

# Hyperspectral Imaging-Based Phenomic Prediction and Selection for Deoxynivalenol Accumulation in Soft Winter Wheat

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Evaluation and improvement of Type III resistance (lower mycotoxin accumulation) is an integral part in developing wheat varieties with resistance to Fusarium Head Blight. Therefore, application of novel tools is necessary to increase selection accuracy and intensity. Here, we explored the application of phenomic prediction using hyperspectral imaging in predicting Deoxynivalenol (DON) content in soft winter wheat kernels. In all Bayesian prediction models used, phenomic prediction recorded higher accuracy (0.63 – 0.67) than genomic prediction (0.55 – 0.60). Following this, we proceeded to use the trained prediction models: Bayes C, Bayesian Ridge Regression, and Bayesian LASSO in a testing set of F<sub>4:5</sub> breeding lines. Selection was carried out using Unsupervised K-Means Clustering. A large proportion of F<sub>4:5</sub> breeding lines predicted to have low DON content were also observed to have low GC/MS-derived DON content. The results of this study revealed the potential application of hyperspectral imaging in predicting Deoxynivalenol accumulation in soft winter wheat kernels with increased selection intensity.