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VERIFICATION OF SHELTERBELT CROP YIELD IMPROVEMENTS IN THE GREAT PLAINS REGION

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ABSTRACT

In 1962, J. H. Stoeckeler summarized the impacts of windbreaks on agriculture in the Great Plains. This paper has been the standard by which windbreak benefits, particular crop yield benefits have been judge. Over the last 60 years, agricultural practices have changed dramatically. The use of minimum tillage and no-tillage practices has provided significant benefits in the control of wind erosion. Progress in hybrid genetics and the introduction of GMO crops have increased yields dramatically over the last 30 years. Many producers are asking if the benefits of field windbreaks are still economically viable. Can we still afford to divert land from production to field windbreaks? The availability of yield monitors, GPS systems and excellent satellite imagery may provide the technology to verify that the yield responses seen as a result of field windbreaks are still relevant today. Preliminary data will be collected during the summer of 2013 in at least five Great Plains States. Data protocols will be tested and refined during the late summer and funding sought in the fall. Our purpose in coming to the AFTA meeting is to seek additional input and suggestions from agroforestry professionals.

Keywords: crop yield monitors, field windbreaks, economics

Study's purpose and need

Windbreaks have a long history of use in all parts of the world. Their many uses and benefits have been review extensively most recently by Brandle et al (2009). Primarily viewed as a means to control wind erosion, windbreaks have been shown to provide significant economic benefits from increased crop yields. While most studies (Stoeckeler, 1962; Baldwin, 1988; Kort, 1988; Brandle et al. 1992) have reported an overall yield increase, many producers still question whether modern agriculture with its many advances in hybrid genetics and genetically modified varieties still provide the advantages of crop protection from wind. Do field windbreaks still provide the yield advantages and economic benefits seen in the past? The proposed study is designed to answer this question for the Great Plains Regions of the USA.

A different approach

If the study methodology were to involve the establishment of research plots with scientific sampling, it would be too large for any one agency, university, or group to take on. The size of

the area, the number of crops grown, and the differences in climate, soils, and farming methods would add so many variables that the number of needed plots would be huge. The intent with this study is to compare multiple years of protected/unprotected field data over a large area and from many farmers. Because we are looking for relative crop yield changes and not absolute numbers, this approach will minimize the variables listed above. In addition, we will not be answering why there is an effect, just whether there is one.

The important part to this study is that the much of the data already exists and is in the hands of many farmers. Yield monitors are a recent development in agricultural machinery that allow producers to assess the effects of factors such as weather, soil properties, management, and in our case, windbreaks, on production. When combined with GPS, they can provide crop yield data for virtually every point in a field. So if this data were joined with knowing if a functioning windbreak was present or not, a comparison of yields between protected and unprotected fields would be possible. Many farmers maintain this data for several years. This could minimize the effects that weather and cropping systems might have on the overall effect.

Working with Extension Educators, NRCS District Conservationists, District Foresters and local Soil and Water Conservation Districts in the seven state region of Minnesota, North Dakota, South Dakota, Nebraska, Kansas, Oklahoma, and Texas, we will seek out individual farmers willing to participate. Their operation must include fields protected by functioning field windbreaks; they must have crop yield monitors on their combines; and they must be willing to share their yield data with the research group.

A minimum of 10 sites per state will be identified (20 or more is desirable) providing at least 70 farm sites for the study. The study will continue for at least two growing seasons providing yield curves for a minimum of 140 fields within the 7 state area. It is anticipated that many of the cooperators will have additional yield data from previous years which will be added to the data file.

Once an individual cooperator has been identified and agreed to participate, an on-site visit will be arranged to assess the location, height, width and condition of any field windbreaks on the farm. Individual crop fields (both protected and unprotected if available) will be selected and a harvest pattern will be agreed upon with the farmer. Field information (crop and soil type) will be collected for each field. Any past year's crop yield data along with cropping practices information will be identified and included in the study.

What do we expect?

At a minimum we expect to be able to produce yield curves of shelter responses of the major crops (maize, soybean, and wheat) as well as important crops with more localized areas of production. Economic analysis in year 3 will help define the economic value of field windbreaks under today's modern agricultural practices.

Our purpose for coming to the AFTA meeting is to solicit input from other agroforesters. We welcome any and all suggestions you might have.

Where do you send comments?

Send your comments to:
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