

breeding populations, each of which originated from many cycles of phenotypic and genotypic recurrent selection from the original collections from old turfs and plants related to Rebel. This seed was entered in the National Turfgrass Evaluation Program and was also used to establish a Foundation seed increase field in Oregon in the early fall of 1996.

Millennium is a turf-type tall fescue with a rich, dark-green color, medium-fine leaf texture, and the ability to produce an attractive, medium-dense turf. It has performed well in trials established in 1996 in the National Turfgrass Evaluation Program (2,3). During the 1997 season, Millennium tied for first place in mean turfgrass quality averaged across 27 locations evaluated throughout the USA. It performed well in both the cool-humid and transition zones. It exhibited early spring green up, good color retention during winter, and improved resistance to large brown patch disease (caused by *Rhizoctonia solani* Kühn).

Millennium is recommended for turfs on home grounds, roadsides, parks, playgrounds, and sports fields where turf-type tall fescues are well adapted. It can be used as a monostand or in mixtures with Kentucky bluegrass (*Poa pratensis* L.) cultivars adapted to the low maintenance and summer stress conditions tolerated by tall fescues.

Certified seed production of Millennium is restricted to three generations of increase from Breeder seed: one each of Foundation, Registered, and Certified. U.S. plant variety protection for Millennium has been applied for (PVP Certificate no. 9900368).

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4. R.F. Bara, W.A. Meyer, R. Bara, D.A. Smith, and C.R. Funk, Plant Science Dep., Cook College, Rutgers Univ., New Brunswick, NJ 08901-8520; M. Richardson, Dep. of Horticulture, 316 Plant Science Bldg, Univ. of Arkansas, Fayetteville, AR 72701; and S. Tubbs, Turf Merchants, Inc., 33390 Tangent Loop, Tangent, OR 97389. Publication no. D-12155-2-99, NJAES. Registration by CSSA. Accepted 30 Apr. 2000. *Corresponding author.

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Registration of 'Metacomet' Tobacco

'Metacomet' Connecticut shade tobacco (*Nicotiana tabacum* L.) (Reg no. CV-120, PI 612391) was developed by the Connecticut Agricultural Experiment Station and released in 1999. This cultivar was developed with resistance to the to-

bacco cyst nematode [*Globodera tabacum tabacum* (Lownsbery & Lownsbery) Behrens] to allow shade tobacco production in cyst nematode-infested soils without the use of fumigant nematicides. Yield and sorting qualities are equal to or better than the nematode-susceptible shade cultivar O-40.

The tobacco cyst nematode was first described from Hazardville, CT, in the early 1950s (1) and is now widely distributed in shade production areas in the Connecticut River Valley of Connecticut and Massachusetts. All previous Connecticut shade and broadleaf cultivars tested were susceptible to *G. t. tabacum* (2). Nematode infection of roots can cause dramatic stunting, reduced leaf weight, and also reduced leaf quality. Losses can exceed 40% at high nematode densities (3). Flue-cured tobacco lines with resistance to *G. t. solanacearum* (Miller and Gray) were identified as resistant to *G. t. tabacum* (4) and crosses to Connecticut shade tobacco were first made in 1987.

Metacomet is an inbred derived from a cross between the nematode-susceptible Connecticut shade tobacco cultivar O-30, which was developed as a commercial production line by Windsor Shade Tobacco, Inc., and the *G. t. solanacearum* resistant flue-cured line VA 81. Cyst nematode resistance in VA 81 was most likely derived from TL 106. Resistance to *G. t. tabacum* is conferred by a single dominant gene (2). Resistance to *G. t. tabacum* and *G. t. solanacearum* may be linked to wildfire [caused by *Pseudomonas syringae* pv. *tabaci* (Wolf & Foster) Young et al.] resistance (5), transferred from *N. longiflora* Cavanilles to the breeding line TL 106 (6). *Nicotiana longiflora* was resistant to *G. t. solanacearum* in pot experiments (7).

The pedigree breeding system was used. The experimental designation of CT 21-2A was used during cultivar development. Metacomet was selected as a selfed inbred over 12 generations of field evaluation for agronomic characteristics and greenhouse evaluation for *G. t. tabacum* resistance. Individual plants in the F₁ and F₆ generations were selected with cyst nematode resistance using a greenhouse seedling assay (2). Progeny testing was performed in 1993 to select plants homozygous for *G. t. tabacum* resistance.

Metacomet was selected under field conditions for growth and yield characteristics in the presence of damaging population levels of *G. t. tabacum* to avoid severe intolerance to nematode infection. Metacomet was also selected for the hypersensitive gene for resistance to tobacco mosaic virus derived from *N. glutinosa* L. and for reduced sensitivity to weather fleck.

The effects of nematode resistance on *G. t. tabacum* populations were determined in field plots in a cloth-covered shade tent at the Experiment Station Valley Laboratory in Windsor in 1993, 1994, and 1997. Nematode population densities were reduced by 83, 74, and 72%, respectively, at the same time that the susceptible cultivar increased populations by more than 200%. The population reduction resulting from the season-long production of a resistant cultivar is comparable with growing a nematode-susceptible cultivar with soil fumigation.

