

## Evaluation of Maize Inbred Lines for Resistance to Fusarium Ear Rot and Fumonisin Accumulation in Grain in Tropical Africa

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### Abstract

Fusarium ear rot and fumonisin contamination is a major problem facing maize growers worldwide, and host resistance is the most effective strategy to control the disease, but resistant genotypes have not been identified. In 2003, a total of 103 maize inbred lines were evaluated for Fusarium ear rot caused by *Fusarium verticillioides* in field trials in Ikenne and Ibadan, Nigeria. Disease was initiated from natural infection in the Ikenne trial and from artificial inoculation in the Ibadan trial. Ear rot severity ranged from 1.0 to 6.0 in both locations in 2003. Fifty-two inbred lines with disease severity  $\leq 3$  (i.e.,  $\leq 10\%$  visible symptoms on ears) were selected and reevaluated in 2004 for ear rot resistance, incidence of discolored kernels, and fumonisin contamination in grain. At both locations, ear rot severity on the selected lines was significantly ( $P < 0.0020$ ) higher in 2004 than in 2003. The effects of selected inbred lines on disease severity were highly significant at Ikenne ( $P = 0.0072$ ) and Ibadan ( $P < 0.0001$ ) in 2004. Inbred lines did not affect incidence of discolored kernels at both locations and across years except at Ikenne ( $P = 0.0002$ ) in 2004. Similarly, significant effects of inbred lines on fumonisin concentration were observed only at Ikenne ( $P = 0.0201$ ) in 2004. However, inbred lines 02C14585, 02C14593, 02C14603, 02C14606, 02C14624, and 02C14683 had consistently low disease severity across years and locations. Fumonisin concentration was significantly correlated with ear rot only at Ikenne ( $R = 0.42$ ,  $P < 0.0001$ ). Correlation between fumonisin concentration and incidence of discolored kernels was also significant at Ikenne ( $R = 0.39$ ,  $P < 0.0001$ ) and Ibadan ( $R = 0.35$ ,  $P = 0.0007$ ). At both locations, no significant inbred  $\times$  year interaction was observed for fumonisin concentration. Five inbred lines, namely 02C14585, 02C14603, 02C14606, 02C14624, and 02C14683, consistently had the lowest fumonisin concentration in both trials. Two of these inbred lines, 02C14624 and 02C14585, had fumonisin levels  $< 5.0$   $\mu\text{g/g}$  across years in trials where disease was initiated from both natural infection and artificial inoculation. These lines that had consistently low disease severity are useful for breeding programs to develop fumonisin resistant lines.

Additional keywords: corn, mycotoxin