NEMARUS: A GOLDEN NEMATODE RESISTANT, RUSSET-SKIN POTATO VARIETY

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Abstract

NemaRus, a russet-skinned potato variety resistant to race A of the golden nematode (*Globodera rostochiensis*), is medium-late in maturity (110 days) and adapted primarily to the Northeastern United States and Northern Florida. Tubers are oblong to long with moderately shallow eyes, and medium-to-heavy russeted skin. The specific gravity of NemaRus is similar to the popular Western U.S.A. fresh market russet variety Centennial Russet. Flesh is creamy white. Glycoalkaloid content of NemaRus averages about 12.0 mg/100 g fresh tissue. NemaRus is field-immune to the common strains of potato virus X and to tuber net necrosis caused by late current-season infection by the potato leaf roll virus. It is resistant to race O of *Phytophthora infestans* to tuber rot caused by *Fusarium sambucinum* & *F. coeruleum*; tolerant to scab, Verticillium wilt, and the pinkeye bacterial disease complex. It is also highly resistant to internal tuber net necrosis associated with high temperatures during tuber initiation and enlargement. NemaRus yielded 24% more U.S. No. 1 tubers than BelRus in Maine and 22% more than Centennial Russet in Northern Florida.

Compendio

NemaRus, una variedad de papa de piel rojiza resistente a la raza A del nematodo dorado (*Globodera rostochiensis*), es semi-tardía en maduración (110 días) y principalmente adaptada al noreste de los Estados Unidos y al norte de Florida. Los tubérculos son oblongos a alargados con ojos moderadamente superficiales y con una piel mediana a fuertemente rojiza. La gravedad específica de NemaRus es similar a la de la popular variedad rojiza para consumo fresco del oeste norteamericano, Centennial Russet. La pulpa es blanco-cremosa. El contenido de glico-alcaloides de NemaRus promedia aproximadamente 12,0 mg/100 g de tejido fresco. NemaRus posee in-

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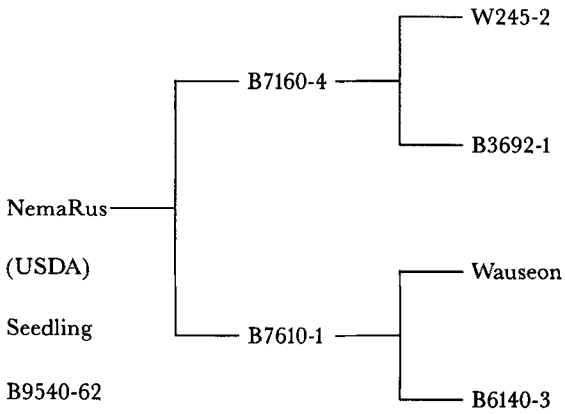
munidad de campo a las razas comunes del virus X de la papa y a la necrosis en red del tubérculo causada por la infección con el virus del enrollamiento de la hoja al final de la temporada. Es resistente a la raza O de *Phytophthora infestans* y a la pudrición del tubérculo causada por *Fusarium sambucinum* + *F. coerculeum*; tolerante a la sarna común, a la marchitez por *Verticillium* y al complejo de la enfermedad bacteriana ojo rosado. Es también muy resistente a la necrosis en red del interior de los tubérculos asociada con las altas temperaturas durante el inicio de la tuberización y crecimiento de los tubérculos. NemaRus rindió 24% más de tubérculos U.S. No. 1 que BelRus en Maine y 22% más que Centennial Russet en el norte de Florida.

Introduction

NemaRus, a new russet-skin potato variety adapted to areas of the eastern seaboard, was released on February 25, 1985, by the U.S. Department of Agriculture, Agriculture Research Service and the Agriculture Experiment Stations of Florida and Maine. It is the first long russet potato variety released in the contiguous 48 States with resistance to race A of the golden nematode (*Globodera rostochiensis*)[2]. The variety Highlat Russet (1), released in 1981 to growers in Alaska, was subsequently confirmed to be resistant to race A of the golden nematode in 1987 (2). NemaRus is adapted primarily to the Northeastern United States and northern Florida. In the Mid-Atlantic and other areas where rainfall patterns are erratic, supplemental irrigation may be necessary for optimum yields.

NemaRus was evaluated under the pedigree number B9540-62. It was selected in 1978 from the cross B7160-4 x B7610-1 made by R.E. Webb in 1976. The female parent (B7610-4) has long, smooth, attractively russetted tubers, and resistance to race O of *Phytophthora infestans* (Mont.) de By. The male parent (B7610-1), has long, white tubers, field immunity to potato virus X, resistance to race A of the golden nematode, and high specific gravity. Some grandparent characteristics include: W245-2, heavy russeted, oblong, relatively flat tuber, with medium specific gravity; B3692-1, round, white tubers with, medium specific gravity, resistance to late blight; Wauseon, round, white tubers for the fresh market, resistance to race A of the golden nematode; B6140-3, oblong to long, attractively russetted tubers with moderately high specific gravity and good processing qualities.

The pedigree of NemaRus is as follows:



The development stages of NemaRus were as follows: The breeding and seedling tuber production were done at the Beltsville Agricultural Research Center, Beltsville, MD. Initial clonal selection and seed increases, and preliminary horticultural evaluations were done on the Chapman Experimental Farm, Presque Isle, Maine; yield and disease evaluations were done at the Aroostook and Echo Lake Farms, Presque Isle, Maine, and at Beltsville, MD. Golden nematode resistance was evaluated by B.B. Brodie using the techniques described by Brodie and Plaisted (2). Richard Moore, Maine Dept. of Agriculture, produced the foundation seed for interregional adaptability trials in Florida, North Carolina, Virginia, New Jersey, and New York. Fortunately, due to restricted nature of golden nematode infestation in the U.S., all yield trials were conducted on noninfested soil.

