length and number of kernel rows) have been measured in the haploids. There were significant differences in all the traits among the haploids of the A464 line. The haploids of the A619 line differed significantly in plant height (Table 2). Besides the differences in quantitative traits, it was noticed that the haploids differed in time of flowering.

Table 2. Parameters of quantitative traits of haploids produced by different inducers.

Traits	(n) A464			(n) A619	
	Inducer #1	Inducer #2	Hybrid Inducer 1x2	Inducer #2	Hybrid Inducer 1x2
Plant height, cm.	142.1±3.1	126.2±2.2**	120.2±2.1***	133.4±1.3	125.5±2.0**
Leaf length, cm.	53.6±0.8	51.0±0.6	46.9±0.7***	49.2±0.4	47.7±0.6
Leaf width, cm.	6.7±0.2**	6.7±0.1**	7.1±0.1	7.3±0.6	6.9±0.8
Ear length, cm.	10.2±0.3	8.9±0.2**	9.7±0.2	10.2±0.3	9.2±0.4
Number of kernel rows, no.	13.3±0.2	11.6±0.2***	11.8±0.2***	12.3±0.2	11.7±0.3

It seems unlikely that differences between haploids could have been caused by the influence of their hybrid endosperms. Most likely the reason for the variation was partial hybridization with the inducers, and perhaps, each inducer had a certain degree of partial hybridization. The phenomenon of partial hybridization has been described in rice and found in sunflower (Faure et al., 2002). Every year we find aneuploid plants among haploids (Chalyk et al., MNL 77, 2003). There is much variation among the aneuploids in their phenotype; also, they might be sterile or partially fertile and usually possess the inducer's marker genes. Traces of the marker genes are being revealed in plants considered haploids, too. Some researchers believe that such plants are androgenic haploids. However, these haploids have nothing in common with haploids usually obtained after self-pollinations of inducers, either in phenotype or in the way the marker genes are expressed.

The observations mentioned above can be applied to confirm partial hybridization during the induction of maternal haploids. However, based on all the results presented, we cannot be sure yet that the development of embryos (considered haploid embryos) occurs due to partial hybridization and that maternal haploids actually are aneuhaploids, i.e., possess some genetic information from inducers.

Overall, the results show that the induction of maternal haploids is a rather complex and, at the same time, interesting phenomenon.

COLUMBIA, MISSOURI
University of Missouri

Map locations of the telomeres

--Coe, EH

Tentative positions of the telomeres have been added to the Genetic 2008 maps in MaizeGDB. The names assigned to these loci are Telomere1S, Telomere1L, etc. Each short-arm end is assigned a zero coordinate, while long-arm ends are approximated from available evidence. Wherever possible, placement is inferred in an anchored contig by evidence in silico for localization of telomere-specific sequences (e.g., pMTY9ER, pBF266) at one end of a contig that is oriented correctly. Firmly mapped contigs at the ends often match well by this criterion, but some contigs do not. Telomere9S, in particular, is ambiguously placed because of conflicts in contig order and relationship to knob probes, presumably at K9S. Comments with each telomere locus identify the basis of its placement.

Note: these positions are based on (1) the July 2005 FPC build; (2) sequenced BACs as of October 2008; and (3) genetic mapping of other loci in the same contig, e.g., on IBM2 or NAM maps.

I look forward to receiving feedback on these placements, and hope that a next-generation placement will be possible for persons with direct interest in the telomeres when the sequencing project is completed and a rebuild is done. If matched with a high-density, high-resolution genetic map – e.g., an enhanced NAM, the cross-reinforcement between the physical and the cytological and the genetic map will be substantial.

DEKALB, ILLINOIS
University of Illinois, Urbana

Pollen shed delay, silking anthesis interval (SAI), occurred in a cool, late season

--Troyer, AF

Corn has an imperfect flower. The female flower becomes the ear, and the male flower is the tassel. Darwin pointed out that silk delay after pollen shed is normal in corn varieties to facilitate cross pollination, which increases plant vigor. The term silk delay also explains what happens during drought (moisture stress) at flowering time. Fresh corn silks are 90% water; thus, they are sensitive to water availability. Corn breeders' selection against silk delay at high plant densities has been useful to increase hybrid corn's drought stress tolerance. Growing degree heat units to pollen shed is normally very stable with a much lower coefficient of variation than heat units to silk. Upright leaves have become more popular in commercial hybrid corn during the last 40 years. I noticed some very unusual flowering of corn while pollinating in my nursery during this late, cool, 2008 season in northern Illinois. This is about heat units and flowering in corn.

