

2017

# MUTI SITE SCREENING IDENTIFIES AND VERIFIES LEVELS OF RESISTANCE TO WHITE MOLD IN COMMON BEAN IN 2016

Robert Higgins

*University of Nebraska - Lincoln*, rhiggins2@unl.edu

James R. Steadman

*University of Nebraska - Lincoln*, jsteadman1@unl.edu

Follow this and additional works at: <http://digitalcommons.unl.edu/plantpathpapers>



Part of the [Other Plant Sciences Commons](#), [Plant Biology Commons](#), and the [Plant Pathology Commons](#)

---

Higgins, Robert and Steadman, James R., "MUTI SITE SCREENING IDENTIFIES AND VERIFIES LEVELS OF RESISTANCE TO WHITE MOLD IN COMMON BEAN IN 2016" (2017). *Papers in Plant Pathology*. 417.

<http://digitalcommons.unl.edu/plantpathpapers/417>

This Article is brought to you for free and open access by the Plant Pathology Department at DigitalCommons@University of Nebraska - Lincoln. It has been accepted for inclusion in Papers in Plant Pathology by an authorized administrator of DigitalCommons@University of Nebraska - Lincoln.

## MUTI SITE SCREENING IDENTIFIES AND VERIFIES LEVELS OF RESISTANCE TO WHITE MOLD IN COMMON BEAN IN 2016

R. Higgins and J.R. Steadman

Department of Plant Pathology, University of Nebraska-Lincoln, Lincoln, NE 68583  
Email: [jsteadman1@unl.edu](mailto:jsteadman1@unl.edu) Data also from M. Brick (CO), S. Singh (ID), J. Kelly (MI), M. Wunch (ND), J. Myers (OR), P. Miklas (WA), E. Berghauer (WI), H. Rietman (BEL), C. Urrea (NE)

The development of common bean cultivars with partial resistance and/ or avoidance to white mold (WM) caused by *Sclerotinia sclerotiorum* would benefit producers by reducing yield loss and reducing input costs for fungicides. Our main objective in this study is to identify bean germplasm supplied by bean breeders from across the USA and Belgium with levels of partial resistance to WM.

Breeders sent seed of 9 bean lines for field testing and 25 bean lines for greenhouse testing with putative sources of resistance to our laboratory. The seeds were divided in equal amounts for field (400g/line) and/or greenhouse (25 seeds/ line) tests and then sent to eight locations to be evaluated by standardized greenhouse and/or field screening methods. Three bean lines were included in both tests as controls: a good source of partial resistance G122, Bunsu with mostly field avoidance and susceptible GN Beryl.

The use of multisite screening in the field was justified when only three sites had data. Weather was the primary factor in locations with field plots that did not report any data. There were eight lines with resistance higher than Beryl and five with resistance similar to the resistant G122 (Table 1).

**Table 1.** The mean infection rating using the CIAT scale\* and t Grouping\*\* in field plots from three white mold resistance screening locations.

| Line          | Mean score by location* |     |     |      | t Grouping** |
|---------------|-------------------------|-----|-----|------|--------------|
|               | BEL                     | OR  | WI  | Mean |              |
| Beryl         | 7                       | 9.0 | 8.3 | 8.1  | A            |
| P14815        | 8                       | 7.3 | 6.7 | 7.3  | A B          |
| WM91212-4-3   | 7                       | 6.0 | 6.0 | 6.3  | B C          |
| N15341        | 6                       | 5.3 | 5.7 | 5.7  | C D          |
| Ex Rico-Bunsu | 5                       | 5.0 | 6.3 | 5.4  | C D          |
| B15430        | 7                       | 4.0 | 4.3 | 5.1  | C D E        |
| USPT-WM-12    | 4                       | 4.3 | 5.7 | 4.7  | D E F        |
| PS08-039-A5   | 4                       | 4.7 | 5.0 | 4.6  | D E F        |
| R13752        | 5                       | 4.3 | 4.3 | 4.5  | D E F        |
| G122          | 4                       | 5.0 | 3.0 | 4.0  | E F          |
| R12844        | 3                       | 4.0 | 4.0 | 3.7  | F            |
| ASS 1865      | 3                       | 3.3 | 4.0 | 3.4  | F            |

\*CIAT Scale: 1 = no disease, 9 = plants dead \*\*Alpha = 0.05; LSD = 1.38

Greenhouse screening identified seven lines similar to Beryl and Bunsu, and two lines similar to G122. North Dakota submitted 15 lines representing different classes of bean but no lines statistically were similar to Bunsu, known to be more escape than resistant (Table 2).

