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## CUPHEA SEED YIELD, BUT NOT SEED OIL CONTENT IS REDUCED BY DROUGHT

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Cuphea can potentially serve as a domestic oil replacement for small and medium-chain fatty acids used in chemical manufacturing. Present domesticated lines of cuphea (*Cuphea viscosissima* Jacq. × *C. lanceolata* f. *Silenoides* W.T. Aiton) grow exceptionally well in the upper Midwestern U.S. However, cuphea does not have a deep root system, is not an efficient water user, and therefore, may be susceptible to drought stress.

A field study was conducted in west central Minnesota in 2002 and 2003 to assess cuphea seed yield and seed characteristics under non-limiting soil moisture conditions. In both years, two levels of irrigation were compared with a non-irrigated control treatment. Drip irrigation was used to maintain soil moisture to field capacity (soil matric potential ~ 0.3 bar) for the fully irrigated treatment and at 50% of the available water holding capacity of the soil (soil matric potential ~ 0.7 bar) for the partially irrigated treatment at a 30-cm wetting depth. In 2003, drought conditions were experienced from mid-July and throughout August. During this period, cuphea was flowering and setting seed. Between July 10 and September 9, only 3.2 cm of precipitation occurred at the experimental site.

Severe drought stress symptoms that included dramatically reduced leaf water potential and photosynthetic rates were observed during late summer for the non-irrigated plants. Seed yield of the fully irrigated plants was over 2.5 fold greater than that of the controls. However, biomass production was not as dramatically affected and seed oil content was similar across treatments at about 34 % (w/w). Results indicate that cuphea seed production, but not seed oil content is sensitive to drought. Possibly, the severe drought stress observed in 2003 was partially due to poorly developed roots inherent to present domesticated lines of cuphea. Future, widespread regional success of cuphea may depend on genetic improvement of drought tolerance.

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