

## Streszczenie w języku angielskim

One of Poland's most significant agriculture sectors and an important part of the nation's food economy is cereal production. The environment, breeding efficacy, farm size, and innovations in technology each have significant effects on cereal production. Due to its substantial yield potential and relevance in both human and animal nutrition, wheat dominates the production of cereals in the country. Plant pathogens are a significant barrier to wheat production, with an average annual reduction of 21% in expected worldwide yields. More than half of the losses are caused by the four primary diseases: leaf rust, fusarium head blight, septoria tritici blotch, yellow rust. Harmful agents can emerge out of nowhere and cause epidemics that result in significant crop losses. Pesticides, quarantine, and breeding use genetic diversity that increases resistance and improves other traits are examples of control strategies. Genetic resistance could reduce the ideal rate of fungicide application needed to stop the spread of disease. The ability of pathogens to adapt and evolve requires a constant search for and transfer of new resistance genes. Wild relatives of crop plants may represent a source of variation in *Lr* genes determining resistance to leaf rust. To date, about 80 *Lr* genes have been identified, at least half of which are derived from wild relatives of wheat. Plants initiate a resistance response in reaction to pathogen infection, which begins with single cells and ends in changes that are apparent on the plant.

In this doctoral dissertation, the aim was to pyramidise the resistance genes *Lr19*, *Lr24*, *Lr26*, *Lr38* and *Lr63* from the primary and tertiary gene pools. Multiplex protocols were developed to determine the presence of resistance genes; in addition, foreign chromatin segments were identified using the GISH method. The lack of cloned *Lr* genes limits the knowledge of the mechanisms of wheat resistance to leaf rust. In this study, we analysed genes encoding PR proteins that, during gene-pathogen interactions by recognising effectors, increase their expression being part of the plant defence mechanism. Additionally, a study was carried out to investigate the short arm of chromosome 3A in diploid wheat species.

**Keywords:** wheat, leaf rust, resistance breeding, gene pool, PR proteins

Nowak Alina