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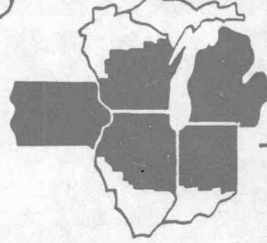
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Agricultural Letter

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WEATHER CONDITIONS have had a depressing effect on this year's domestic crop production. Supplies of many major grains, especially feedgrains, will be much smaller than anticipated in the upcoming year. Because of its prominent role in grain production, the reduction in U. S. production will have a pronounced worldwide effect on available grain supplies. Estimated world grain output for 1974-75 was recently reduced 5 percent, to 942 million tons from 984 million tons. Over 39 million tons of the 42 million ton cutback was due to the downward revisions in U.S. production estimates.

The largest deviation between earlier expected production levels and the most recent production estimates is in feedgrains, down 25 percent. Last March it was estimated that U. S. corn production—the largest component of the feedgrains—might total nearly 6.7 billion bushels, over 1.7 billion bushels or 26 percent more than the most recent estimate. Soybean and wheat production estimates for the current year have also been revised downward 15 and 11 percent, respectively, from the March estimates. It should be noted that the March production estimates were based on intended planted acres and long-term yield trends which implies that weather conditions would approach the norm in the ensuing months.

Obviously, normal weather conditions have not prevailed during 1974. Heavy rains during May and June delayed plantings in many parts of the Midwest and were followed by high temperatures and below normal precipitation in July and early August. Most major Midwestern crops reached record yields in 1972, but yields declined in 1973 and are now expected to decline further this year. Many observers are now questioning whether developments during the past two years represents a break in long-term weather trends or is merely a short-term phenomenon.

A detailed statistical analysis of the influence of weather and climate on U. S. grain yields, made by the National Oceanic and Atmospheric Administration (NOAA) in the fall of 1973, deals with this question. The NOAA study points out that two major factors affect crop yields in any given year, technology and weather. An attempt was made to isolate the effects technology and other residual factors by statistical means so specific weather factors that contribute to higher or lower yields could be evaluated. Analysis of three crops—corn, soybeans, and wheat—were conducted using yield, temperature, and rainfall data from five major producing states over an 83-year period. The states studied account for 50 to 60 percent of the respective crops' total U.S. production.

Drought conditions were defined as a combination of temperature and precipitation conditions over a period of time leading to a substantial reduction in yields of one or more of the three crops. A substantial

reduction in yields was further defined as a 10 percent yield decline from the yield expected with temperature and precipitation equal to the long-term averages.

The conclusions set forth were that there has been a remarkable run of near-normal weather that has produced relatively high yields in recent years. Favorable weather appears to have been a casual factor with respect to the recent string of consistent high yields, especially for corn. The average or normal weather experienced in the Corn Belt in recent years has been nearly optimum for corn yields. These near optimal weather conditions coupled with increasing technology has produced yields in recent years that may not be sustainable in future years. Furthermore, there is statistical evidence that suggests technology has not influenced the susceptibility of crop yields to weather. Also, the report states that there is no reason to expect the variability experienced in the bulk of the 83 years under study to disappear in the future. Thus, the study contends it is unlikely that yields of these three crops will stay at the consistently high levels achieved in recent years.

The suggestion that technological change and its effect on yields is mutually exclusive from weather factors may be open to some debate. Certainly the use of herbicides and minimum tillage cultivation practices conserve limited moisture supplies. Proper application of insecticides and fertilizers can also minimize other stresses on the crops, an indirect but important factor concerning yields. Furthermore, the increasing amount of land coming under irrigation in recent years serves as another moderating factor.

The probabilities of drought affecting yields during any one year are about 10 percent for corn and wheat and slightly more than 2 percent for soybeans according to the study. However, this also suggests that there is nearly a 90 percent probability that corn and wheat yields will be average or above average in a given year and almost a 98 percent probability that soybean yields will be average or above average. Moreover, although the probabilities can be statistically established on a historical basis there is no way to determine "a priori" what the weather will be in any given year.

Terry Francl
Agricultural Economist