Leaf yield and quality of Metacomet and the nematode-susceptible O-40 were compared in field plots infested with 120 to 250 infective *G. t. tabacum* juveniles per cubic centimeter of soil. Fresh weight yields were 759.6 and 614.7 g plant⁻¹ for Metacomet and O-40, respectively. Cured leaf quality was determined by industry evaluation. Economic value, determined by percentage weight in each grade and percentage weight in each cured leaf grade in 1993, was \$42.27 kg⁻¹ for Metacomet and \$24.20 for the O-40 standard. Metacomet demonstrated higher leaf yields per plant than another cyst nematode resistant cultivar, 'Poquonock', averaging 753 and 732 g plant⁻¹, respectively. While not significantly different, Metaco-

met also had a greater impact on tobacco cyst nematode populations than Poquonock, averaging 76.3 and 65.0% population reductions per year, respectively.

Metacomet shade tobacco will allow the production of high quality shade tobacco in fields infested with *G. t. tabacum*. This cultivar allows growers to produce a tobacco crop while reducing cyst nematode populations in a manner comparable with a fumigant nematicide.

Breeder seed of Metacomet will be maintained and distributed by the Connecticut Agricultural Experiment Station Valley Laboratory, 153 Cook Hill Rd., Windsor, CT 06095. U.S. plant variety protection for Metacomet will not be applied for.

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Registration of 'Poquonock' Tobacco

'Poquonock' Connecticut shade tobacco (*Nicotiana tabacum* L.) (Reg no. CV-121, PI 612392) was developed by the Connecticut Agricultural Experiment Station and released in 1999. It was released because of its resistance to the tobacco cyst nematode [*Globodera tabacum tabacum* (Lownsbery & Lownsbery) Behrens], which will allow shade tobacco production in cyst nematode-infested soils without the application of fumigant nematicides. Yield and sorting qualities are equal to or better than the nematode-susceptible shade cultivar O-40.

The tobacco cyst nematode is widely distributed in shade production areas in Connecticut and Massachusetts. All previous Connecticut shade cultivars evaluated were susceptible to *G. t. tabacum* (1). Cyst nematode infection may cause leaf quality reduction, dramatic early season stunting, and fresh leaf weight losses exceeding 40% at high nematode densities (2). Flue-cured tobacco lines with resistance to *G. t. solanacearum* (Miller & Gray) Behrens were also resistant to *G. t. tabacum* (3). Resistance to *G. t. tabacum* is conferred by a single dominant gene (1). Resistance to *G. t. tabacum* and *G. t. solanacearum* may be linked to wildfire [*Pseudomonas syringae* pv. *tabaci* (Wolf & Foster) Young et al.] resistance (4). Wildfire resistance was transferred from *N. longiflora* Cavanilles to the breeding line TL 106, which had a pair of chromosomes from the wild species (5), and eventually to VA 81. *Nicotiana longiflora* was resistant to *G. t. solanacearum* in pot experiments (6).

Poquonock is an inbred derived from an initial cross made in 1987 between the nematode-susceptible Connecticut shade tobacco cultivar O-30 and the *G. t. solanacearum* resistant

flue-cured line VA 81. The pedigree system of breeding was used. Poquonock was selected from the F₂ generation of the O-30 and VA 81 cross, back-crossed to O-30 twice, then to the nematode-susceptible shade cultivar O-40 twice, then crossed again to a selfed inbred (three generations) from the cross of O-30 by VA 81. Both O-30 and O-40 were developed and commercially grown by Windsor Shade Tobacco, Inc. Resulting selections were selfed to homogeneity for six generations. Individual plants in the second and fourth selfed generations were selected with cyst nematode resistance using a greenhouse seedling assay (1). Progeny testing was performed in 1993 to identify plants homozygous for *G. t. tabacum* resistance. The experimental designation CT-107 was used during development.

Poquonock was selected for growth and yield characteristics under field conditions. Selection was done in the presence of damaging population levels of *G. t. tabacum* to avoid severe intolerance to nematode infection. Poquonock was also selected for the dominant hypersensitive gene for resistance to tobacco mosaic virus derived from *Nicotiana glutinosa* L. and for reduced sensitivity to weather fleck, caused by ozone.

Poquonock reduced cyst nematode population densities by 67% in 1994 and 63% in 1997 in field plots in a cloth-covered shade tent at the Experiment Station Valley Laboratory in Windsor. In comparison, the susceptible cultivar O-40 increased *G. t. tabacum* populations by more than 200% annually. Production of Poquonock shade tobacco reduced cyst nematode populations in a manner similar to soil fumigation after production of a susceptible cultivar.

Leaf yield and quality of Poquonock and the nematode-susceptible O-40 were compared in field plots infested with 120 to 250 infective *G. t. tabacum* juveniles per cubic centimeter soil. Yields were similar or greater for Poquonock than the O-40 standard. Average fresh weight leaf yield of Poquonock and the susceptible O-40 was 731.9 and 614.7 g plant⁻¹, respectively. Cured leaf quality was determined by industry evaluation. Economic value, determined by leaf yields and percentage weight in each cured leaf quality grade in 1993, was \$44.00 kg⁻¹ for Poquonock and \$24.20 kg⁻¹ for the nematode-susceptible O-40 standard. Poquonock produces higher quality leaf grades than 'Metacomet', which has the advantage of higher leaf weights (6).

Poquonock shade tobacco will allow the production of high-quality shade tobacco in fields infested with damaging populations of *G. t. tabacum*. This cultivar allows growers a nonchemical nematode control tactic that can reduce nematode populations comparable with a fumigant nematicide.

Breeder seed of Poquonock will be maintained and distributed by the Connecticut Agricultural Experiment Station Valley Laboratory, 153 Cook Hill Rd. Windsor, CT 06095. U.S. plant variety protection for Poquonock will not be applied for.

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