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'MNUS 248' (Mesabi™) Strawberry

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'MNUS 248' (Fig. 1) is a June-bearing (short-day) strawberry (*Fragaria ×ananassa* Duch.) that is notable for its combination of high productivity; midseason ripening period; a fruit with a smooth, creamy fruit texture; resistance to five Eastern North American races of *Phytophthora fragariae* Hickman, the causal organism of red stele root rot; and moderate resistance to several other diseases. It has seldom shown symptoms of winter injury in the continental climate of Minnesota where it was developed. It will likely be useful for matted-row production by strawberry producers in the midwestern and northeastern United States and adjacent parts of Canada.

'MNUS 248' is the second cultivar to be released from a breeding program begun in 1980 through the collaboration of the Univ. of Minnesota and the U.S. Dept. of Agriculture, Agricultural Research Service (USDA–ARS) Fruit Laboratory in Beltsville, Md. The program was initiated to address the needs of strawberry producers in the midwestern United States who desire cold-hardy cultivars that have high-quality fruit and resistance to red stele root rot as well as other diseases. In this program, seedlings were germinated and screened for red stele root rot in greenhouse bench tests in Maryland and subsequently planted in Minnesota, where selection and testing was performed. 'MNUS 248' is sold as Mesabi™ strawberry. Mesabi is a transliteration of the word for giant from the language of the Ojibwe people of northern Minnesota.

Origin

'MNUS 248' was raised as a seedling from the cross 'Glooscap' × MNUS 99 (Fig. 2), made in 1986 at Beltsville, Md. We selected 'MNUS 248' at the Univ. of Minnesota North Central Research and Outreach Center (NCROC) at Grand Rapids, Minn., in 1988. It was propagated for later observation in trials at the Univ. of Minnesota Horticultural Research Center (HRC) near Excelsior, Minn., and the NCROC from 1988 to 1990, and at the USDA Beltsville Agricultural Research Center, Beltsville, Md., in 1991 to 1997. 'MNUS 248' was evaluated in replicated yield trials from 1992 through 1997 at three Minnesota locations. Plantings were established in 1991, 1993, and 1995 and harvested for the two subsequent seasons at three Univ. of Minnesota sites: the HRC, the NCROC, and the West Central Research and Outreach Center at Morris (WCROC). The HRC and WCROC have loam soils and are in USDA hardiness zone 4a (annual average minimum temperature range from –31.7 to –34.4 °C) and the NCROC has a sandy loam soil and is in USDA hardiness zone 3b (average annual minimum temperature range from –34.5 to –37.2 °C). For further descriptions of these sites, see Luby et al. (1984). Trials at the HRC could not be harvested in 1993 due to flooding of plots from excessive rains. 'MNUS 248' and eight other common cultivars of the midwestern United States and eastern Canada, including 'MNUS 210' (Winona™ strawberry) (Luby et al., 2001), were planted in a randomized complete-block design. Plants were spaced 0.45 m apart within single-row plots that were 4 m long and 1.2 m apart. The plants were permitted to form a matted row that was ≈0.4 m wide. At the HRC and WCROC, the entire plots were mulched for protection during the winter in late October or early November with 10 to 15 cm of straw, which was removed in April. At the NCROC, however, a split plot design was employed on 7-m-long plots that were split, with half of the plot being mulched and the other half receiving no mulch. All trials had straw mulch applied between the rows in the spring. All plots were irrigated, fertilized, and sprayed with fungicide and insecticide, as needed, in accordance with standard commercial recommendations.

The plots were harvested every 2 to 4 d as fruit ripened. The marketable yield and the weight of a sample of 20 berries were recorded for each plot. Relative season of each entry was calculated in each trial by determining the proportion of total yield for each plot that was harvested during the first 7 to 10 d of the harvest season for that location–year combination. From at least one harvest in each year, at locations as indicated in Table 2, fruit were rated subjectively for appearance, flesh firmness, skin toughness, flavor, and internal and external color using a scale from 1 = very poor to 9 = outstanding. Plots were also rated subjectively on scales ranging from 1 (severe symptoms) to 9 (no symptoms) for various diseases as opportunities arose to observe these situations in particular years or at particular locations (Table 3). Data were analyzed using SAS (SAS Institute, Inc., Cary, N.C.).

