Soil Moisture

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Introduction

Soil moisture is critical for crop production most years in northwest and west central Iowa.

Materials and Methods

Soil moisture samples were taken at 17 sites in northwest and west central Iowa between October 28 and November 3, 2020. Moisture samples were taken at 1-ft increments down to a 5-ft depth. Samples were weighed, oven dried and reweighed at the Northwest Research Farm, Sutherland, Iowa. The moisture percentage was calculated from these data, and then used to calculate the inches of plant available moisture in the soil. The data from these sites are listed in Table 1.

Results and Discussion

Long-term fall averages range from about 4.5 in. to 6.0 in. in the top 5 ft of soil, representing a time period from origination of sites in the 1950s in many cases, until 1990. Averages for the last 30 years have been significantly higher. The amount of subsoil moisture in northwest Iowa, not surprisingly, is well below average this fall. The level of subsoil moisture at the soil moisture sites in 15 northwest Iowa counties ranged from 1.4 in. to 6.0 in. of plant-available moisture. The average among the 17 observations in the 15 counties was 2.8 in. Soil moisture sampling did not occur in the past two years with the assumption that the profiles were near field capacity November 1. In comparison, the three years in the last decade with the lowest fall averages were 2011 averaging 3.5 in. from 14 locations in 10 counties; 2012, averaging 4.5 in. from 20 observations in 15 counties; and 2013, averaging 5.3 in. from 15 samples in 12 counties.

The graphs below are from Iowa State University Soil Moisture Network (https://mesonet.agron.iastate.edu/agclimate/smts.php). This weather station timeseries data from April 15 to November 1, 2020, shows the volumetric soil water content at 12-in., 24-in., and 50-in. depths under growing crops. Note the 50-in. moisture sensor at the Western Research Farm, Castana, Iowa, was not functioning. Volumetric soil water content during the early part of the growing season was at or near field capacity at both sites, but neared the wilting point by the end of the growing season.

Much of the area produced near trend-line corn and soybean crops on limited summer rainfall. Corn and soybean crops appeared to produce root systems that went deeper than the expected 5-ft depth. Deeper rooting may have been a result of good planting time conditions and a relatively dry spring that encouraged early season root development

Rainfall during November, March, and April also will contribute to subsoil moisture. Typical rainfall for those months is 4.8 to 5.7 in. About 80 percent of that rainfall contributes to subsoil moisture reserves.

Table 1. Soil moisture available to plants.

Site	County fall average soil moisture (in.)	County	2020 crop	Plant available soil moisture (in.)
Doon	4.3	Lyon	corn	6.0
Sibley	5.1	Osceola	soybean	2.4
Spirit Lake	5.7	Dickinson	corn	2.2
Estherville	5.9	Emmet	soybean	2.5
Ireton	4.2	Sioux	alfalfa	2.3
Sanborn	5.9	O'Brien	corn	1.4
Sutherland	5.9	O'Brien	corn	2.4
Rossie	5.7	Clay	corn	3.2
Akron	4.3	Plymouth	corn	1.5
Le Mars	4.3	Plymouth	corn	2.8
Marcus	5.6	Cherokee	corn	3.4
Newell	6.0	Buena	soybean	2.9
Rolfe	6.0	Pocahontas	soybean	3.4
Lawton	4.6	Woodbury	corn	4.0
Battle Creek	6.0	Ida	soybean	2.6
Schaller	5.9	Sac	corn	1.8
Castana	4.9	Monona	corn	2.8

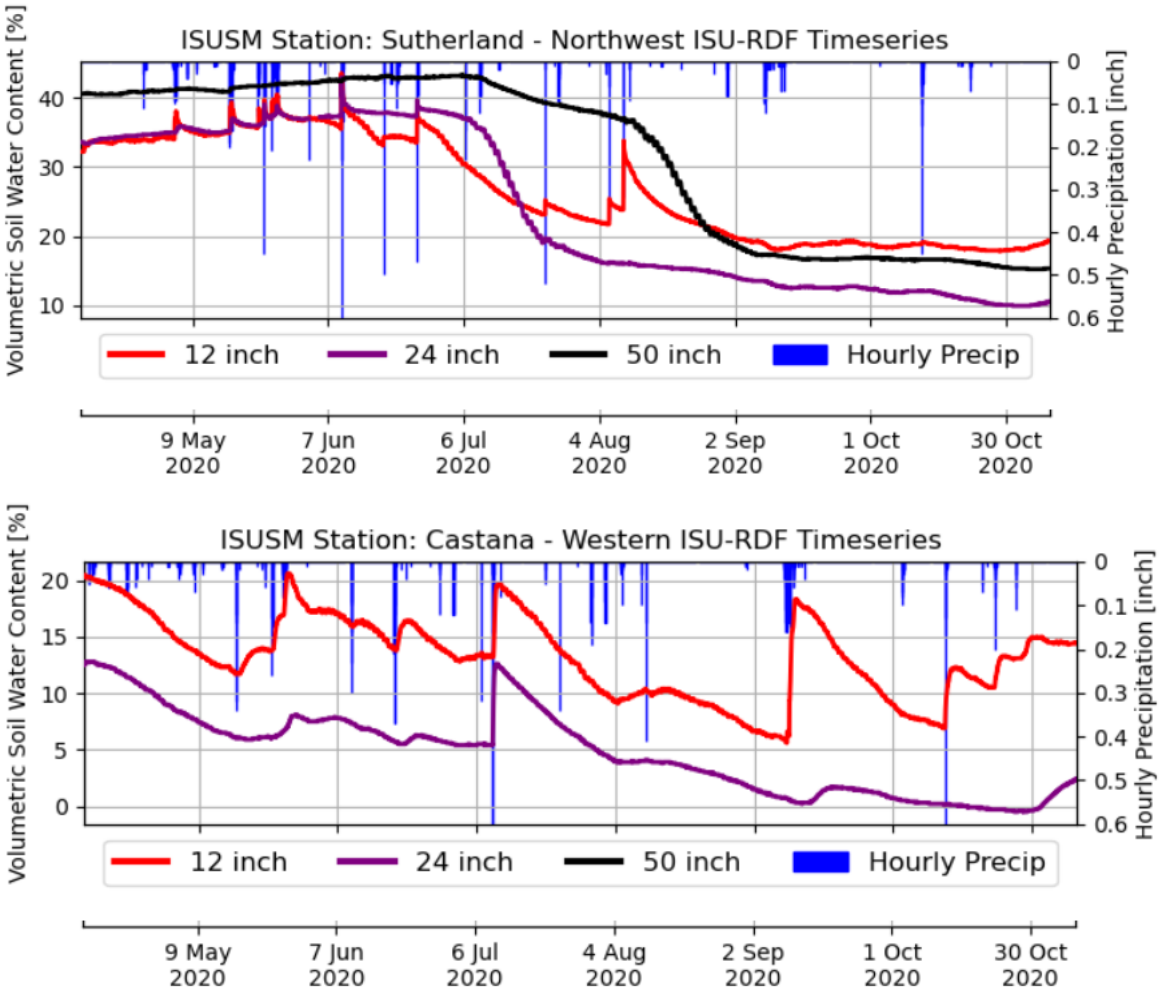

Figure 1. Soil moisture sensor data from the 2020 growing season.