls of such plants elicited an unrolling of the leaves but symptoms subsequently developed which appeared to be those of potassium deficiency. More leaf unrolling occurred when the application of the nutrient solution was accompanied by puncturing the main vascular bundles of the adherent leaves. A solution containing both 0.005 M CaCl_2 and 0.005 M K_2SO_4 was less effective than the nutrient solution in correcting adherence.

Albescent seedlings producing only white leaf tissue regreened in some cases following one or more transfers to aerated or unaerated complete nutrient solutions; sand-cultured seedlings of the same selfed seedlot continued to produce only white leaves. Greening of al seedlings seemed to be most pronounced when the attached grain was immersed in the nutrient solution. Applications of casein hydrolysate, yeast extract or coconut milk to mechanically exposed cotyledons of white al seedlings produced no beneficial effects. Leaf tip feeding with 0.3 M sucrose (method of Spoehr) prolonged the life of white al plants but induced no further visible chlorophyll formation.

A pale green selection segregating from selfed plants of P.I. 194047 has responded to foliar applications of Nu-Iron, a product of Tennessee Corp. Leaf areas which had been in contact with the spray became visibly greener in several days; untreated seedlings or those sprayed with solutions of FeSO_4 alone or in combination with micronutrients did not survive. Sprays of ferric oxalate solution did not produce the same effect nor were benefits observed following the incorporation of Fe-HEDTA or ferric oxalate in the solutions supplied to sand-grown pale green 194047 seedlings.

Comparable responses in unclassified pale green seedlings were observed in the field; when splashed with a clay loam mud either deliberately or during precipitation, a localized increase of the greening of leaf tissues resulted. Areas greened when in contact with the dried mud applied to either the adaxial or abaxial leaf surface. Iron and/or micronutrient solutions as sprays elicited no greening of these seedlings.

A selfed selection from P.I. 174415 was reported by Dr. H. H. Kramer (personal communication) to respond to a mixture of micronutrient solutions. The enhancement of greening of pale green, yellow, or white seedlings from this ear was confirmed using an aqueous foliar application of FeSO_4 with the micronutrients indicated by Hoagland and Arnon. A white seedling thus treated became green enough to produce selfed