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Microclimate studies of crop environments under different agroforestry arrangements

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One of the factors influencing crop yields is evapotranspiration; the evaporation of water from both plants and soil. Soil moisture provides many nutrients to crops, so evapotranspiration rates are of concern. This study will focus on the environmental conditions above crop fields in Northeastern Missouri and see which conditions lead to higher evapotranspiration rates. The fields also contain two kinds of buffers: a tree and a grass buffer. Weather instrumentation was placed above the crops between the different buffers and data was collected in regular intervals throughout each day over the past two years. The first year the crop was corn, and soybeans the second year. Some of the variables looked at include temperature, humidity, net radiation, wind speed, and wind direction. In this project a comparison is made between the conditions over soybeans between the tree and grass buffer to see which buffer creates which environmental conditions. The main hypothesis was that grass buffers would lead to higher evapotranspiration rates due to higher winds (grass being shorter than trees) advecting moisture away. Evapotranspiration rates were derived using a Penman equation and, using MATLAB, graphs were made of each of the variables using 10-day averages. It was determined that the hypothesis was correct by looking at the data output qualitatively. However, the significance of the difference between the grass and agroforestry buffers has yet to be found since the time period used in the Penman equation is questionable. Therefore the equations used thus far will be examined thoroughly and modified if need be to set the quantitative data to the correct time period. In this results will be obtained that will be more understandable to the general public and science community.