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## **Sektion 5**

### **Resistenzzüchtung I**

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#### **05-1/05-2 - Resistance breeding progress and impact of disease severity under natural infections in winter wheat variety trials in Germany in 1983-2019**

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There is an increasing pressure from society and politics to reduce the use of chemical plant protection in crop production. In this regard, resistance breeding against relevant fungal diseases is of utmost importance. Hence, this study aims at quantifying breeding progress achieved in resistance breeding towards varieties with higher yield and lower susceptibility for six major diseases under natural infection in Germany during 1983-2019. Further aim was the prediction of disease related yield losses during 2005-2019 by mixed linear models using disease traits as covariates. For all traits, overall progress of the fully treated intensity (I2) was considerably higher than for intensity without fungicides and growth regulators (I1). The susceptibility level was considerably reduced during the study period for mildew (MLD), tan spot (DTR), and Septoria nodorum blotch (SNB), to a lesser extent for brown rust (BNR) and Septoria tritici blotch (STB), however, not for yellow/stripe rust (YLR). Considerable yield loss under severe disease infestation was predicted for STB (-6.6 %), BNR (-6.5%) and yellow rust (YLR, -5.8 %), but lower losses for the other diseases. The yield loss for low vs. high susceptible varieties under severe disease conditions was about halved for BNR and YLR but less for STB indicating differences in resistance breeding progress between diseases. The empirical evidence on the functional relations between disease infestation, variety resistance and yield loss based on a large-scale multi-disease field trial data set in German winter wheat provides relevant evidence to the ongoing discussion on the reasonableness of chemical plant protection in crop production.

#### **05-3 - Wirksamkeit von Gelb- und Braunrostresistenzen sowie Evaluierung genetischer Ressourcen auf deren Resistenz im Rahmen des nationalen Evaluierungsprogramms EVAII**

*Effectivity of stripe rust and leaf rust resistances and evaluation of genetic resources for their resistance in frame of the national evaluation program EVAII*

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Jährlich werden seit 2001 durch das JKI Feldversuche mit Hilfe von naheisogenen Linien (NILs), die je ein einzelnes Gelbrost- (Yr-) sowie Braunrostgen (Lr-Gen) ausprägen, durchgeführt. So entstand ein langjähriger Überblick über die Wirksamkeit von Resistenzen und deren teilweise Überwindung durch virulente Rassen. Es zeigte sich, dass nur noch wenige der 17 getesteten Yr- und 51 Lr-Gene effektiv gegenüber einem Großteil der innerhalb der jeweiligen Rostpopulation vorhandenen Rassen wirken. Nur die Resistenzen Lr19, Lr45 und Lr72 sowie Yr5, Yr10, Yr15 und Yr27 führten zu vollständiger Resistenz. Auf Basis dieser Daten konnten durch Kreuzung von NILs mit effektiver Resistenz mit der anfälligen Sorte