IOWA STATE UNIVERSITY
Agronomy Department

Crop Physiology and Metabolism

PHENOLOGY OF TROPICAL CORN GENOTYPES IN CENTRAL IOWA

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1. Rationale

- Tropical corn genotypes have been evaluated for grain production; nevertheless, yields have fallen short of U.S. Corn Belt populations.
- The comparison between tropical corn and their adapted strains with a focus on biomass production has not yet been explored under Iowa day length conditions.
- Tropical germplasm for temperate environments are not attractive for high grain yields, but show promising results for biomass potential through taller and more vigorous plants.

2. Proposed Solution

- It is hypothesized that tropical genotypes with longer growth cycles will result in delayed flowering time and greater biomass yields, especially in northern temperate climates such as Iowa.
- This study will identify the adaptability of the tropical genotypes by means of studying crop development.

3. Method

- Field trails were established at the Sorensen Research Farm in Boone County, IA during the 2014 growing season. Three genotypes (Tuxpeno, Suwan, and Tuson) were planted at different dates (7 of May, 20 of May and 3 of June) to evaluate phenology of adapted (5 cycles) and non-adapted (1 cycle) strains by using the leaf collar method, and further refinement by Abendroth (personal communication).

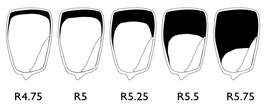
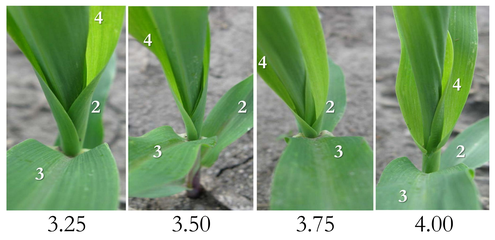


Fig. 1a. Division every quarter for kernels in the R5 main stage (above) . 1b. Leaf collar method: Division every quarter for Vegetative main stages (right).



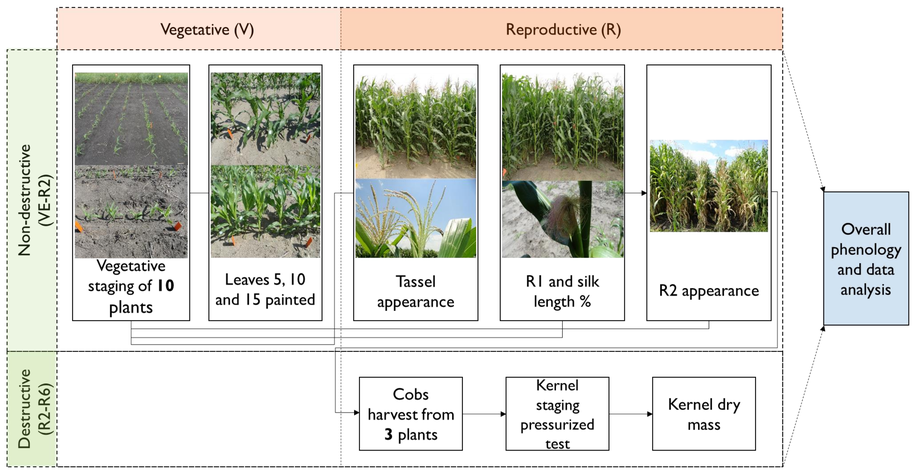
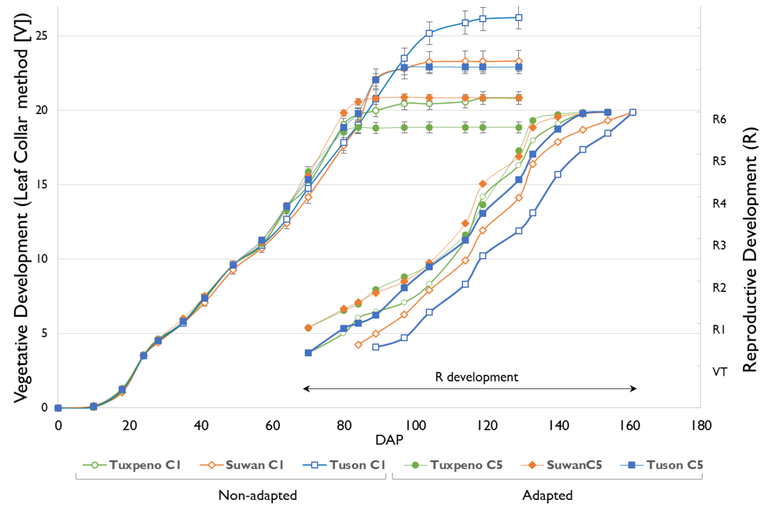


Fig. 2. Phenology methods design for corn staging

4. Research Results

- Adapted strains were slightly more developed than non-adapted from 64 to 84 days after planting, DAP, ($p<0.0007$), but at around 89 DAP adapted strains reached the asymptote ($p\leq0.029$), where non-adapted strains reached greater final vegetative development.

Fig. 3. Phenology for adapted (closed bullets) and non-adapted (open bullets) tropical corn. The left axis represents the stage of vegetative development. The right axis represents the stage of reproductive development.



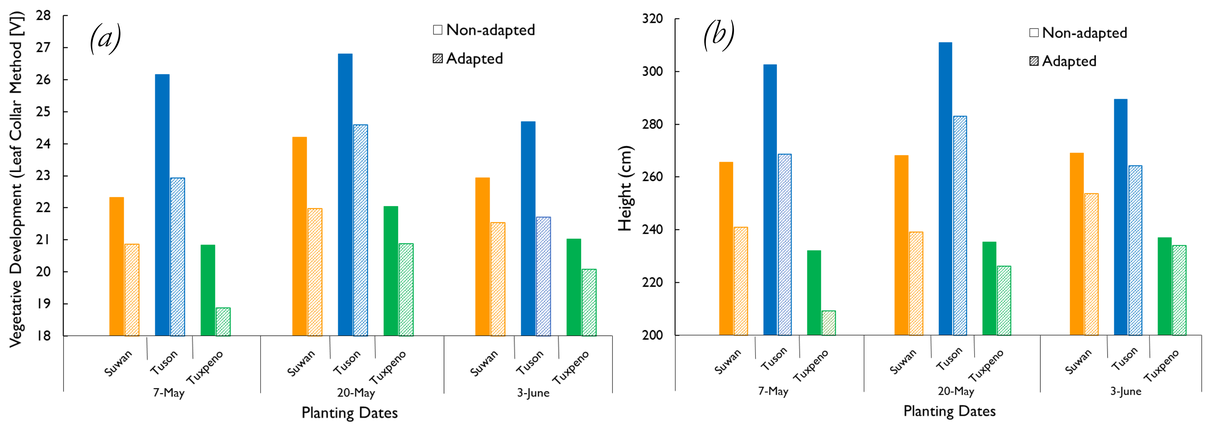


Fig. 4. Vegetative performance of adapted (red bars) and non-adapted (blue bars) tropical corn for three planting dates. (a) Final vegetative development, and (b) Final height measured at 130 DAP.

- Non-adapted tropical strains were more developed (Fig. 4a), and taller (Fig. 4b; $p<0.0001$), while their reproductive stages of development began comparatively late, 10-15 days later than the adapted ones on average. On the other hand, adapted strains exhibited minor final vegetative development but became reproductive quickly (≥R1), approximately 80 DAP.

5. Summary and Conclusion

- Differences in crop phenology among genotypes were small and insignificant during the first 60 DAP, ($p\geq0.1458$); thereafter, differences were evident (Fig. 3; $p<0.005$).
- Although adapted tropical corn performed better for grain development, non-adapted performed better for vegetative development. Further research is being conducted for establishing the impact of adaptation on biomass production.