

FACTORS AFFECTING CEREAL RYE BIOMASS IN BELTSVILLE USING MULTIPLE LINEAR REGRESSION MODEL

Cereal rye (*Secale cereals*) is a remarkable multipurpose grass from the *Poaceae* family. It is largely cultivated for its grains as food and foliage for feed. Its hardy nature allows it to grow in a wide range of environments. It plays an important role in preventing nutrient loss from soil resulting from erosion, mitigates weed and pest proliferation and encourages pollinators while preserving the soil moisture.

In this analysis, I will be investigating the factors that affect the biomass of cereal rye grown in Beltsville between 2010-2012. This analysis is based on an existing study on “Using statistical learning algorithms to predict cover crop biomass and crop nitrogen content” by Marcillo *et al.* (2020).

Method

The dataset was mined from the GitHub project called CoverCrops_ML_project by GuilleMarc. The data was analysed in R studio. Dataset was transformed to contain only 144 rows (observations from Beltsville) and 14 columns (biomass_25, ndvi_25, tiller_eff_25, n_rate_fall, n_rate_spring, n_soil_base; where biomass_25 is Y and others were predictor variables).

The relationship between the variables was examined with scatter plots and correlation matrix. Dataset was loaded into a simple multilinear regression model for a better understanding of the relationships.

Results

The model percentage of fit is 85.05%. It indicates that this regression model is a good fit for predicting values of cereal rye biomass. Normalized difference vegetation index has a p-value of 0.00018 and a highly negative effect or inverse relationship to cereal rye biomass. Nitrogen efficiency, nitrogen fertilizer application in fall and Tiller efficiency (with p values of $< 2e-16$, $3.44e-11$ and $1.98e-09$ respectively) all have a very high significant effect on cereal rye biomass. Nitrogen soil base with a P-value of 0.01163 shows that it does not affect cereal rye biomass.

References

Marcillo, G. S., Mirsky, S., Poncet, A., Reberg-Horton, C., Timlin, D., Schomberg, H., and Ramos, P. (2020). Using statistical learning algorithms to predict cover crop biomass and cover crop nitrogen content. *Agronomy Journal*, 112(6), 4898-4913.