Research Notes: Evidence of a Second Gene Controlling a Short Internode (Zigzag Stem) Character

H. R. Boerma
University of Georgia

B. G. Jones
Gold Kist Research
1) Evidence of a second gene controlling a short internode (zigzag stem) character.

Kilen and Hartwig (1975) have described a short internode character found in PI 227.224 which causes a zigzag stem appearance. They indicated that the short internode character was probably determined by a single recessive gene pair based on classification of the presence or absence of the zigzag stem appearance. In the F_2 generations of the crosses, PI 227.224 x 'Coker 338' and PI 227.224 x 'Davis,' we observed two different ratios. In the first cross the segregation was 3 normal stem : 1 zigzag stem (724:229, expected 714:238, $\chi^2 P = .5-.3$). In the PI 227.224 x Davis cross the ratio was 15 normal stem : 1 zigzag stem (765:58, expected 772:51, $\chi^2 P = .5-.3$). This ratio differed from a 3:1 at the 1% level of probability (by the Chi-square test). The F_1 plants in both crosses had normal stem types. These data suggest that PI 227.224 and Davis differ by two recessive genes for this character. The F_3 generation of this cross will be evaluated during the summer of 1976. Crosses have been made to determine the relationship of the two recessive genes indicated in this cross and the single recessive gene indicated by Kilen and Hartwig (1975).

The F_2 generation of a third cross ('Jackson' x PI 227.224) was space planted. Jackson also appeared to differ from PI 227.224 by one recessive gene for this character. The average internode lengths (mean of the sixth and seventh internodes) were 2.2, 2.0, 1.6, and 2.9 cm for the normal, zigzag, PI 227.224, and Jackson plants, respectively. This small difference in internode length (0.2 cm) between normal and zigzag stem types and the fact that normal stem plants were found with shorter average internode lengths than some of the zigzag stem plants suggest that the zigzag stem appearance may be due to some other anatomical characteristic. This possibility is also being explored.
Soybeans have been evaluated for a second year as to their contribution to silage quality when interplanted with *Zea mays*. In 1974, two forage cultivars ('Black Wilson' and 'Laredo') available in the local seed trade, and 'Amsoy 71' were interplanted with a number of sorghum-sudans, grain sorghums, and *Zea mays*. A number of protepeas (*Vigna unguiculata*) were also interplanted.

The forage soybeans increased dry matter yield over that of the grasses alone with or without nitrogen, or with protepeas in 1974. The soybeans flowered and set seed in the shade of the tall grasses much more readily than did the forage protepeas. With the first frosts in the fall the protepeas were killed, but the indeterminate forage soybeans increased growth.

Material harvested as silage in the fall of 1974 were subjected to quality evaluation by an artificial rumen technique (*in vitro* digestibility-IVD) and by crude protein analyses. IVD's of *Zea mays* and the *Zea mays*-legume combinations were far superior to that of the other mixtures in the study. The soybeans and protepeas both increased the crude protein content above that of *Zea mays* alone. Protein increase was greatest with the soybeans. However, *in vitro* digestibility of the mixture was significantly reduced by the soybeans whereas it was increased by the protepeas.

In 1975, *Zea mays* was planted alone or in combination with the two forage soybean cultivars used in 1974, plus wild soybean (*Glycine ussuriensis*) [Editor's note: now called *G. soja*], protepeas, and hyacinth bean, *Dolichos*