Root knot caused by the southern root-knot nematode (*Meloidogyne incognita* (Kofoid & White) Chitwood) is a serious disease of sweet potato (*Ipomoea batatas* (L.) Lam.) in most production areas of the U.S. and especially in the southern states (3). Considerable variation in pathogenicity of this obligate parasite on sweet potato was reported by Giamalva et al. (1) in 1963. In 1973, Martin and Birchfield (2) reported the discovery of a race of *M. incognita* that was highly virulent and reproduced abundantly on a sweet potato line, L4-73, that had been established as resistant to root-knot nematode populations commonly found in Louisiana. This strain of *M. incognita*, herein designated the “resistance breaking” (RB) race, was provided through the courtesy of Dr. W. J. Martin of the Department of Plant Pathology, Louisiana State Univ., Baton Rouge. These findings have caused considerable concern about the future of breeding for root-knot resistance in sweet potato, since the existence of RB races makes the work much more difficult and complicated. A breeding line of sweet potato (W-51) was developed at the U.S. Vegetable Laboratory, in cooperation with Clemson University, that is resistant to both the common and the RB race of root-knot nematodes (*M. incognita*). It also carries resistance to fusarium wilt (*Fusarium oxysporum* f. sp. *batatas* (Wr.) Snyd. & Hans.) and the sweet potato flea beetle (*Chaetocnema confinis* Crotch.). W-51 is being released for use as a root knot resistant parent in sweet potato breeding programs.

### Table 1. A summary of the reactions of W-51, L4-73 and 5 commercial cultivars to fusarium wilt and root knot.

<table>
<thead>
<tr>
<th>Entry</th>
<th>Fusarium wilt</th>
<th>Southern (<em>M. incognita</em>)</th>
<th>Javanese or tropical (<em>M. javanica</em>)</th>
<th>Northern (<em>M. hapla</em>)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>HR</td>
<td>HR</td>
<td>HR</td>
<td>HR</td>
</tr>
<tr>
<td>L4-73</td>
<td>R</td>
<td>R</td>
<td>S</td>
<td>R</td>
</tr>
<tr>
<td>Jewel</td>
<td>HR</td>
<td>S</td>
<td>I</td>
<td>R</td>
</tr>
<tr>
<td>Nemagold</td>
<td>S</td>
<td>HR</td>
<td>I</td>
<td>S</td>
</tr>
<tr>
<td>Jasper</td>
<td>R</td>
<td>R</td>
<td>S</td>
<td>R</td>
</tr>
<tr>
<td>Centennial</td>
<td>I</td>
<td>S</td>
<td>S</td>
<td>I</td>
</tr>
<tr>
<td>Goldrush</td>
<td>HR</td>
<td>S</td>
<td>S</td>
<td>R</td>
</tr>
</tbody>
</table>

2HR = highly resistant — only a trace of disease, R = resistant — very low level of disease, I = intermediate — moderately diseased, S = susceptible — severely diseased.

**Origin and progeny**

W-51 is a 1974 seederling from the 6th generation (Population I) of a mass selection sweet potato population with a broad gene base. A 1976 test of 396 seedlings of W-51, open pollinated seed, (OPS) showed that 91% were resistant to the southern root-knot nematode (Edisto isolate) and 75% had fusarium wilt resistance equal to or better than ‘Centennial’, which has intermediate resistance. In a later test, 20 seedlings from W-51 (OPS) were tested for reaction to the RB race of the southern root-knot nematode; 4 seedlings (20%) were found to have resistance superior to W-51 and 7 (35%) had resistance at least equal to W-51.

**Description**

W-51 has a high level of resistance to all isolates of the southern root-knot nematode against which it has been tested (Table 1). Of special significance is its high resistance to the virulent RB race (Fig. 1) reported by Martin and Birchfield (2). In addition, W-51 carries a high level of resistance to the Javanese root-knot nematode (*M. javanica* (Treub.) Chitwood) and the northern root-knot nematode (*M. hapla* Chitwood). It is highly resistant to fusarium wilt and transmits this resistance well. Like ‘Centennial’ and ‘Jewel’, W-51 is moderately resistant to the sweet potato flea beetle, but it is susceptible
to injury by wireworms (Elateridae) and Diabrotica larvae. No white grub (Plectris aliena Chapin) injury was noted during 3 years of field observations.

In field tests, W-51 yield was similar to 'Centennial' and 'Jewel', although in some tests it yielded less. Roots have orange flesh and rose skin and are generally fusiform with a tendency to elongate and crook. Roots sprout well and vines are vigorous with short internodes. In baking tests, the flavor has been acceptable, but fiber is sometimes objectionable. W-51 flowers early and profusely and sets sufficient seed for breeding purposes with no special treatment.

**Availability**

Small quantities of vine cuttings or roots of W-51 are available for free distribution to sweet potato breeders upon written request to the U.S. Vegetable Laboratory, 2875 Savannah Highway, Charleston SC 29407.

**Literature Cited**


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**Bean Breeding Lines Wisconsin (RRR) 77 and Wisconsin (RRR) 83**

D. J. Hagedorn and R. E. Rand

*Department of Plant Pathology, University of Wisconsin, Madison, WI 53706*

**Additional index words.** root rot resistance, new bean germ plasm

The first bush green beans (*Phaseolus vulgaris* L.) with resistance to the important Wisconsin bean root rot disease complex (*Fusarium solani* f. sp. *phaseoli*, *Pythium* spp., *Rhizoctonia solani*) have been developed and released by the authors. These new green bean breeding lines have been designated Wis. (RRR) 77 and Wis. (RRR) 83 and are recommended for use in breeding programs.

**Origin**

Wis. (RRR) 77 was derived from a 1972 cross between resistant single plant selections designated WH 71-2 and WH 71-27 which had been chosen as superior in root rot resistance in our 1971 bean root rot nursery at the University of Wisconsin Hancock Experimental Farm. During the winter of 1972-73, two outstanding, but different, sister plant progenies were crossed. Following vigorous field selection in 1973, the best single plant selection was crossed with the cultivar 'State Half Runner', which had also shown resistance to Wisconsin's bean root rot complex. The most resistant plants from this cross were then hybridized with the cultivar 'Tenderwhite' to improve plant and pod type. Since then, superior plants were repeatedly selected and tested individually until 1975 and 1976 when they were bulked.

The origin of Wis. (RRR) 83 was similar to that outlined above except that the final (1974) cross was made with the cultivar 'Gloria'.

**Description**

Both Wis. (RRR) 77 and Wis. (RRR) 83 have a very good bush, but they are shorter and slightly earlier than 'Tenderwhite' and other similar cultivars. Pods are borne quite high and toward the middle of the plant. Pods of Wis. (RRR) 77 are medium long, straight, oval-round, and medium green in color; leaves are medium small in size. Wis. (RRR) 83 pods are medium green in color, quite long, straight, round, but tend to pinch in around developing seeds when older: leaves are of moderate size. Both beans have green hypocotyls and white flowers, as well as white seeds of regular size and shape.

**Outstanding characteristics**

WIS. (RRR) 77 and Wis. (RRR) 83 combine a good bush habit and proper maturity with resistance to the most important bean disease in Wisconsin, root rot. These beans have not been tested for reaction to an array of other bean diseases. However, individual laboratory studies with *Fusarium solani* f. sp. *phaseoli* and *Phythium* spp. have shown that both beans have resistance to each of these pathogens—good confirmation of our field tests. This germ plasm should be very useful to bean breeders.

**Availability**

Small amounts of seed are available free of charge to public and private researchers for use in breeding.