Modern corn production practices have been developed to sufficiently meet nearly all the growth requirements for high yields. However, factors that limit the potential for optimum yields will persist while productive chloroplasts, the biological catalysts that capture the energy to drive photosynthesis, continue to be deprived of incident sunlight.

Corn genetics have distinctive influences on the expression of those factors limiting yields such as the efficient biosynthesis of carbon dioxide for photosynthesis and carbon (C) allocation within the plant, including that released into soil through root exudation. The Solar Corridor Cropping System Community was formed in late 2010 with the goal of optimizing grain production by maximizing photosynthesis using planting patterns for efficient capture of solar radiation and carbon dioxide. LeRoy Deichman is currently serving as the Community Leader, and with 114 ASA members comprising our community, we hope more will consider joining.

Our Focus

The mature (oldest) chloroplasts in the lower leaves of high-yield modern corn fields are deprived of incident sunlight for most of the growing season due to current planting patterns. The Solar Corridor Cropping System Community is focused on determining the upper limits of productivity if incident sunlight is provided to those lower leaves throughout their life. While our base data is on corn, we are looking at all crops that fit into a crop rotation. While our focus is on grain yield, we are looking at multiple benefits in soil quality, C sequestration, insect pest control, plant lodging, disease resistance, enhancing beneficial arthropods, and community values in societies at large. Results to date have shown that the properly designed solar corridor has, indeed, increased yields, root exudates of C, and soil microbial activity. The yield increases are variety and cultivar specific (most current commercial corn varieties do not respond). Additional crop production benefits include sustained late-season lodging resistance due to high winds and to the incidence of stalk rot.

The solar corridor hypothesis states that using a properly selected variety in a properly designed cropping system (SCCS), corn planted in 152- or 190-cm row widths can produce as much or more grain as in 76- or 95-cm rows and simultaneously produce additional crop and soil benefits in the area (the corridor) between the widely spaced corn rows. Deichman’s presentation at the 2005 ASA Annual Meeting demonstrated that the additional benefits can be achieved without affecting corn yield.

Examples of Research from Our Members

Here are examples of some members of the Community who have pursued specific related research projects within their own research stations: