CONTINUOUS WAVELET ANALYSIS BASED SPECTRAL FEATURE SELECTION FOR WINTER WHEAT YELLOW RUST DETECTION

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ABSTRACT—This study aims at identifying some mechanisms based on spectral features through continuous wavelet (CWT) analysis, and examining their estimating and discriminating power. In 2003, an inoculation of yellow rust fungal was conducted. Field measurements of canopy reflectance and biochemical properties were made with 5-7 day intervals during key growing period. Through a two-tailed paired student t-test, it was found that the variation of chlorophyll content is closely associated with the yellow rust infection. Based on this relationship, four spectral features were thus identified by CWT analysis. According to the results of stepwise linear regression and partial least squares (PLS) regression, the estimating power of those spectral features was not satisfied. However, the discriminating power of those features was revealed by linear discrimination analysis (LDA) and quadratic discriminate analysis (QDA), which yielded a success rate of 76.4%. Therefore, the CWT analysis and discriminate analysis are of great potential in identifying the yellow rust infected wheat plants.

Key Words: yellow rust, continuous wavelet analysis, linear discrimination analysis (LDA), quadratic discriminate analysis (QDA)