

The impact of modern genomics on potato disease resistance breeding

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Methods to track and verify the integrity of multiple disease resistance genes are needed for crop improvement in light of pathogen population changes. Diagnostic resistance gene enrichment sequencing (dRenSeq) enables the high-confidence identification and complete sequence validation of functional resistance genes in crops. We have shown that the technology can direct parental selection in breeding programs and confirms transgene integrity in GM crops. Our study reveals a very limited base of utilised resistances in major potato cultivars but

has identified additional and currently very effective resistances in potato varieties that could be combined with the help of the technology. To combine the most complementary resistances, we can assess the diversity of pathogen populations through a similar enrichment-sequencing based approach referred to as PenSeq. The combination of dRenSeq and PenSeq enables, for the first time, a comprehensive Pathogen/Crop coevolution study on a global scale.

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