Description[1]

Plants: medium-late maturing, large, upright, slightly open, good-to-excellent row cover. *Stems*: large, medium-green with light pubescence, no pigmentation. *Wings*: medium size, straight. *Nodes*: slightly swollen. *Stipules*: small-to-medium size, semi-clasping. *Leaves*: light-to-medium green, moderately pubescent, closed. *Terminal leaflet*: medium-large, length 80.9 ± 5.3 mm, width 51.9 ± 3.5 mm, index 64.1, labiate, asymmetrical. *Primary leaflet*: medium-large, length 76.9 ± 6.6 mm, width 49.3 ± 3.7 mm, index 64.1 asymmetrical, labiate, 3-4 pairs. *Secondary leaflet*: small, length 31.1 ± 5.3 mm, width 27.9 ± 4.5 mm, index 39.7, numerous, quite prominent. *Tertiary*: small, abundant. *Midrib*: light-green, slightly pubescent. *Petioles*: light-green, slightly pubescent.

[1]100 items of each specimen measured to develop descriptive data.

Flowers: very sparse, inflorescences are borne on short peduncles, and are very inconspicuous and mostly malformed, are set down inside foliage. *Peduncle*: short, light-green, slight pubescent. *Buds*: sparse, light-to-yellow green, usually dehisce before fully developed. *Calyx*: triangular, light-to-yellow green, pubescent. *Corolla*: pale cream to white, often incomplete with only calyx surrounding anthers. *Anthers*: pale yellow. Because NemaRus flowers so infrequently, we were unable to acquire sufficient flowers to measure the length of the anthers and pistils.

Tubers (Fig. 1): oblong to long, mean length 124.0 ± 9.1 mm; mean width 67.7 ± 3.7 mm, mean depth 56.5 ± 3.4 mm. *Indices*: width to length 55; depth to length 45; depth to width 84. *Skin*: medium-to-heavy russet. *Eyes*: shallow, well distributed over tuber. *Flesh*: creamy white. *Dormancy*: medium. *Maturity*: medium-late.

FIG. 1. Tubers of NemaRus grown in Hastings, Florida.

Characteristics

NemaRus is resistant to race A of the golden nematode[2], field immune to potato virus X and to tuber net necrosis caused by late current-season infection with the leaf roll virus. It is highly resistant to tuber heat necrosis associated with high temperature during tuber initiation and enlarge-

[2]Evaluation by Dr. B.B. Brodie, USDA, ARS, Cornell University, Ithaca, NY (2).

ment. It is resistant to Fusarium tuber rot[3] caused by *F. sambucinum* Fukl. and *F. coeruleum* (Lib.) Sacc. In other disease trials conducted at the Aroostook Farm in Maine, NemaRus was resistant to race O of *Phytophthora infestans*, and tolerant to: scab, *Streptomyces scabies* (Thaxt.) Waks. Henrici, Verticillium wilt, *Verticillium albo-atrum* Reinke & Berth., and the pinkeye bacterial disease complex. In disease trials conducted at Hastings, Florida, NemaRus exhibited some tolerance to southern bacterial wilt, *Pseudomonas solanacearum* E.F. Smith and the soilborne corky ring spot virus. Natural infiltration with major aphid-born viruses was low. NemaRus has a low level of total glycoalkaloids (12.0 mg/100 g fresh tissue)[4]. Following two months storage at 10° C, it produces French fries of excellent color, but of moist texture. It fried well after two months of storage at 50°F but not after five months (Table 1). In Maine yield trials from 1982 to 1984, NemaRus yielded 2% more than Russette and 24% more than BelRus; in Florida yield trials, (1981, 1982 and 1984) it yielded 14% more than Russette and 22% more than Centennial Russet (Table 1).

TABLE 1. — *Three-year mean of U.S. No.1 yields, specific gravity, and fry color for NemaRus and locally adapted russet varieties grown in Maine and Northern Florida.*

	Maine[a]					Northern Florida[b]		
Variety	Metric tons/ha	% total yield	Fry[d] score 2mo 50F	Fry score 5mo 45F	Specific gravity	Metric tons/ha	% total yield	Specific gravity
NemaRus	30.2	82	2.4	3.4	1.069	31.0	83	1.062
Centennial Russet	—[c]	—	—	—	—	25.4	81	1.065
Russette	29.5	87	3.3	3.6	1.079	27.2	81	1.074
BelRus	24.4	85	2.4	3.6	1.081	—	—	—

[a]Years 1982-84
[b]Years 1981, 82 and 84
[c]Not tested
[d]Weighted Ave = $\frac{\text{number of fries} \times \text{color class}}{\text{number of chips/sample}}$
Color class: 1-2 = satisfactory, 3-5 = unsatisfactory, 1 = very light, 5 = very dark.

Literature Cited

1. Dearborn, C.H. 1981. Highlat Russet for Alaskans. Am Potato J 58:177-180.
2. Brodie, B.B. and R.L. Plaisted. 1987. Resistance in the potato cv. Highlat Russet to the golden nematode *Globodera rostochiensis*. Am Potato J 64:523-524.

[3]Evaluation by Dr. S.S. Leach, USDA, ARS, University of Maine, Orono, ME.
[4]Analysis by Dr. S.L. Sinden, USDA, ARS, PSI, Vegetable Laboratory, Beltsville, MD.