POTENTIAL MARKER-ASSISTED SELECTION FOR RESISTANCE TO SCLEROTINIA WHITE MOLD IN PINTO AND GREAT NORTHERN BEAN

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Introduction

Resistance to white mold (*Sclerotinia sclerotiorum*) in dry bean (*Phaseolus vulgaris*) is quantitatively inherited with low heritability.

The identification of QTL conferring resistance may enable MAS to combine resistance sources and expedite development of resistant cultivars.

Objectives

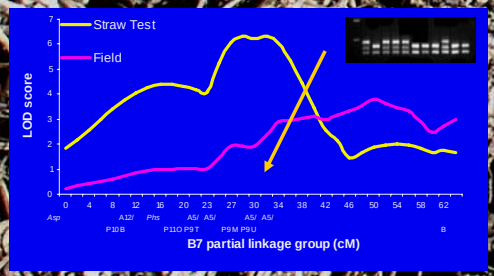
Backcross resistance-linked QTL markers into pinto & GN

Develop pinto & GN lines with resistance to white mold

Materials & Methods

Backcross B7 resistance QTL (Fig. 1) from G122 source (Miklas et al., 2001) into Winchester pinto bean using MAS

Backcross B8 resistance QTL (Fig. 2) from NY6020-4 source (Miklas et al., 2003) into Maverick pinto and Matterhorn great northern beans using MAS



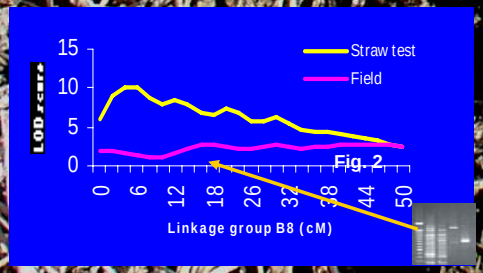


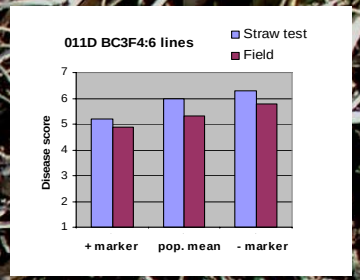
Fig. 2

Fig.1

Table 1. Segregation and phenotypic variation explained by the QTL linked markers for disease reaction in the MAS BC-lines.

Population	Lines	Observed marker	Expected ratio	Variation expl. straw	Variation expl. field
MAS for B7 QTL					R^2
Winchester*2/CO8112034//G122/Winchester (BC3F4:6)					
(I) PS02-011A	50	32+ / 18-	1:1	42%	17%
(II) PS02-011D	38	18+ / 20-	1:1	64%	12%
MAS for B8 QTL					
Maverick*3/NY6020-4 (BC2F4:6)					
(III) PS02-005C	52	24+ / 28-	1:1	47%	NT
Maverick/3/OT9630-17-25*2/NY6020-4 (BC2F4:6)					
(IV) PS02-006D	33	14+ / 19-	1:1	35%	17%
Matterhorn*3/NY6020-4 (BC2F4:6)					
(V) PS02-029C	41	15+ / 26-	1:1	26%	27%

NT = not tested



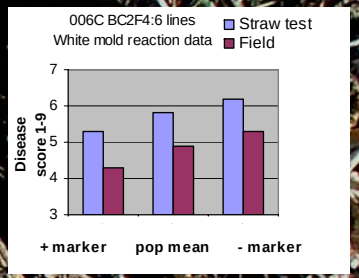


Table 2. Effect of presence/absence of QTL linked markers on performance of MAS-BC lines

Trait	+ marker	RP mean	- marker
PS02-11A (B7 QTL)		Winchester	
Yield (lbs/A)	2702	3496	2820
Harvest maturity (DAP)	88	88	87
PS02-011D (B7 QTL)		Winchester	
Yield (lbs/A)	2156	3004	2383
Seed size (g 100^{-1} seed)	40	41	37
Harvest maturity (DAP)	90	88	87
PS02-006C (B8 QTL)		Maverick	
Yield (lbs/A)	3390	3158	2925
Seed size (g 100^{-1} seed)	41	43	42
Harvest maturity (DAP)	110	92	112
PS02-029C (B8 QTL)		Matterhorn	
Yield (lbs/A)	2144	2469	2052
Harvest maturity (DAP)	90	93	89
WM score field (1-9)	4.9	4.7	6.1

Summary

MAS was effective in transferring QTLconditioning resistance to white mold into pinto and great northern bean.

Although the QTL explained a major portion of the phenotypic variation they had only minor effect on the level of resistance conferred.

Results

- The markers effectively transferred the resistance QTL into the recurrent parents (Table 1).
- Presence/absence of the marker equated to a difference of 1 unit of disease score (Bar graphs).
- No linkage drag due to presence of the markers was observed (Table 2), but overall yield was depressed in the MAS BC-lines compared to the recurrent parents.

Literature Cited

Miklas, P. N., W. C. Johnson, R. Delorme, R. H. Riley, and P. Gepts. 2001. QTL conditioning physiological resistance and avoidance to white mold in dry bean. Crop Sci. 41:309-315.

Miklas, P. N., R. Delorme, and R. Riley. 2003. Identification of QTL conditioning resistance to white mold in a snap bean population. J. Am. Soc. Hort. Sci. 128:564-570.