

# Molecular markers for disease resistance in various crops obtained by NBS profiling

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## Introduction

Breeding for resistance is one of the major efforts in many breeding programmes. As in organic farming the use of pesticides is prohibited, resistant cultivars are of high importance. To select for resistant plants, screening assays are needed that often are laborious and require extensive knowledge on plant-pathogen interactions. To facilitate the introgression of resistance genes into adapted breeding material, molecular markers are a powerful tool.

NBS profiling is a new marker technology developed at Plant Research International that improves the detection of molecular markers for disease resistance (Van der Linden *et al.*, 2004). The advantage of NBS profiling compared to other marker technologies, such as AFLP and SSR, is its gene-targeting nature (Fig. 1). The technology directs a PCR reaction to NBS domains which are part of the largest class of disease resistance genes. NBS profiling produces multiple markers in a variety of resistance genes in a single assay.

## NBS profiling methodology

DNA is isolated from fresh plant leaf tissue and cut with restriction enzymes. Adapters are ligated to the fragments, followed by PCR using a selective primer that recognises NBS motifs and an adapter primer.

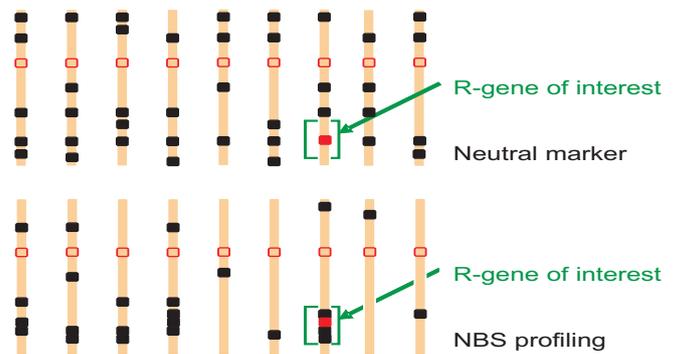


Figure 1. Example of NBS profiling in comparison to the use of neutral marker technology.

Amplified products are separated on a gel by electrophoresis to visualise banding patterns (Fig. 2). The approach has been used successfully for the generation of molecular markers for disease resistance genes in a number of crops, including potato, tomato, barley, wheat and lettuce.

Currently, we are using NBS profiling to find molecular markers for resistance to *Fusarium* head blight in wheat.

## References

Van der Linden CG, Wouters DCAE, Mihalka V, Kochieva EZ, Smulders MJM, B Vosman (2004) Efficient targeting of plant disease resistance loci using NBS Profiling. *Theor. Appl. Gen.* 109, 384-393.

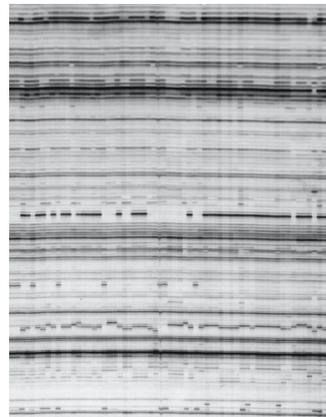


Figure 2. Example of NBS profiling gel for the identification of markers for resistance.