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## The Use of Climate Information in Midwest Agriculture Results from a Farmer Survey – Part II

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While much research has been done on the impacts of climate variability and climate change on agricultural production, there are few studies on how weather/climate information influence agribusiness decisions. Also, innovation in climate services for agriculture is occurring at high speed (Swart et al., 2017), therefore it is necessary to update studies on the use of these services in agriculture.

This article is a second part of a report on the use of climate information in US Midwest farming. It describes how farmers use climate information in decision-making. A previous article (Cabrini et al., 2022a) analyzes the sources of weather/climate information for Midwest farmers.

### Data

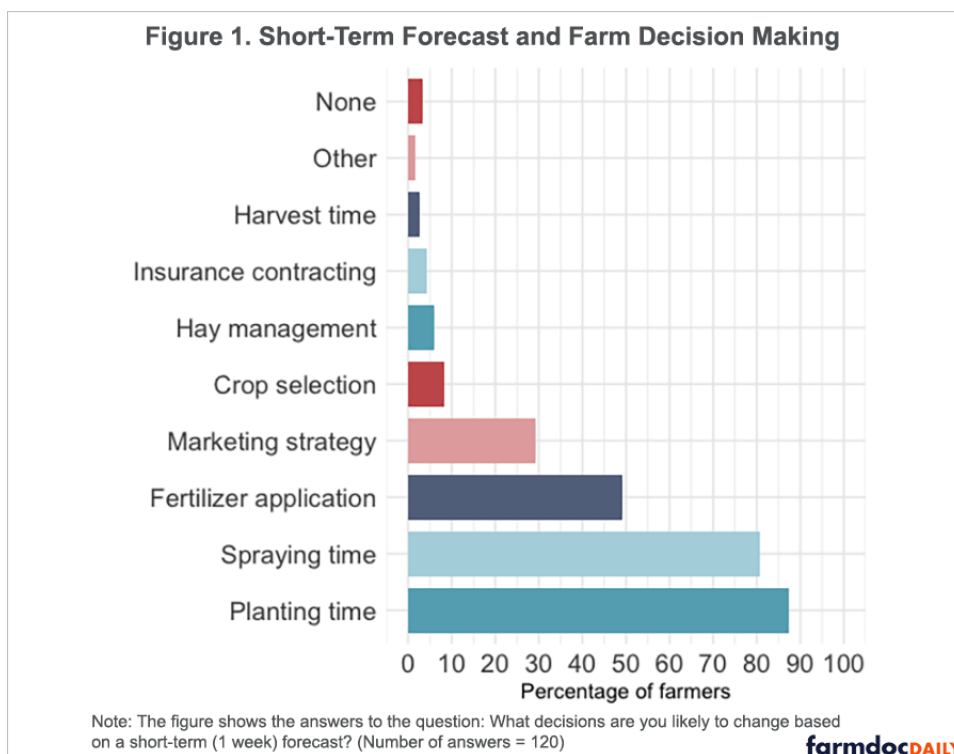
Qualitative and quantitative tools were combined in the analysis. Interviews with open questions were done with 12 farmers in Illinois. Then, an online survey was conducted through the list of subscribers to *farmdoc* in which 181 answers were obtained from farmers. The data gathering and sample characteristics are presented in Cabrini et al., (2022a).

### Use of Short-Term Forecasts

Most farmers use the short-term forecast in farming decisions (Figure 1). This forecast influences several crop management decisions: Planting and spraying time, fertilizer application, and hay management.

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Some quotes from the interviewed farmers emphasize the influence of short-term forecasts at planting time:

*"I'll check the forecast especially when I am going to plant, I'll always be looking at the 10 days forecast."-  
"If we were going to have some cold weather maybe we will delay planting, but that would be the only time that weather would delay us."*

### Use of Seasonal Forecasts

With respect to seasonal El Niño-Southern Oscillation (ENSO)-based forecasts, 50% of the farmers indicated that this forecast does not influence farm business decisions (Figure 2). However, 72% of them reported that they check ENSO forecast. Some comments from farmers were:

