EFFECT OF ISOLATES AND CONCENTRATIONS OF *XANTHOMONAS CAMPESTRIS* PV. *PHASEOLI* ON DRY BEAN GENOTYPES

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Introduction

Common bacterial blight (CBB), caused by *X. campestris* pv. *phaseoli* Smith (Dye), is a important seed-borne disease of common bean in many parts of the world. The CBB causes 20-60% yield losses and adversely affects seed quality. Leyna and Coyne (1985) Lienert and Schwartz (1994) and Pompeu and Crowder (1973) reported significant effects of cultivar, isolate and concentration. Different concentrations beginning from 10^5 are used for CBB screening and some cannot discriminate between susceptible and resistant genotypes. An appropriate concentration of inoculum may depend on the isolate utilized (Aggour et al., 1988). Our objective was to study the effect of isolates and concentrations of *Xcp* on different dry bean genotypes.

Materials and Methods

Twenty-nine dry bean genotypes with different levels of resistance to CBB and two susceptible checks ("ICA Pijao" and "UI 114") were evaluated. *Xanthomonas* isolates from Colorado and Wisconsin and bacterial concentrations of $5x10^7$ and $5x10^9$ cfu/ml were used. Sequential inoculations on the primary and first trifoliolate leaves were realized 10 and 20 days after sowing, respectively. About 14 and 21 days after each inoculation, disease evaluations were made on a 1 to 9 disease severity scale, where 1 = no visible symptoms, and 9 = severely diseased. The multiple-needles inoculation method and a randomized complete block design with three replications were used. A three-factor factorial was used to analyze data. Evaluations were carried out in the greenhouse at Kimberly, Idaho in 2005.

Results

Significant differences among isolates (I), inoculum concentration (C), and reaction of dry bean genotypes (G) were found on the primary and first trifoliolate leaves, respectively (Table 1). There was a significant interaction between I x C, I x G and C x G on primary leaf and all interactions were significant on trifoliolate leaf. The mean disease scores on the primary leaf were lower than on the trifoliolate leaf (Table 2). On trifoliolate leaf, Wisconsin isolate was more virulent than Colorado isolate and in all cases $5x10^9$ effected higher disease scores than $5x10^7$. Both *Xcp* at $5x10^7$ on the primary and Colorado isolate at $5x10^7$ and Wisconsin isolate at $5x10^9$ cfu/ml on the trifoliolate leaf did not separate dry bean genotypes. Both *Xcp* at $5x10^9$ on the primary and Colorado isolate at $5x10^9$ and Wisconsin isolate at $5x10^7$ cfu/ml on the trifoliolate leaf separated susceptible, intermediate and resistant genotypes. In each case, VAX 3 and Wilkinson 2 showed the lowest disease scores.

References

Aggour, A., D.P. Coyne, and A. Vidaver. 1988. Annu. Rpt. Bean Improv. Coop. 31:75-76.
Leyna, H., and D.P. Coyne. 1985. Annu. Rpt. Bean Improv. Coop. 28:70-71.
Lienert, K.J., and H.F. Schwartz. 1994. Annu. Rpt. Bean Improv. Coop. 37:59-60.
Pompeu, S., and L.V. Crowder. 1973. Ciencia e cultura 25:1078-1081.

Table 1. Analysis of variance for 31 genotypes evaluated with *Xcp* in the greenhouse at Kimberly, Idaho in 2005.

Source	df	Mean Square			
		Primary leaf		First trifoliolate	
Replication	2	329.9	**	144.6	**
Isolate (I)	1	27.9	*	2833.6	**
Concentration (C)	1	3873.9	**	2603.9	**
Genotype (G)	30	35.4	**	31.3	**
I x C	1	33.6	*	1021.0	**
I x G	30	7.8	*	4.2	**
C x G	30	23.2	**	4.7	**
I x C x G	30	6.9		9.1	**
Error	1000	5.2		1.1	

*,**: significant at 5 and 1%, respectively.

