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In-Season Forecast of Soil Water-Nitrogen And Corn-Soybean Yields for Central and Northwest Iowa; August 12 Forecast

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In-Season Forecast of Soil Water-Nitrogen And Corn-Soybean Yields for Central and Northwest Iowa; August 12 Forecast

Abstract

For many farmers and agronomists, at this point in the growing season more thoughts move to determining realistic yield expectations. Making those yield estimates might be tough, especially for soybean, since both the corn and soybean crops are roughly halfway through grain fill. The daily rates of water and nitrogen uptake by the corn crop are decreasing and crop growth is at a slower rate than previous forecasts. Soybeans are still accumulating nitrogen and water at high rates (Tables 1 and 2). At this point, weather, insects, and diseases can still influence yields.

Keywords

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ICM News

In-Season Forecast of Soil Water-Nitrogen And Corn-Soybean Yields for Central and Northwest Iowa; August 12 Forecast

August 14, 2015

By Mark Licht and Sotirios Archontoulis, and Ranae Dietzel, Department of Agronomy

For many farmers and agronomists, at this point in the growing season more thoughts move to determining realistic yield expectations. Making those yield estimates might be tough, especially for soybean, since both the corn and soybean crops are roughly halfway through grain fill. The daily rates of water and nitrogen uptake by the corn crop are decreasing and crop growth is at a slower rate than previous forecasts. Soybeans are still accumulating nitrogen and water at high rates (Tables 1 and 2). At this point, weather, insects, and diseases can still influence yields.

This article is an updated forecast as of August 12 for the status of the soil water-nitrogen and the expected corn-soybean yields for eight cropping systems in Iowa. The data provided here and the analysis are part of the pilot Yield Forecast project that is coordinated by the Iowa State University. Briefly, this project combines use of the [Agricultural Production Systems sIMulator](#) (APSIM) cropping systems model, the [Weather Research and Forecast Model](#) (WRF), and parallel in-field data collection to provide in-season systems-level forecasts. This pilot project focuses on two locations (central and northwest Iowa), two crops (corn and soybean), and two planting dates (early and late planting). Additional information can be found in two previous ICM News articles on [June 17](#) and [July 31](#).

Results from the August 12 forecast show that available soil water and nitrogen reserves are adequate to sustain high grain yields for Ames and Sutherland (Table 1). Our forecast model analysis indicates that in Ames, nitrogen availability is or will be the most important factor in determining the final corn yield whereas the most important factor in Sutherland will be water.

Table 1. Current status of crop stage, crop water and nitrogen use, and soil water and nitrogen as of the August 12, 2015 forecast date.

Cropping System ¹	Available water in soil profile (5 ft)	Plant available water to roots	Crop water use	Available N ³ soil profile (5ft)	Plant available N to roots	Crop N use
	----- inches -----			----- lbs N / acre -----		
ACE	8.7	6.6	12.1	12	9	249
ACL	8.2	6.1	9.5	34	29	232
SCE	6.2	3.8	9.8	135	128	250
SCL	7.8	5.4	7.7	193	187	200
ASE	9.9	7.5	9.8	10	7	206
ASL	9.8	7.4	7.5	12	7	161
SSE	8.0	5.6	8.2	78	72	191
SSL	9.1	6.7	6.1	105	98	140

¹ Cropping systems are defined as first digit = Ames (A) or Sutherland (S); second digit = Corn (C) or Soybean (S); and third digit = Early (E) or Late (L) planting date.

² Crop staging is using standard vegetative (V) stages found in the [Soybean Field Guide](#) and [Corn Field Guide](#) available through the ISU Extension and Outreach Store

³ it refers to the inorganic nitrogen (nitrate-nitrogen and ammonium-nitrogen)

Over the next 10 days corn will accumulate dry mass at an average rate of 280 lbs/acre/day and soybean at a rate of 165 lbs/acre/day (Table 2). Overall, soil water and nitrogen reserves together with nitrogen supply from organic matter mineralization will satisfy crop needs without major stress over the next 10 days.

Table 2. Predicted cumulative rainfall, water and nitrogen use, nitrogen mineralization and crop growth from August 12, 2015 to August 22, 2015 based on the forecasted weather.

