Many agricultural drought indices have limited value because they are either too simple or too complex. For example, Lawn and Garden Moisture Index (LGMI), which is being used for monitoring drought in southeast U.S., is simple as it uses fewer inputs; it is less reliable due to its less realistic evapotranspiration and soil water estimation. On the other hand, DSSAT is a reliable model; it is complex because of its several inputs. The purpose of this study was to develop an index that could be close to LGMI in simplicity and to DSSAT in reliability. The proposed index, Water Deficit Index (WDI), is a function of actual to potential transpiration ratio: $WDI = 1 - T/T_p$. While T_p is estimated using FAO-56 model, T is calculated from water uptake coefficient and available soil water: $T = \alpha(\theta - \theta_{wp})$. Using historical weather data of four locations, daily WDI and LGMI values were computed for grass, and DSSAT stress factors were computed for maize. These values then were used to calculate the departure of WDI from LGMI and DSSAT. Although LGMI and WDI showed similar trends of crop water stress, LGMI values were always greater because of unrealistically high evapotranspiration estimation. Except during initial crop stage, WDI and DSSAT showed similar water stress. The difference in this stage was because WDI calculated the stress for grass having a constant canopy, while DSSAT did so for maize having small canopy. In conclusion, WDI is as simple as LGMI because it is based on easily available weather data. WDI is more realistic than LGMI because WDI has more realistic evapotranspiration and soil water balance functions. WDI is as reliable as DSSAT because their water stress estimations are not significantly different. WDI is simpler than DSSAT because WDI dose not depend on complicated crop physiological processes.

Key words: agricultural drought, drought index, crop water stress, water deficit index
Challenges/issues: quantifying/forecasting crop water stress or agricultural drought