**Table 2.** The mean straw test rating\* and t Grouping\*\* in greenhouse screening from six locations.

| Line        | Mean score by location |     |     |     |     |     | Overall Mean | t Grouping    |
|-------------|------------------------|-----|-----|-----|-----|-----|--------------|---------------|
|             | CO                     | WI  | WA  | OR  | NE  | MI  |              |               |
| N15341      | 8.4                    | 9.0 | 7.9 | 8.4 | 8.8 | 8.7 | 8.5          | A             |
| P14815      | 8.2                    | 9.0 | 6.6 | 6.9 | 7.9 | 8.0 | 7.8          | A B           |
| NDF140436   | 7.4                    | 9.0 | 6.5 | 6.9 | 8.7 | 7.9 | 7.7          | A B C         |
| B15430      | 5.2                    | 9.0 | 7.5 | 7.8 | 8.9 | 7.3 | 7.6          | A B C D       |
| NDF140443   | 6.2                    | 9.0 | 5.6 | 7.0 | 8.8 | 8.6 | 7.5          | A B C D E     |
| NDF140446   | 6.6                    | 8.6 | 6.3 | 6.4 | 8.6 | 8.4 | 7.5          | A B C D E     |
| NDF140422   | 5.7                    | 8.6 | 6.8 | 6.3 | 8.4 | 8.7 | 7.4          | A B C D E     |
| NDF140433   | 5.7                    | 9.0 | 6.3 | 6.3 | 8.8 | 7.5 | 7.3          | A B C D E F   |
| WM91212-4-3 | 7.4                    | 8.3 | 6.5 | 5.9 | 7.3 | 6.2 | 6.9          | B C D E F G   |
| NDF140461   | 4.2                    | 6.6 | 6.9 | 6.6 | 8.3 | 8.0 | 6.8          | B C D E F G H |
| ASS 1865    | 6.1                    | 7.8 | 5.2 | 4.8 | 7.1 | 8.9 | 6.7          | B C D E F G H |
| NDF140423   | 4.8                    | 6.8 | 6.7 | 6.0 | 8.3 | 7.2 | 6.6          | B C D E F G H |
| NDF140405   | 5.2                    | 7.6 | 6.6 | 6.1 | 7.3 | 6.7 | 6.6          | B C D E F G H |
| NDF141308   | 7.2                    | 8.0 | 5.0 | 4.2 | 7.6 | 6.7 | 6.5          | B C D E F G H |
| R13752      | 6.2                    | 8.3 | 6.3 | 4.4 | 6.9 | 6.3 | 6.4          | C D E F G H   |
| NDF140427   | 4.8                    | 8.3 | 5.7 | 5.4 | 7.1 | 7.0 | 6.4          | D E F G H     |
| Beryl       | 5.8                    | 5.8 | 5.8 | 5.1 | 7.7 | 8.0 | 6.4          | D E F G H     |
| NDF140409   | 4.9                    | 8.2 | 6.2 | 6.1 | 7.5 | 5.0 | 6.3          | D E F G H     |
| NDF140415   | 5.4                    | 7.3 | 5.4 | 6.1 | 7.5 | 6.0 | 6.3          | D E F G H     |
| NDF140408   | 5.2                    | 7.4 | 6.0 | 6.0 | 6.8 | 6.1 | 6.3          | E F G H I     |
| NDF140406   | 5.1                    | 4.9 | 6.3 | 5.0 | 8.2 | 7.9 | 6.2          | E F G H I     |
| NDF140460   | 3.5                    | 7.3 | 4.7 | 6.0 | 7.4 | 7.5 | 6.1          | F G H I       |
| PS08-039A-5 | 5.1                    | 7.2 | 5.3 | 5.0 | 5.9 | 5.9 | 5.7          | G H I         |
| R12844      | 4.6                    | 5.8 | 5.7 | 5.2 | 5.5 | 6.8 | 5.6          | G H I         |
| Bunsi       | 4.3                    | 5.6 | 5.8 | 4.9 | 7.8 | 5.1 | 5.6          | H I           |
| G122        | 4.4                    | 4.7 | 4.1 | 4.2 | 5.2 | 6.9 | 4.9          | I J           |
| USPT-WM-12  | 3.3                    | 4.3 | 3.8 | 3.7 | 4.2 | 5.0 | 4.1          | J             |
| 031-A-11    | 3.3                    | 3.0 | 4.4 | 3.7 | 4.2 | 5.2 | 4.0          | J             |

\*Straw test rating scale based on modified Petzoldt and Dickson scale (Teran *et al.*, 2006) (1-3 = resistant, 4-6 = intermediate, 7-9 = susceptible) \*\*Alpha = 0.05, LSD = 1.3

#### REFERENCES:

1. CIAT (Centro Internacional de Agricultura Tropical). 1987. Standard system for the evaluation of bean germplasm. Van Schoonhoven, A. and M.A. Pastor-Corrales (compilers). Cali, Columbia. 54 p.
2. Teran, H. M. Lema, H. Schwartz, R. Duncan, R. Gilbertson, and S. Singh. 2006. Modified Petzoldt and Dickson scale for white mold rating of common bean. Ann. Rep. Bean Improv. Coop. 49: 115-116.