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SSC's doubled haploid research at Ames and DeKalb.

This note comes after much encouragement from Dave Weber for information about my work on 'doubled haploids'. While developing the system my aims were always practical – produce better parents. I was lucky to have Sprague's Stiff Stalk Synthetic available, plus some fine stocks I had brought with me from Cornell. (taken from accompanying letter from SSC to Ed Coe Aug 2012.)

The amount of haploid work accomplished at Ames and DeKalb was substantial. At both places the work was carried out in competition with other activities - at Ames, organizing lectures and teaching plant cytogenetics at the leading edge to graduate students, - at DeKalb in competition with a company-wide reorganization of corn breeding, development of hybrids for the north of France, developmment of a breeding program for 'Colorado' type hybrids for Argentina, and much more.

I am pleased the "doubled haploid" technique is in substantial use today. In Botanical Review, 1969, I ventured that "Agronomically, other than in the commercial breeding program for which I was personally responsible, little use has been made of the [doubled haploid] method in the development of homozygous diploids. Increased interest in and use of such radical techniques is likely in the future as the challenges of intensified commercial maize culture and of the highly competitive hybrid seedcorn market necessitate an increasingly high degree of responsiveness on the part of the maize breeder."

The practicality of the method today certainly owes much to Coe's 'stock 6' and its derivatives, to improvements and techniques for genome doubling, and to the higher technical skills of maize breeders.

Firsts [achieved by SSC]:
1) First haploid to doubled haploid. The first homozygous diploid derived from a haploid was out of sweet corn, Golden Cross Bantam).
2) First substantial confirmation of different rates of

parthenognesis among female parents. (Stadler obtained a frequency of about 1:100 in a diploid multiple recessive tester; most prior information suggested rates of in the range of 1:1000.)
3) First recognition that rates of parthenogenesis were influenced by the male parent.
4) First haploids in quantity.
5) First observation of high rates of somatic chromosome complement doubling in haploids.
6) First doubled haploids in quantity.
7) First to use 'embryo markers' for dry seed haploid selection (Pu, etc.).
(A major disadvantage of Pu, purple embryo marker, is - was - that it occurs widely in Corn Belt maize; Stadler told me that 15% of the then available inbreds in use had the purple plumule phenotype, - hence Pu was not a 'clean' marker for my purposes.)

8) First doubled haploid line(s) in succesful commercial hybrid(s). (Example: DeKalb 640)

9) First "second generation" doubled haploid lines in commercial hybrid (H2386 and H2398, both ex H73xH225).

10) First cloning of haploid through reproductive process: n ton to n (W23 haploid).

11) First, with Sam Goodsell, to demonstrate cytoplasmic transfer through androgenesis.
12) First to demonstrate (in W22) the possibility of 'fixing' high performing substrains of long established inbreds through haploidy.