EFFECTS OF OUTCROSSING ON KERNEL
TRAILS AND GRAIN YIELD IN
HYBRID MAIZE (ZEA MAYS L.)

Mack, C.T.1, Z.W. Wicks III2, P.B. Beauzay2
1Department of Agronomy, Iowa State Univ., Ames, IA
2Plant Science Dept., South Dakota State Univ., Brookings, SD 57007

ABSTRACT

A six-year study was conducted to determine the effects of outcrossing on
grain yield, kernel weight, ear weight, and kernel protein concentration of maize
(Zea mays L.). Both yellow and white varieties were used in crosses. The use
of the white endosperm varieties allowed separation of selfed and outcrossed
kernels for measurement of levels of outcrossing, as well as kernel traits for self-
ed versus outcrossed kernels in the yellow varieties.

Averaged over locations, levels of outcrossing in outer rows of four-row
plots was 52.42% and 43.83% for inner rows. Grain yield associated with
greater percent outcrossing (outer rows) was 1.51 Q*Ha⁻¹ higher than when asso-
ciated with lower outcrossing levels (inner rows). This agreed with findings
which showed outcross kernel weight exceeding selfed kernel weight. The ratio
of outcrossed to selfed kernel weight was 1.071 for outer rows and 1.064 for
inner rows. Ear weight did not appear to increase as levels of outcrossing
increased. Lack of response for this trait may have been due to localization of
outcrossed kernels in the apical or basal portions of the ear which would tend to
mask changes in ear weight. Finally, kernel protein concentration was shown to
be increasing for outcrossed versus selfed kernels. The differences in protein
concentration between selfed and outcrossed kernels was greatest in inner rows
where sink demand was lower due to fewer outcross kernels competing for lim-
ited amino acid supply.