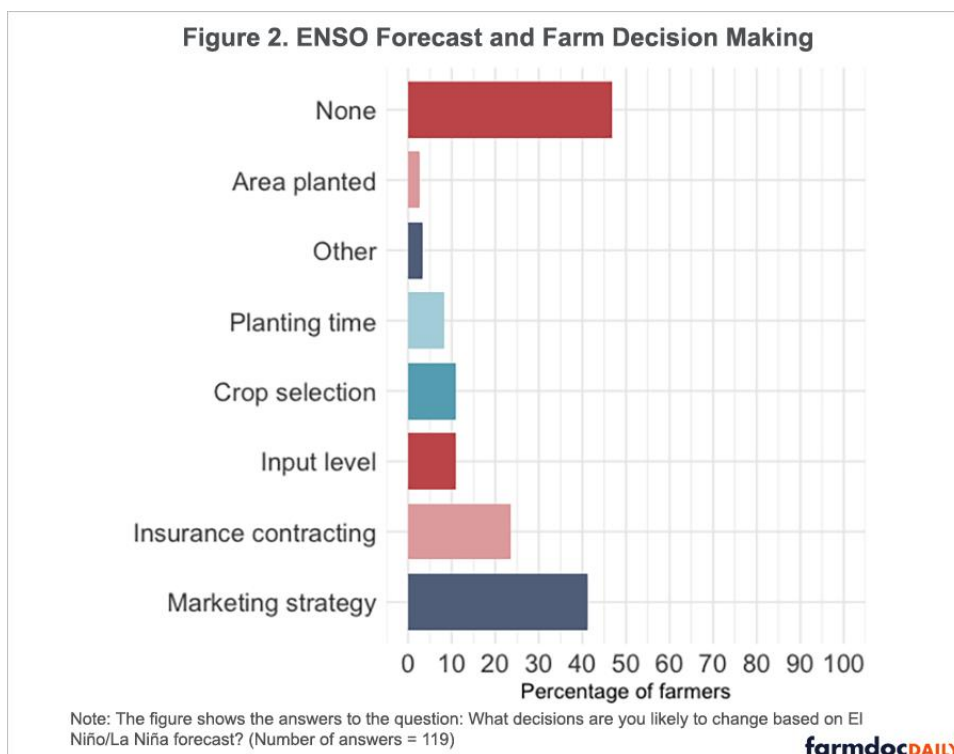
*"I pay attention to it, but I don't know how much I use it."- "Beyond 10 days the accuracy is just not that strong that you were going to make too many critical decisions based on that"*

Within the farming decisions influenced by the ENSO-based forecast, "marketing strategy" was selected with the higher frequency. These quotes from the interviews exemplified the use of climate information in marketing:

*"Specially selling crops, like if I am selling futures, hedging my crop... if the climate is going to affect the yields, maybe there is gonna be a bad drought or something, I might not sell the crop ... price should be higher."*

*"It might influence my decision on how to sell the crop, especially when it becomes to forward pricing."*

*"... we rely on information to help make decisions on grain marketing. So, if Argentina, Brazil, South America are struggling weather-wise that could influence out marketing decisions here..."*



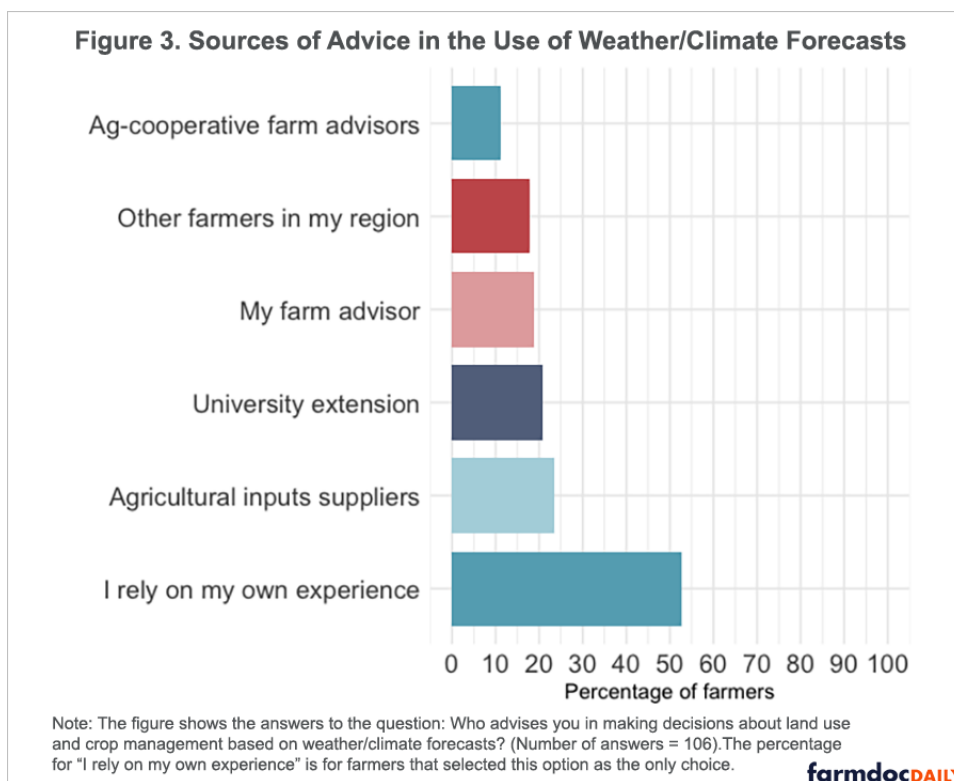
### Final Comments on Weather Forecast Use

