'Chase' Pinto Dry Bean

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'Chase' Pinto Dry Bean

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Additional index words. Phaseolus vulgaris, rust, common bacterial blight, halo blight, bacterial brown spot, white mold

The release of 'Chase' fulfills a need in southwestern Nebraska for a Pinto dry bean cultivar (Phaseolus vulgaris L.) with resistance to rust [Uromyces appendiculatus (Pers.) Unger] and several bacterial diseases. Rust, common bacterial blight [Xanthomonas campestris pv. phaseoli (Smith) Dye], and bacterial brown spot (Pseudomonas syringae pv. syringae van Hall) diseases have recently reduced bean yields and seed quality of Pinto dry beans in that region and northeastern Colorado. 'Chase' is the first Pinto cultivar that combines resistance to rust (races of rust prevalent in recent years in Nebraska and Colorado), bacterial brown spot, halo blight [P. syringae pv. phaseolicola (Burkholder)], moderate resistance to common blight, and moderate avoidance of white mold [Sclerotinia sclerotiorum (Lib.) de Bary] due to a porous canopy. 'Chase' also has resistance to potato leafhopper “bum” injury caused by Empoasca fabae Harris.

Origin

We deemed it important to develop an early maturing Pinto line with resistance to rust and common blight and with moderate avoidance to white mold. 'Chase' (evaluated as PWM-89-5 from 1989 to 1992) was derived by pedigree selection (Fig. 1) from a cross of a Nebraska (NE) Great Northern (GN) breeding line GN WM-84-17 (upright plant habit, moderately early, resistant to common bacterial blight and rust, and moderate avoidance of white mold) and a NE Pinto (P) breeding line PWM-84-45 (prostrate habit, early maturity, good Pinto seed size and shape, rust-resistant, but susceptible to white mold and common blight). These lines were derived from intercrosses of P and GN lines that were derived from pedigree selection from crosses of GN Nebraska #1 selection 27 (late-maturing, Type III plant habit, and resistant to common blight) (Coyne and Schuster, 1983) × 'Tacaragua' (Venezuela) (black seed, Type IIb plant habit, late maturity, resistant to rust races in Nebraska, and moderate avoidance of white mold) and F_{BC}, GN Nebraska #1 selection 27 × Pinto 'UI-111' (early maturity; Type III plant habit; susceptible to rust, common blight, and white mold Fig. 1). We used the classification scheme reportedly Singh (1982) to describe growth habits of common beans. The cross GN Nebraska #1 selection 27 × 'Tacaragua' was made by Valladares-Sanchez et al. (1983) to study the inheritance of resistance to common bacterial blight.

Description

Annual recurrent selections for disease resistances were made in separate inoculated common blight and rust nurseries at North Platte, Neb., and a natural white mold nursery at Mitchell, Neb. Yield trials were located at several sites in Nebraska and Colorado (Tables 1 and 2). All trials were grown under irrigated conditions using standard, region-specific cultural practices. 'Chase', along with standard cultivars Pinto UI-114 and Othello, were included in the tests. Disease ratings of entries were recorded in the inoculated and in any naturally infected nurseries (Table 1). Yields (Table 2) (except in the rust- and common-blight-inoculated nurseries at North Platte), days to maturity, seed weights, seedcoat cracking, and duration of cooking required to reach tenderness were also recorded. 'Chase' was resistant to rust in Nebraska over 4 years (1989 to 1992) and also expressed slightly more leaf resistance to common blight than Othello and 'UI-114' (Table 1). 'Chase'...
also was observed to have high resistance to halo blight and brown spot diseases in naturally infected nurseries (Table 1). Although the percentage of plants with white mold were similar for 'Chase' and 'Othello', 'UI-114' was more susceptible to white mold than the above entries (Table 1). 'Chase' is susceptible to BCMV NY-15 strain. This is the first Pinto resistant to this variety of pathogens and is recommended for planting where rust and common blight are problems in western Nebraska and eastern Colorado. 'Chase' (rating = 2) and 'Tacaragua' (rating = 1) were highly resistant and GN 'Starlight' (rating = 6) susceptible to potato leafhopper "bum" injury in other trials containing 22 entries (unsprayed) at North Platte in 1991 and 1992 using a rating scale where 1 = no plant injury, 2 = trace, 3 = slight, 4 = moderate, 5 = severe, and 6 = very severe. Similar ratings were observed for these cultivars in both years and the cultivars differed significantly [LSD0.05 = 0.7 (1991); LSD0.05 = 0.9 (1992)]. Pinto 'UI-114' and 'Othello' were not included in those trials.