My breeding starts are typically backcrosses of related, elite inbred lines. I grew 1600 plants each of six backcross pedigrees involving four different elite inbred backgrounds at 60,000 plants per acre, including alleys. I self-pollinated the earliest, strongest silking 10% of the plants. This year many plants silked strongly, and I had to wait a day or two or three or more days for the tassel to shed before pollinating. That's very unusual. The pollen shed delay plants had their tassels tightly encased in the uppermost two leaves of the plant. All of my plants had ligules. When I "unwrapped" these tassels, the tassels felt cool and damp; they were water cooled by plant transpiration. I've never seen plants and felt tassels like these before. This year I saw and handled about a thousand plants with delayed pollen shed.

My nursery was planted April 24 and emerged evenly in about 10 days. We were 30% short of heat units in May and June was normal. We never caught up. We had a cool, late season with timely, ample rainfall. The July 7, 2008 Illinois Weather & Crops,

vol. 29, no. 19, shows corn tied with 2002 for shortest plant height in the last 11 years. August 4, no. 23, shows corn two weeks behind the 5-year average for dough stage. My corn grew very tall. I pollinated inbred plants that appeared to be too tall and too late for northern Illinois; yet, on those same days, I drove by hybrid corn fields on the way to work that had not yet flowered. It was a very unusual season. We had higher than average yields; several experiments on the farm averaged well over 200 bushels per acre.
Is there a lesson? Yes: The delayed, late-shed tassels that were encased in a leaf or two indicate heat units must warm the tassel per se to cause pollen formation and dissemination. The plant is a sufficient enough receptor of heat units to develop the plant and tassel, but the tassel per se must receive heat units to develop and shed pollen.

Spring seasons like our 2008 are probably rare.

HONOLULU, HAWAII
University of Hawaii

Branched tassel (*Brta*) on chromosome 2

--Brewbaker, JL; Yu, H

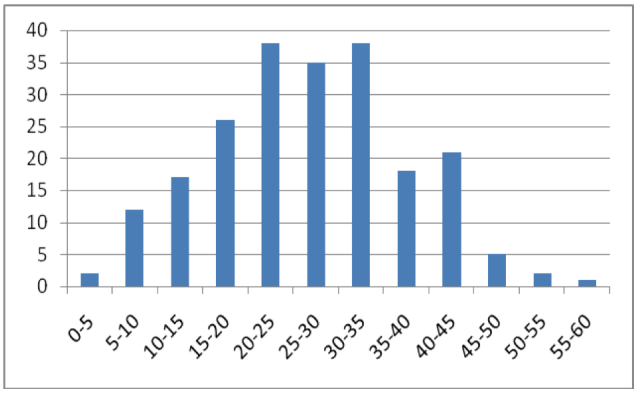
Tassels of inbred Hi27 and most of our 150 NILs (MNL81:15) average ~13 branches (Figure 1). Reduced branch numbers occur only when plants are under biotic or abiotic stress. Several of our Hi27 NILs display more highly branched tassels (Figure 2), of which the most prominent are in stocks with chromosome 2 mutants like *fl* and *v4*. This branching we show to be governed by a single gene designated *Brta*.

Tassel branch numbers were recorded in the classic series of publications on the races of maize. These data are summarized in Table 1, showing an average of 27.0 tassel branches (both primary and secondary) for the 251 races included in our survey. The data were normalized and ranged from 3.6 for Palomero Toluqueño (Mexico) to 50+ for the Piras of Colombia. Tropical breeders are very familiar with the large and impressive tassels of many tropical

Figure 1. Normal Hi27 tassel.

Figure 2. Branched tassel in genotype (*fl Brta*)^Hi27.

Table 1. Tassel branch number in 251 races of maize.



varieties and hybrids. The contrast of a 40-branch tropical tassel with that of B73 (6.0 branches) or of Mo17 (4.7 branches) is most striking. Historically, temperate breeders have selected inbreds with small tassels, reflecting the small but significant energy requirements of tassels. This trend continues for tropical plant breeders. Male-sterile tassels are now seen in many commercial fields.

In a survey of 60 largely tropical inbreds in the collection of Hawaii Foundation Seeds (HFS), branch numbers averaged 15.4. The numbers appeared again to be normally distributed but concentrated around their mean (very similar to Hi27, with ~13 branches). Temperate inbreds were generally at the low end of this range. Environmental effects can be very great. In a trial planted 11/16/07 under severe winter stress (low light, heavy rain, yields reduced 75%), Hi27 averaged only 2.8 branches and the branched NILs averaged only 5.7

Backcross conversions of Hi27 to incorporate the dominant genes *fl* (chrom. 2S-75.7) and *v4* (chrom. 2L-87) began in 1969 with MGC stock 63-2370-5/2367-2 (*lg gl2 fl v4*). Selfing after 6 backcrosses created *fl* and *v4* NILs, each proving to be double mutants *fl v4*. The line selected for *fl* alone had highly branched tassels (20.9 branches), while the line selected for *v4* had normal Hi27 tassels. An additional NIL selected as a floury with white kernels (*y* locus on chrom. 6) was also highly branched, and we've bred a branched floury stock lacking *v4*.