***Basic information***

Details about the experiment and data collection can be found in the published article Schomberg et al. 2023, *Interseeded cover crop mixtures influence soil water storage during the corn phase of corn-soybean-wheat no-till cropping systems*, available at Agricultural Water Management <https://doi.org/10.1016/j.agwat.2023.108167> [1]. The file *CCSP Experiment Setup Info Tables 1 Through 4.xlxs* include the following: A schematic of the crop rotation; Table 1 provides a list of the cash crops and cover crops making up the four cropping systems; Table 2 provides the corn planting and harvest dates, cumulative growing degree days (CumGDD oC), rainfall, and sensor measurement periods during the corn growing season; Table 3 provides information on the soil sensors including numbers per plot, sensor waveguide lengths, depths measured, and horizon thicknesses for estimating water volume; and Table 4 provides average monthly air temperature and rainfall estimated from 2011 through 2020 data.

The data used to calculate the average monthly air temperature and rainfall from 2011 through 2020 are in the file CCSP Weather 2017-2020 Rain and Air Temp used for GDD.xlxs. This file also includes the data and calculations of corn growing degree days (GDD oC) using 10 oC and 30 oC as minimum and maximum optimum temperatures as described in Abendroth et al. [2]. Weather data used as inputs for ETCalc [3], an online to evapotranspiration calculator developed by Danielescu [3], are provided in CCSP ET Calc Input Output Data and Meta Info.xlxs. Daily potential evapotranspiration (PET) was estimated based on the Penman Monteith method.

***Soil water and temperature***

Details about the soil water and temperature measurements are described in the manuscript [1]. Adjustments to the soil water and soil temperature data due to failed sensors are described below. Soil volumetric water content (m3 m-3) was used to estimate soil water storage (SWS) or the mm of water in the soil profile daily. Soil water storage (mm) was estimated by multiplying daily volumetric water content times the soil depth to get millimeters of water for each layer which were subsequently summed to get a profile total. Measured soil depths and layer depths are given in Table 3 of the manuscript and included in file *CCSP Soil Temperature (C) and soil water (mm) by depth.xlxs* in the first tab. Soil water storage and soil temperature data for each replication, cropping system treatment, and soil depth are provided in separate tabs for each year.

Estimation of cumulative evapotranspiration (ETe) and infiltration (INFe) were as described by Sadeghi et al. [4]. The simple approach calculates the change in SWS for the soil profile between successive days with negative values contributing to ETe and positive changes contributing to infiltration. These calculations can be made from the data in the file *CCSP Soil Temperature (C) and soil water (mm) by depth.xlxs* and are not included here.

**Cover crop aboveground biomass** **and corn yield.**

The file CCSP Corn yield cover crop biomass data.xlxs contains cover crop biomass and corn yield data for 2017 through 2020. These data are provided at the replication and cropping system treatment level for each year. Details about cover crop biomass sampling are contained in the manuscript. Corn yields were collected via a yield monitor on the crop combine. Yields were adjusted to the standard moisture content of 15.5 percent.

**Adjustments to missing soil water or soil temperature measurements.**

**2017**

REP 3 system 5 and 6 depth 1 water and temperature sensor data were missing from some sensors during 7/23 to 8/10 but there were a few measurements during each 24-hour period for all dates. These values were used for the day and no missing values were estimated.

REP 4 system 5 and 6 depth 1 water and temperature sensor data were missing from system 5 from 7/23 to 8/10 and system 6 from 7/28 to 8/26. In this case the missing data in systems 5 and 6 were estimated from systems 3 and 4 depth 1 using regression over all dates. Hourly data were estimated for each sensor prior to calculating averages for a plot to introduce variation in the estimated values. The values over a 24-hour period for each sensor were averaged for the day. Plot averages were estimated as the average of the multiple sensors.

**2018**

A few sensors were discarded due to bad data leaving only one sensor per plot for aggregation to daily values. Interpolation was needed only for one plot over a two-day period to fill missing data.

**2019**

Replication 2: Depth 4 sensor in system 6 produced bad data this data was substituted with the same data from system 5 depth 4 as the changes within this depth are generally slow and contribute little to the overall whole plot soil water storage. This depth has little change over the season.

Replication 3: Depth 4 sensors in systems 3 and 6 had bad data. Replaced system 3 depth 4 data with system 4 depth 4 data and replaced system 6 depth 4 data with system 5 depth 4 data. The reasoning again was similar to that above.

Replication 4: Problem with one sensor resulting in data that was out of range and was discarded. Data from the remaining duplicate sensor were used. No replacements or interpolations were made.

**2020**

Only minor issues with an occasional missed measurement.

**References**

[1] H.H. Schomberg, K.E. White, A.I. Thompson, G.A. Bagley, A. Burke, G. Garst, K.A. Bybee-Finley, S.B. Mirsky, Interseeded cover crop mixtures influence soil water storage during the corn phase of corn-soybean-wheat no-till cropping systems, Agricultural Water Management. 278 (2023) 108167. https://doi.org/10.1016/j.agwat.2023.108167.

[2] L.J. Abendroth, R.W. Elmore, M.J. Boyer, S.K. Marlay, Corn growth and development. PMR1009, Iowa State University Extension., Ames, Iowa, 2011. https://store.extension.iastate.edu/product/13656 (accessed September 23, 2022).

[3] S. Danielescu, Development and application of ETCalc, a unique online tool for estimation of daily evapotranspiration, Atmosphere-Ocean. (2022) 1–13. https://doi.org/10.1080/07055900.2022.2154191.

[4] A.M. Sadeghi, J.L. Starr, J.R. Teasdale, R.C. Rosecrance, R.A. Rowland, Real-time soil profile water content as influenced by weed-corn competition, Soil Science. 172 (2007) 759–769. https://doi.org/10.1097/ss.0b013e3180de4a14.