Biofuel production from biomass seems to be an alternative solution to mitigate fossil fuel use and to reduce greenhouse gas emissions. However, growing food crops like corn grain, soybean, and cereals for biofuel production would compete with land use for food production. Cellulosic biomass derived from crop residues would not compete with food use since both can be produced simultaneously; therefore, it seems to be a promising alternative renewable source of energy.

Corn production for grain is important given its many uses for human food, animal feed, and other industrial products. Additionally, the abundance and potentially large biomass yield makes corn an attractive bioenergy feedstock. However, harvesting corn biomass for an extended period could negatively impact soil productivity. Sustaining soil organic carbon (SOC) and crop productivity will greatly depend on the amount of stover harvested.

Rye is a winter cover crop known for its superior winter hardiness, its sensitivity to herbicide kill, and its consistent large residue production. The impact of rye as a winter cover crop on corn productivity varies with geographic location. Studies in the U.S. Southeast indicated that using cover crops can improve soil productivity, especially when combined with conservation tillage practices.

In the January–February 2015 issue of *Agronomy Journal*, researchers evaluate the effect of in-season weather conditions, rye as a winter cover crop, and corn residue harvest on grain yield and biomass distribution across two soil types. Their experiment was conducted at two locations in Alabama: the E.V. Smith Research Center in central Alabama (Compass loamy sand soil type) and the Tennessee Valley Research and Extension Center (TVS) in the northern part of the state (Decatur silt loam soil type). The examined factors were cereal rye as a cover crop with three levels (no cover, rye as a cover crop harvested in spring, and rye retained after chemical termination with glyphosate) and two corn residue removal levels (0 and 100% removal).

Grain yields were positively correlated with cumulative precipitation and negatively with seasonal average temperature at both locations. The strongest negative correlations between corn yields and air temperatures were detected in plots where rye was removed in spring and in plots without a cover crop. This negative correlation between air temperature and yield underscores the impact of heat stress on corn productivity. Furthermore, this is an indication that when rye is retained in the field, it has the potential to lower the daily maximum soil temperature, especially in June and July, which corresponds to a critical period of development for corn. At TVS, stronger correlations between grain yields and weather conditions were detected where rye was retained in the field. However, the differences between the two locations were attributed to differences between the two soil types.

Significant differences in grain and biomass yields were observed among individual year-site-years. This was attributed to differences in weather conditions among site-years.

An interesting result was that corn grown where rye was removed in spring resulted in similar or lower yields compared with plots where rye was retained or no-rye plots at both locations. As reported in previous studies, corn grew better where rye was retained.