

Early maize for cool summer areas of southern Australia

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More maize could be used for summer forage and grain production in south-eastern Australia if early maturing varieties with some cold and drought tolerance were available. The widely-grown hybrid varieties XL45 and XL66 flowered too late at Bungaree (564 m) in the Central Highlands of Victoria in the summers of 1980 and 1981. Polar Vee and Maris Carmine, which are hybrid varieties from Canada and England respectively, flowered a few weeks earlier, thus maturing seed before the autumn frosts.

Methods

In order to combine earliness with cold and drought tolerance, a project has begun in which XL45, Polar Vee and Maris Carmine have been crossed with varieties from cold and/or dry regions of Peru, Mexico and Colombia (obtained from Maize Bank, CIMMYT, Mexico).

The first objective, early flowering, is difficult to achieve because of the complex environmental and genetic control of this character. Although all parents are alike in their tendency to flower early (i.e. tassel initiation at about leaf stage 3) the tropical ones have negative photoperiod responses (1,2) which retard anthesis and further delay silking. These varieties therefore are late-flowering in our latitude, and only plants in which anthesis and silking coincided (i.e. "balanced flowering") and with flowering time similar to Maris Carmine were sibbed in F₂ generation. From the next generation, lines were also selected for stable early flowering, as shown by a narrow range in anthesis time and a high percentage of balanced flowering.

Results and Discussion

The first aim of stable early-flowering lines is being achieved. The two components of the early-flowering character (rapid anthesis and balanced flowering) appear to be more or less recessive and inherited independently. Hence suitable early plants in F₂ generation have had to be sibbed for several more cycles (depending on the tropical variety) before a few lines have attained stability.

The second objective of cold and drought tolerance calls for methods for identifying plants with these characters. Early sowing increases frost risks. A sowing in September last year gave some evidence of variation in frost tolerance of seedlings. Controlled environments should also be used, especially for segregating material in the seedling stage.

1. Aitken, Y. 1977. Z. Pflanzenzuchtg. 78: 216-237.

2. Aitken, Y. 1980. IIZ. Acker and Pflanzenbau. 149: 89-106.