

APPLICATION OF A 3D WINDBREAK MODEL TO COMPARE FIELD PLOT DESIGNS FOR LIMITING POLLEN DISPERSAL. Craig A. Clark, Juan Astini, Raymond W. Arritt, Mark E. Westgate and A. Susana Goggi, Graduate Students and Professors, Department of Agronomy, Iowa State University, Ames, IA 50011.

Placing windbreaks or shelter around a field may help reduce the escape of transgenes into the environment. An optimal configuration of such designs is desirable, but the cost and labor involved in field studies imposes practical limitations on the number of candidate designs that can be tested. We propose that a combined shelter flow model and a Lagrangian dispersion model can be used as a screening tool to test the effect of border design, field geometry, wind climatology, and other factors on pollen transport. This allows field studies to focus more efficiently on designs that are likely to be successful. We tested the model by simulating results from field projects in the 2005 and 2006 growing seasons in which a tall annual grass (sorghum sudangrass) was planted as a border around a small maize plot. Field measurements for both 2005 and 2006 showed that a sorghum sudangrass border reduced the maximum distance of pollen dispersal from 300 m to 160 m. Model results show a decrease in downwind transport of pollen but predicted patterns of pollen deposition are much smoother than observed. We propose that this limitation derives partly from incomplete knowledge of the diurnal timing of pollen shed and partly from limitations in sampling observed pollen deposition.