# The Plus-Hybrid System: A Method to Increase Corn Grain Yield by Combined Cytoplasmic Male Sterility and Xenia. (C01-stamp103854-Oral)

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## Abstract:

Cytoplasmic male sterility (cms) is used increasingly in hybrid seed production, because of its superior cost-efficiency. Non-restored cms-hybrids often yield more than their male-fertile counterparts. An additional positive effect is found when these cms-hybrids are pollinated by unrelated hybrids. This combined effect of cms and genetically dissimilar pollen sources (i.e. xenia) is referred to as the 'Plus-Hybrid' effect. The Plus-Hybrid system consists of blending a non-restored cms-hybrid with an unrelated male-fertile hybrid as a pollinator. The objectives of this study were to: (i) determine the combined effect of male sterility and xenia on the grain yield of male-sterile hybrids as pure stands in small-plot experiments and (ii) to evaluate applicable Plus-Hybrids as blends in large-strip mixture trials. Small-plot experiments were conducted for two years in the USA and three years in Switzerland with cms-hybrids. Compared to their isogenically pollinated male-fertile counterparts, the average grain yield increases of Plus-Hybrids were 4.5 % ($p<0.10$) with American, and 8.2 % ($p<0.01$) with European germplasm. To confirm those findings of small-plot trials, large-strip mixture trials were conducted for three years in the USA and one year in Switzerland. All Plus-Hybrids in the large-strip mixture trials outyielded their isogenically pollinated (partially) male-fertile control. The Plus-Hybrid system is a promising option for obtaining substantial increases in grain yield when cytoplasmic male-sterile versions of elite germplasm are available.

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