

WARM-SEASON WATER USE/DROUGHT TOLERANCE TRIAL PROTOCOLS

Approach 1- Individual Plot Level Irrigation:

- a. Year 1- Plots are fully established under full irrigation levels (plot size is 1 meter x 1 meter or 10.76 sq. ft.)
- b. Years 2, 3, 4 - Following uniform irrigation of all plots to initiate the study, full scale, automated irrigation is terminated, and individual plots are thereafter monitored on a regular basis (could be daily, bi-weekly, or weekly to correspond to particular watering frequencies allotted by the region or budget provided the cooperator) during the morning hours of the dry-down 'season'.
- c. When quality attributes of a specific plot or plots are noted to have fallen below a defined threshold (i.e. 65% wilt), it is hand-irrigated with an amount of water necessary to recharge the root zone to field capacity (between ½" to 1"). Irrigation events are recorded on a per plot basis, so that total irrigation applied over the season can be calculated on a plot basis and statistics applied.
- d. A dry-down 'season' lasts around 120 days, then plots would be fully irrigated to assess recovery. Turf quality ratings will be collected as well during dry down and recovery.
- e. A rainout shelter is employed for this approach. Data produced through the work documents 1) 'water quantity required (inches) per entry' for each location, 2) turfgrass quality before and during dry-down, during and after recovery, and a 3) ranking of the entries used.

Approach 2- Zone Level Irrigation: Larger study area size (~3 to 4 times more area and plant material) is used for accommodating multiple studies or 'zones' of irrigation (3 ET levels x 3 entry reps/ET level x 10.76 sq. ft/plot). This trial is not conducted under rainout shelters due to size constraints.

- a. Year 1- Similar to Approach 1, a full set of replicated entries is established, but within each of 3 target irrigation ET levels (zones). Plots (1 m x 1 m or similar size) will be fully established under full irrigation levels.
- b. Years 2-4- Irrigation treatments imposed. ET levels will correspond to 3 levels of historical reference evapotranspiration (ET_o) for the location, the maximum of which should be near full water requirement (0.6 x ET_o for warm-season) and lowest of which should be ~1/2 of this maximum level. ET_o levels for this trial are:
 - i. Warm-season: 0.6 x ET_o, 0.45 x ET_o, 0.3 x ET_o applied 1-3x weekly (depends on location)
- c. Frequency of irrigation to plots would also be a constant 1 or 2 day per week irrigation schedule (a single frequency should be decided on for all locations).
- d. Irrigation 'season' is approximately 120-150 days.
- e. Irrigation scheduling to account for rainfall (determined by location)
 - i. Approach 1- Let system run regardless of rainfall, do not adjust irrigation
 - ii. Approach 2- Do not adjust schedule for any events <0.25". Account for 50% effective rainfall for all other events in adjusting irrigation applied for each zone. (For instance, if a 1" rainfall is received; all plots are turned off for one event. If ½" is received, only the low irrigation level may be turned off, but others receive appropriate % adjustments to account for ¼" effective rainfall.
 - iii. Ultimately, accounting of total water received within each zone on a weekly basis is most important.
- f. Quality attributes (wilt/firing/% green cover, etc.) of all plots within each irrigation level will be noted regularly during the study, just prior to an irrigation day during the morning hours.
- g. At the conclusion of the study, irrigation + rainfall for each zone would be totaled by week (~10-14 weeks in duration). Quality (>6) or other parameter (>75% green cover) of interest in determining acceptability would also be noted on a per plot basis for each week. Finally, the particular amount of water needed to sustain acceptable quality each week would be determined on a plot by plot basis and totaled for the study. This amount might fluctuate by week or month.
- h. This approach is best suited for areas of the US that likely see visible drought stress arise in summer months where irrigation is not applied, i.e. (New Mexico, California, Colorado, etc.).
- i. Repeating the studies over three years will allow for upper and lower end seasonal requirements to be determined for each location.
- j. Data produced through the work will document 1) 'water quantity required (inches)' per entry for each location, 2) turfgrass quality ratings at regular intervals, and a 3) ranking of the entries used.