Location / cropping system	Forecasted cumulative rainfall	Cumulative soil water evaporation	Cumulative crop water use	Cumulative crop N use	Cumulative net soil N mineralization	Average crop growth rate ¹
	Inches	Inches	inches	lbs N/acre	lbs N/acre	lb DM/ac/d
ACE	0.15	0.42	2.8	10.3	11.3	287
ACL	0.15	0.42	2.75	14.9	11.0	285
SCE	1.06	0.43	3.3	4.6	7.5	274
SCL	1.06	0.45	3.3	18.6	11.2	273
ASE	0.15	0.41	2.6	41.2	7.6	149
ASL	0.15	0.38	3.0	33.5	6.3	181
SSE	1.06	0.43	3.5	52.2	8.2	161
SSL	1.06	0.43	3.5	46.4	8.5	163

¹ DM, above ground dry matter (lb DM/ac/d, pounds of above ground dry matter per acre per day)

Compared to the last forecast on [July 31](#), the range of uncertainty (difference between 10% and 90% probability) has continued to decrease. On average, today's forecast indicates that corn attainable yield will be about 230 bu/ac at Ames with early planting and near 205 bu/ac at Sutherland. More details can be found in Fig. 1. In this particular year, the 50% probability (median) is close to 10% probability (best case scenario) for the corn in central Iowa (Fig. 1). This reflects excellent growing conditions to date. The 90% probability, which reflects the minimum yield that can be achieved (worst case scenario), shows lower values for corn in Sutherland because of the water stress conditions that occurred in the mid- to late-vegetative stages. Soybean yields are higher for the earlier planting dates at each location and central Iowa seems to have slightly higher yield levels than northwest Iowa.

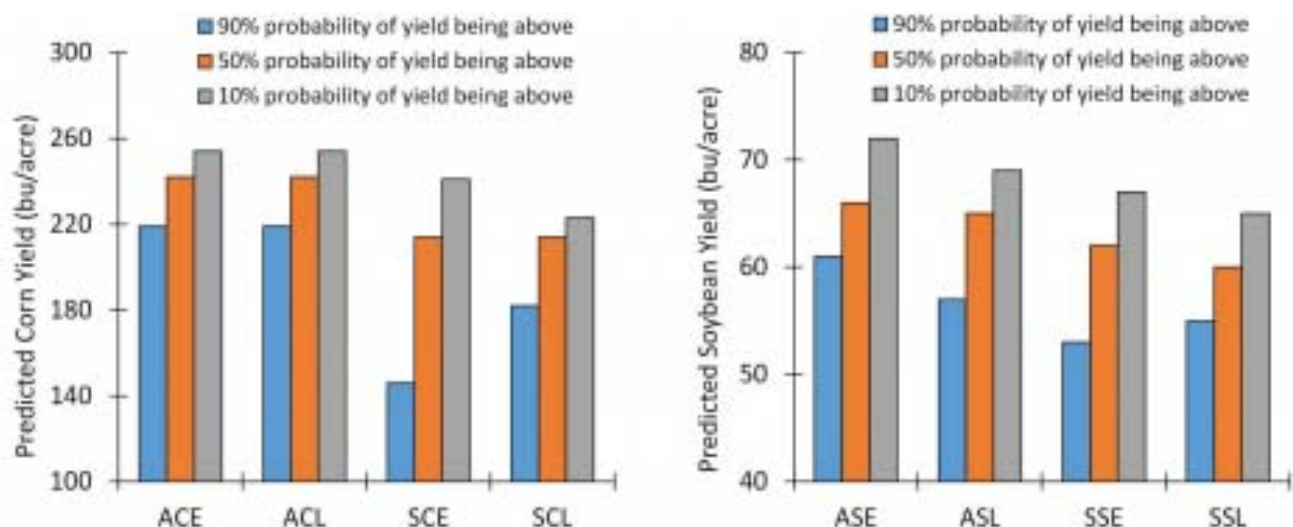


Fig. 1 Attainable yield predictions for eight cropping systems in Iowa based on information available until August 12, 2015. ACE = Ames Corn Early planted, ACL = Ames Corn Late planted, SCE = Sutherland Corn Early planted, SCL = Sutherland Corn Late planted, ASE = Ames Soybean Early planted, ASL = Ames Soybean Late planted, SSE = Sutherland Soybean Early planted, SSL = Sutherland Soybean Late planted.

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