

FIELD EVALUATION ON INTA 'S ASSOCIATION MAPPING POPULATION IN ARGENTINA AND USE OF INDICES FOR DROUGHT TOLERANCE IN SUNFLOWER

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INTRODUCTION

World population growth and climate change have intensified the global challenge of food security, where water deficit emerges as a critical factor limiting sunflower yield. In this context, a study was carried out in the Association Mapping Population (AMP) of INTA with the objective of characterizing the behavior against water deficit, generating data for association mapping studies and identifying new sources of tolerance to water deficit.

MATERIAL METHDOS

159 inbred lines were evaluated in three field trials with moderate water deficit at the Agricultural Experimental Station, Manfredi, Córdoba, Argentina (-31.85,-63.75). Planting was carried out according to a partially repeated block design with randomly distributed plots, and a progressive moderate water deficit was induced by means of agroethylene bands from the V6-V8 stage until the end of the cycle. The irrigation condition was achieved by drip irrigation. Leaf temperature, leaf area, stomatal conductance, radiation interception, plant height, stem and head diameter, seed weight, number of seeds per head, oil content, grain yield and oil yield were recorded. Subsequently, linear mixed models were used to obtain the adjusted means for each variable analyzed, which were used as the basis for generating the drought tolerance index (DTI) (Fernandez. 1992) and drought tolerance stability index (DTSI) (Bousslama & Schapaugh Jr. 1984).

RESULTS AND DISCUSSION

The DTI index showed significant differences ($p < 0.05$) among genotypes for all the descriptors evaluated except for plant height and stomatal conductance. As for the DTSI index, significant differences ($p < 0.05$) between genotypes were only found for fat yield. The indices as a whole allowed discriminating groups of genotypes and distinguishing those with better performance against water deficit, based on their resilience to water deficit and their productivity in environments with such stress. The data generated are being used for association mapping studies to identify new sources of tolerance to water deficit.

Figure 1. Irrigation condition by drip irrigation and drought by agroethylene bands



Figure 2. Formulas for DTI and DTSI indices

$\frac{DTI}{Y_p \cdot Y_s} = \frac{Y_p \cdot Y_s}{Y_p^2}$	<ul style="list-style-type: none"> • Y_p = Descriptor value for TDH under irrigated conditions. • Y_s = Descriptor value for TDH under water stress conditions. • Y_p^2 = Mean PMA value of the descriptor for TDH under irrigated conditions. 	$\frac{DTSI}{Y_s} = \frac{Y_s}{Y_p}$	<ul style="list-style-type: none"> • Y_p = Descriptor value for TDH under irrigated conditions. • Y_s = Descriptor value for TDH under water stress conditions.
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Figure 3. Scatter plot. Dispersion of the DTI and DTSI indices of the 159 PMA genotypes obtained from the adjusted means corresponding to the three seasons under study.

