

## Datasets in the Bushland Texas Sunflower collection:

- [\*\*Agronomic Calendars for the Bushland, Texas Sunflower Datasets\*\*](#): Calendars list by date the agronomic practices applied, severe weather, and activities (e.g., planting, thinning, fertilization, pesticide application, lysimeter maintenance, harvest) in and on lysimeters that could influence crop growth and water use. These include fertilizer and pesticide applications. There is one calendar for each year for the NE and SE lysimeters and fields.
- [\*\*Growth and Yield Data for the Bushland, Texas Sunflower Datasets\*\*](#): several tabs list by date, field, and replicate number: crop growth [plant height, crop row width, leaf area index, biomass (undried and dried), head mass (when present), growth stage, etc.]; population density; machine (combine) yield by field location; and hand (manual) harvest statistics per replicated plot (numbers of plants and pods, total biomass, dry seed (achene) yield, yield at standard moisture content, harvest index). There is one growth and yield file for each year for the east (NE and SE) fields. Protocols for plant measurements and growth staging changed over the years, requiring different data dictionaries for different growing seasons.
- [\*\*Weighing Lysimeter Data for The Bushland, Texas Sunflower Datasets\*\*](#): Lysimeter raw data for relative soil water storage (lysimeter mass converted to equivalent depth of water considering the lysimeter surface area), and microclimate. There is one file for each year for the east (NE and SE) fields. Lysimeter relative soil water storage (and sometimes rain gauge and wind speed) data are given for 5-minute periods. Other data are given for 15-minute periods. For every 5-minute storage datum there is a corresponding flag that indicates what is occurring (P for precipitation, including snow; Sn for wind-blown snow; DW for dew or frost accumulation; D for emptying of drainage tanks; I for irrigation; M for maintenance operations that disturb lysimeter mass; CW for lysimeter scale counterweight adjustment; F for loss of load cell data; and NO for storage increases that are due to noise and should not be counted as precipitation, dew, frost, or irrigation). The 15-minute data include wind speed, air temperature and relative humidity at one or more heights; radiation metrics (e.g., reflected solar irradiance, net radiation, photosynthetically active radiation reflected and transmitted, etc.); nadir and oblique view surface temperature from infrared thermometers; soil heat flux and soil temperature; and core and sidewall drainage into drainage tanks that were suspended from the lysimeter). Not all properties listed were sensed in every year. A separate tab gives daily sums or averages of the sensed properties. For data visualization there is a tab with graphs of the major daily data, another tab with graphs for 15-minute data, and a final tab with graphs for 5-minute data. The later two allow viewing data in five-day periods beginning with any day of the year specified by the user.
- [\*\*Soil Water Content Data for The Bushland, Texas, Large Weighing Lysimeter Experiments\*\*](#): For all years of weighing lysimeter research at Bushland, soil volumetric water content data from periodic (weekly or longer periods) readings are presented in two files for each year, one for the east (NE and SE) lysimeters and fields, and one for the west (NW and SW) lysimeters and fields. There were at least four neutron probe access tubes in the field surrounding each lysimeter in any year, but there were often more than that as needed for sub-experiments. Access tubes were given unique numbers in any given year. Each lysimeter also had two access tubes in it. There are typically three data tabs. The first summarizes the soil profile water content values by date and field or lysimeter location, and it contains values of field capacity, permanent wilting point, and management allowed depletion for comparison. Another lists all the soil water content values by date, time (when available), depth, access tube number, and field location (NE field or lysimeter, SE field or lysimeter, NW field or lysimeter, SE field or lysimeter). A third data tab lists by access tube number geographic coordinates (UTM) of the access tube locations. A

final tab gives a graphical view of the data showing how the soil water profiles at each access tube changed over the season.

- [Evapotranspiration, Irrigation, Dew/frost - Water Balance Data for The Bushland, Texas Sunflower Datasets](#): In a single file for each year, water balance component data for both lysimeters are given. One data tab gives daily values in mm depth of water of evapotranspiration (ET), dew and frost accumulation, precipitation (snow and rain), irrigation, lysimeter scale counterweight adjustment, and amount lost when drainage tanks were emptied. Another data tab gives 15-minute sums of dew and frost accumulation, precipitation, irrigation, and ET. A third data tab lists by day of the year the values of irrigation amounts received by each lysimeter, and the method of irrigation application [mid elevation spray application (MESA), subsurface drip irrigation (SDI), low energy precision application (LEPA) drag socks, or high pressure sprinkler].
- [Standard Quality Controlled Research Weather Data – USDA-ARS, Bushland, Texas](#): A single file for each year contains weather data from the Soil and Water Management Research Unit Research Weather Station, collected at 2-m height over grass mowed to not exceed 12-cm height and irrigated and fertilized to maintain reference conditions. Typically, sensors were duplicated at each height, and data from a duplicate sensor may be used to fill gaps in data from the primary sensor using appropriate regression relationships. Gap filling may also be accomplished using sensors deployed at one of the four large weighing lysimeters immediately west of the weather station, or from the nearby Conservation & Production Research Laboratory (CPRL) weather station. The weather station is located immediately adjacent to the east side of the east lysimeter fields. Weather variables include solar irradiance, air relative humidity (RH), air temperature, wind speed, air pressure, and precipitation (mean precipitation for the four weighing lysimeters, and precipitation determined for each lysimeter from lysimeter mass changes). Because the large (3 m by 3 m surface area) weighing lysimeters are better rain gauges than are tipping bucket gauges, the 15-minute precipitation data are derived for each lysimeter from changes in lysimeter mass. One data tab gives the data in 15-minute periods. Another data tab gives daily sums of precipitation. Another tab gives a graphical check for missing data. And yet another tab allows data visualization by graphing five days of 15-minute data beginning on a day of year chosen by the user.

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