Table 2. Mean CBB reaction in the primary and first trifoliate leaves for two concentrations of Colorado and Wisconsin *Xcp* isolates for 29 resistance sources and two susceptible dry beans, evaluated in greenhouse at Kimberly, Idaho in 2005.

Genotype	Primary Leaf				First Trifoliate			
	Colorado		Wisconsin		Colorado		Wisconsin	
	$5x10^7$	$5x10^9$	$5x10^7$	$5x10^9$	$5x10^7$	$5x10^9$	$5x10^7$	$5x10^9$
A 493	1.0	5.6	1.0	6.8	1.0	8.1	7.8	8.9
Colima 9	1.0	4.4	1.1	6.3	1.1	6.8	5.4	8.7
G 1320	1.0	4.9	1.2	6.4	1.1	8.2	7.6	8.0
G 17341	1.0	4.3	1.0	6.0	1.1	4.8	5.6	7.6
Ica Pijao	1.0	8.1	1.9	6.3	2.0	8.7	8.3	9.0
ICB 3	1.0	7.3	1.9	7.2	1.0	8.0	6.6	9.0
ICB 6	1.2	6.4	1.9	6.3	1.2	8.7	8.7	8.7
ICB 8	1.3	8.4	1.6	5.2	1.1	8.3	8.0	8.3
ICB 10	1.0	8.3	2.8	9.0	1.9	7.2	7.2	8.7
ICB 12	1.0	6.8	1.4	7.9	1.2	7.8	7.9	8.7
Montana 5	1.0	7.0	1.7	6.6	2.0	7.8	7.0	8.4
Montcalm	1.3	4.9	2.4	6.0	2.4	8.6	7.8	9.0
OAC 88-1	1.0	4.4	1.0	6.8	1.5	7.8	7.8	8.2
Pinto UI 114	1.2	3.8	2.0	6.0	2.8	8.7	7.2	9.0
Tamaulipas 9-B	1.0	9.0	3.7	6.3	1.0	7.3	7.7	9.0
TARS VCI-4	1.0	5.6	3.0	7.0	1.6	7.6	8.2	8.3
USDK CBB-15	1.0	5.2	2.0	5.7	1.6	8.0	7.7	8.7
USPT 72	1.0	6.7	3.0	7.0	2.7	8.7	7.8	8.7
USPT 73	1.0	5.4	2.7	6.2	3.1	8.0	8.0	9.0
USPT CBB-1	1.0	3.9	3.1	4.6	1.3	8.4	7.8	8.7
VAX 1	1.0	3.1	1.2	4.5	1.0	6.5	6.8	8.3
VAX 2	1.0	6.4	1.0	5.2	1.1	7.6	6.6	8.0
VAX 3	1.1	4.1	1.0	1.0	1.0	3.6	3.4	6.6
VAX 4	1.5	3.1	1.0	2.6	1.1	4.8	6.6	7.9
VAX 5	1.0	4.0	1.0	1.2	1.0	4.9	7.0	7.9
VAX 6	1.0	3.4	1.0	1.0	1.0	4.6	5.3	7.4
Wilkinson 2	1.0	1.0	1.0	2.9	1.0	2.1	4.8	6.1
XAN 91	1.0	6.5	3.3	8.5	1.5	6.3	8.7	8.8
XAN 112	1.0	8.4	1.0	6.3	5.4	9.0	8.7	8.5
XAN 159	1.1	3.6	1.0	3.3	1.0	3.6	6.9	8.7
XAN 309	1.0	3.9	1.2	2.0	1.0	5.8	6.1	9.0
Mean	1.1	5.4	1.7	5.3	1.5	6.9	7.0	8.4
LSD(0.05)[1]	2.1	2.1	2.1	2.1	1.0	1.0	1.0	1.0
LSD(0.05)[2]		0.4				0.2		

[1] To compare between genotypes within isolate and concentration; [2] To compare between means of isolate and concentration.