Under nondisease conditions, the yields of 'Chase' were similar to 'Othello' and generally exceeded those of Pinto 'UI-114' (Table 2). In contrast, under rust and bacterial blight conditions (1992), the yields of 'Chase' exceeded those of 'Othello' and 'UI-114' (Table 2). 'Chase' yielded more than 'UI-114' 86% of the time and 'Othello' 80% of the time, based on the combined analysis (Eskridge and Mumm, 1992) of 15 trials conducted in Nebraska and Colorado in 1992. The yield of 'Chase' also exceeded 'UI-114' and 'Othello' in the midwest regional nursery in 1992 (Table 2). The seed weight of 'Chase' (3625 seeds/kg) was slightly lower than the two control cultivars (2959 seeds/kg) (Nuland, 1992). The seed shape of 'Chase' is similar to that of Pinto 'UI-114', but the background color of 'Chase' is darker than that of Pinto 'UI-114'. 'Chase' (86 to 94 days) generally matured several days later than 'Othello' (83 to 89 days) or 'UI-114' (83 to 93 days) in 1990 to 1992 in Nebraska. The plant height and spread of 'Chase' was nearly similar to the above two controls (data not included). 'Chase' has a Type III plant habit. There was no significant difference in seedcoat cracking, using Dickson's dropping method (Dickson and Boettger, 1977), and in cooking time, using the "Mattson" cooker (Jackson and Varriono-Marston, 1981), between 'Chase' and Pinto 'UI-111' (data not included).

### Table 1. Summary of disease reactions of Pinto bean cultivars (Phaseolus vulgaris L.)

<table>
<thead>
<tr>
<th>Cultivar</th>
<th>Common blight (NP†) (leaf reaction ratings)</th>
<th>Leaf area diseased (%)</th>
<th>White mold incidence (%)†</th>
<th>Halo blight (NP†) Brown spot (S)†</th>
<th>Rust reaction (NP†)</th>
<th>BCMV NY-15 reaction†</th>
</tr>
</thead>
<tbody>
<tr>
<td>'Chase'</td>
<td>2.5</td>
<td>2.5</td>
<td>2.0</td>
<td>2.5</td>
<td>4</td>
<td>26</td>
</tr>
<tr>
<td>'Othello'</td>
<td>3.0</td>
<td>3.5</td>
<td>2.7</td>
<td>5.0</td>
<td>26</td>
<td>34</td>
</tr>
<tr>
<td>'UI-114'</td>
<td>2.5</td>
<td>2.5</td>
<td>2.7</td>
<td>5.0</td>
<td>10</td>
<td>43</td>
</tr>
<tr>
<td>LSD0.05</td>
<td>1.0</td>
<td>0.9</td>
<td>1.4</td>
<td>1.4</td>
<td>10</td>
<td>25</td>
</tr>
</tbody>
</table>

†NP = North Platte, Neb., separate inoculated nurseries. Common blight reaction rating: 1 = no lesions; 2 = 1% to 5%; 3 = >5% to 25%; 4 = >25% to 50%; and 5 = >50% of leaf area with lesions (source: D. Coyne).

### Table 2. Mean yield (in kilograms per hectare) of Pinto bean cultivars (Phaseolus vulgaris L.) in Nebraska (1989–92).

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>WNM†</td>
<td>CDBN†</td>
<td>NDN†</td>
<td>WNM†</td>
<td>CDBN†</td>
</tr>
<tr>
<td>'Chase'</td>
<td>2686</td>
<td>2877</td>
<td>2135</td>
<td>3394</td>
</tr>
<tr>
<td>'Othello'</td>
<td>2871</td>
<td>2889</td>
<td>2134</td>
<td>2937</td>
</tr>
<tr>
<td>'UI-114'</td>
<td>2119</td>
<td>2212</td>
<td>2105</td>
<td>2586</td>
</tr>
<tr>
<td>LSD0.05</td>
<td>336</td>
<td>415</td>
<td>679</td>
<td>422</td>
</tr>
</tbody>
</table>

†CDBN = Cooperative dry bean nurseries, Scottsbluff (S) and Mitchell (M), Neb. (source: D. Nuland; coordinator: J. Myers, Univ. of Idaho, Kimberly is recommended for planting where rust and common blight are problems in western Nebraska and eastern Colorado. 'Chase' (rating = 2) and 'Tacaragua' (rating = 1) were highly resistant and GN 'Starlight' (rating = 6) susceptible to potato leafhopper "bum" injury in other trials containing 22 entries (unsprayed) at North Platte in 1991 and 1992 using a rating scale where 1 = no plant injury, 2 = trace, 3 = slight, 4 = moderate, 5 = severe, and 6 = very severe. Similar ratings were observed for these cultivars in both years and the cultivars differed significantly [LSD0.05 = 0.7 (1991); LSD0.05 = 0.9 (1992)]. Pinto 'UI-114' and 'Othello' were not included in those trials.

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### Availability

Foundation seed of 'Chase' was produced in California and in Nebraska in 1992 to grow certified seed in Nebraska in 1993. Small samples of seed (500 g) for trial may be obtained from Ronald Helsing, Manager, Nebraska Foundation Seed Division, Agronomy Dept., Univ. of Nebraska, Lincoln, NE 68583. Plant variety protection will be sought.

### Literature Cited