

Characterisation of Resistance Pathways to *Rhynchosporium secalis* in Barley using Suppression Subtractive Hybridisation

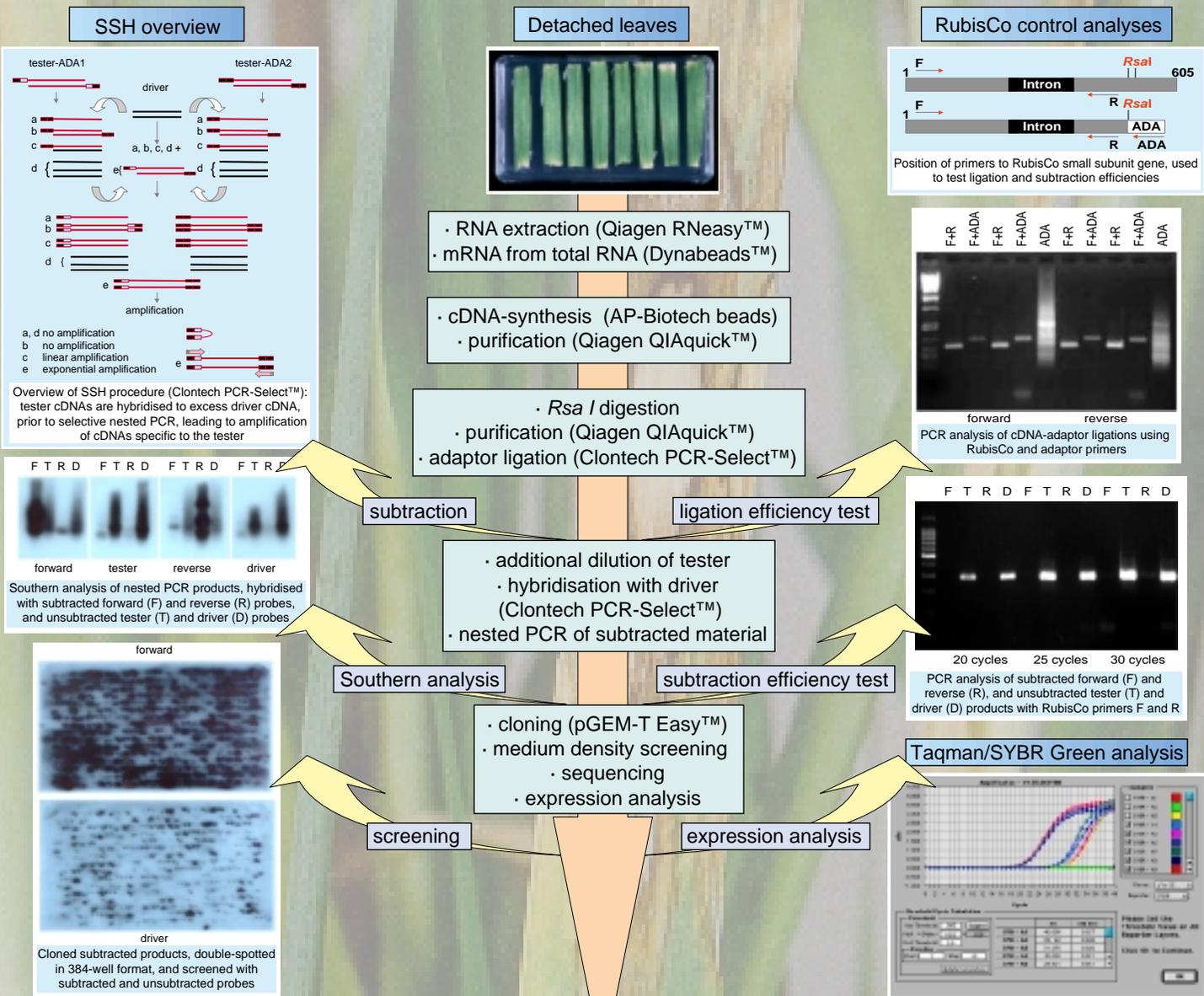


Wayne Morris, Peter Hedley, Ingo Hein, Edward Campbell, Paul Birch and Adrian Newton
 Scottish Crop Research Institute, Invergowrie, Dundee, United Kingdom

Introduction

Rhynchosporium secalis is the cause of leaf scald in barley. Resistance is conditioned by either race-specific genes, of which at least eleven resistance genes have been identified, or quantitative factors which are probably race-non-specific. The molecular bases of either form of resistance are poorly understood.

We present here the generation of cDNA libraries enriched for sequences induced in barley following activation of *R. secalis* resistance, using an improved suppression subtractive hybridisation (SSH) method.



Results and conclusions

Two SSHs were performed: 1. To enrich for barley cDNAs specifically expressed when *R. secalis* resistance was activated (avirulent); 2. To enrich for barley cDNAs specifically expressed in the susceptible interaction with *R. secalis* (virulent). SSH-derived PCR products were directly cloned into pGEM-T Easy. Preliminary sequencing has revealed a clone with homology to a cysteine protease gene in the avirulent interaction. Cysteine proteases are currently being associated with the plant hypersensitive response (Avrova *et al.*, 1999*). Cloned sequences from the virulent interaction included lipoxigenase, abscisic acid (ABA)-induced gene, osmotin-like gene and potato wound-induced gene, implicating involvement (respectively) of the following stress-related pathways: jasmonate, abscisic acid, pathogenesis-related and wound response. Further sequencing and analyses of gene expression and function will be performed to better characterise these interactions.

Gene	Origin	% of clones
1) AVIRULENT:		
Cysteine protease	Barley	1
Polyphenol oxidase	Potato	1
Photosystem I apoprotein	Rice	11
Succinyl CoA ligase subunit	Arabidopsis	8
Retrotransposon dell-46	Henry's Lily	1
Unknowns/no match		32
2) VIRULENT:		
Lipoxygenase	Potato	1
ABA-induced gene	Barley	5
Osmotin-like (PR5)	Wild potato	4
Potato wound inducible (WIN)	Potato	2
Catalase	Tomato	1
Chloroplast ORF5	Tobacco	13
ATP synthase	Wheat	1
Chloroplast psbA	Barley	1
Elicitor-induced EST	Tomato	1
Pathogen-induced EST	Tomato	1
Unknowns/no match		40

*Avrova, A.O., Stewart, H.E., De Jong, W., Heilbronn, J., Lyon, G.D. and Birch, P.R.J. 1999. MPMI 12: 1114-1119