The 90% of surveyed farmers reported no influence of short-term and seasonal forecasts on crop selection. A 50%-50% corn/soybeans is the most frequent land assignment and farmers maintain this corn/beans rotation, despite climate forecasts.

Past research on the use of climate information in agriculture showed similar results to the ones in this study. Mase and Prokopy (2014) conducted a review of papers published from 1979 to 2013, in Australia, Canada, and the United States. They conclude that in crop production systems, farmers emphasize short-term forecasts, which are perceived to be the most useful compared to seasonal forecasts. This statement remains true for IL farmers nowadays. On the other hand, the influence of forecasts on marketing strategy is not mentioned in this review, however, the current study indicates that it is relevant for IL farmers.

### Sources of Advice in the Use of Weather/Climate Forecasts

Half of the farmers reported that they rely on their own experience when making decisions based on climate/weather forecasts (Figure 3). The other half of the farmers receive advice from the public sector (University extension) and/or the private sector (Ag inputs supplies, farm advisors, and neighbors).



### Climate Information in Decision Support Tools (DST)

Forty percent of the surveyed respondents use DST in their farming operations ( $n = 119$ ), and half of them indicated that these apps are a source of weather/climate information. The most frequently mentioned applications were Climate FieldView (68%) and Granular (22%). In the interviews, farmers mentioned that they use these DST to check the forecast for each of their farms, monitor rainfall and hail in the different fields, and check appropriate conditions for spraying.

The proportion of farmers using DST is larger compared to the numbers reported by Lu et al. (2021) from a survey conducted in 2013-2014. In that survey, the percentages of Midwest farmers and advisors having subscriptions to DST with weather/climate information were 17% and 19%, respectively. Also, these authors reported that advisors are more likely to use free weather/climate services provided by universities or government agencies.

Farmers also provided information about their needs for better weather/climate information in DST. The following items were reported:

- Finer prediction models: improved medium- and long-term forecasts.
- Canopy level temperature and humidity for disease risk
- Better wind, and hail event precision
- More soil moisture information
- Prediction on soil temperature
- Information on field trafficability
- A weather radio station
- More weather stations in their fields

- Better statistical analysis for decisions
- Recommendations on how much N to apply mid-season based on fall/spring weather after fall anhydrous application.
- Recommendation on nitrogen anhydrous applications based on temperature forecast.
- Recommendations for scheduling the plots for optimal planting time at the farm level, based on soil moisture and considering equipment restrictions.

## Summary

Farmers strongly rely on short-term weather forecasts for crop management decisions. The planting season is the most critical time when short-term forecast information is valuable. On the other hand, seasonal ENSO-based forecasts are perceived as less reliable and have little impact at the field level. However, for 40 % of farmers seasonal forecast influence marketing timing.

Forty percent of the surveyed respondents use DST and half of them use climate information/forecasts from DST. Farmers have several demands for improving climate information for farm decision-making, including more accurate medium-longer term forecasts and better agronomic-climate models for planting and fertilizing decisions.

Innovation in climate services can aid farmers and other players in the ag sector with risk management and better decision-making. This report is part of a study that aims to generate valuable information for improving the access and use of climate data and tools in decision-making and to identify the demands for new climate services.

## References

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