
Plant Pathology Seminar Series

“Molecular mapping and characterization of stripe rust resistance genes in important winter wheat cultivars in the U.S. Pacific Northwest”

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Stripe rust, caused by *Puccinia striiformis* Westend. f. sp. *tritici* Erikss. (*Pst*), is one of the most devastating and economically important diseases across major wheat growing regions in the world. Growing resistant cultivars is the most effective and environmentally sound method for controlling the disease. This study was conducted to identify resistance genes/QTL in three winter wheat cultivars Madsen, Skiles and Eltan and develop molecular markers for marker-assisted selection.

Madsen has shown high-level and durable resistance since its release in 1988 and was identified to have both all-stage resistance (ASR) and high-temperature adult-plant (HTAP) resistance. Two major effect ASR QTL on chromosome arms 1AS and 2AS, one minor ASR QTL on 1BS and two HTAP resistance QTL on 3BS and 6BS were identified in Madsen.

Skiles is susceptible to all tested *Pst* races at seedling stage but shows strong resistance at adult-plant stage with higher resistance level expressed at high temperature, indicating that Skiles has only HTAP resistance against the tested *Pst* races. Six HTAP resistance QTL were mapped in Skiles, with two major QTL mapped on 3BS and 4BL and four minor QTL on 1BL, 5AL, 6B and 7DL. Markers linked to the QTL were used to select highly resistant breeding lines derived from crosses with Skiles.

Eltan has shown variable reactions from moderate susceptibility to resistance in different years since its release in 1990. Five QTL were detected in Eltan, with two major ASR QTL on 2BS and 4BL, one minor ASR on 5BS and two minor HTAP resistance QTL on 6AS and 7BL. The two major ASR QTL became less effective due to the fact that the *Pst* population has changed to virulent, leading to the resistance reduction in Eltan.

By studying these three wheat cultivars with different genes for different types of resistance, it is concluded that the best strategy to achieve high-level and durable resistance is to combine several genes for effective ASR and adequate HTAP resistance. These studies provide the information of useful genes and molecular markers for improving resistance to stripe rust in wheat cultivars.

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PhD Exit Seminar



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