Modeling resistance to oat crown rust in series of oat trials

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Abstract

Based on the results of post registration variety trials a recommendation for farmers is produced which varieties should be sown. In trials on spring oat one of the observed characteristics is resistance to oat crown rust. This is main disease which affects all regions of crop growth ([2]). Crown rust reduces oat yield and causes thin kernels with low weight. Moderate to severe epidemics can reduce grain yield by 10 to 40%.

To answer the question which oat varieties in the Polish post registration trial system are the best in terms of resistance to crown rust, we analyzed series of 40 oat field trials from two consecutive years 2009 and 2010. For this purpose the generalized linear mixed model ([3]) with single variance component representing variety×site interaction was applied. The most resistant varieties were identified and significant differences were detected. One of the varieties was also more resistant to crown rust then standard (the combination of three varieties pointed by specialist as standard varieties). Maximum likelihood estimates were obtained using Laplace transformation to compute likelihood function. All computations were performed using R package ordinal ([1]).

Keywords

Generalized linear mixed model, Multinomial distribution, Ordinal data, Oat crown rust.

References

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