Performance

'MNUS 248' generally produced high yields and medium-large berries compared to other cultivars in Minnesota trials (Table 1). The fruit matured in the middle part of the season for short-day cultivars (mid-June to mid-July in Minnesota), about the same time as its parent, 'Glooscap', and other common midseason cultivars grown in Minnesota, such as 'Kent', 'Jewel', and 'Cavendish'. In all Minnesota trials, 'MNUS 248' consistently had yields similar to or greater than these other mid-season cultivars. Compared

Fig. 1. Fruit of 'MNUS 248' strawberry.

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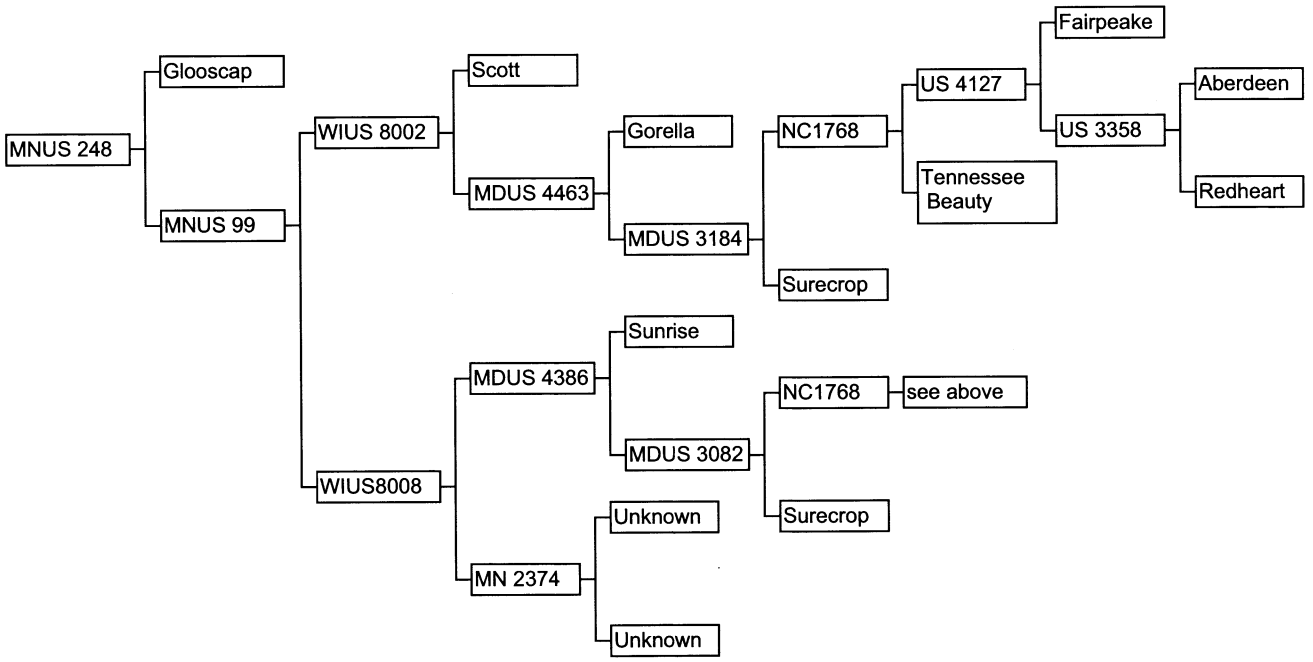

Fig. 2. Pedigree of 'MNUS 248' strawberry.

to these cultivars the berries of 'MNUS 248', generally have been similar in size, as indicated by berry weight (Table 1), to berries of 'Glooscap', 'Kent', and 'Jewel', and smaller than 'Cavendish'.

'Glooscap' is currently the most widely planted midseason cultivar among commercial Minnesota producers. Of the 19 trials summarized in Table 1, 'MNUS 248' had a larger yield than 'Glooscap' in 16 trials and greater average fruit weight in 17 trials. 'MNUS 248' has been productive on soils of heavy and light texture in matted row production systems.

Fruit of 'MNUS 248' have a symmetrical conic shape and an attractive red, glossy, translucent surface that produces an attractive appearance (Table 2). The flesh is moderately firm with a consistent, creamy, melting texture during mastication. The skin is of medium toughness but tends to weaken in hot weather (>30 °C).

Relative to other cultivars tested in Minnesota, 'MNUS 248' has moderate resistance to the common foliar diseases, leaf spot (caused by *Mycosphaerella fragariae* Tul.) and powdery mildew (caused by *Sphaerotheca macularis* Walls ex Fr.), and moderate to high resistance to leaf scorch (caused by *Diplocarpon earliana* Ell. and Ev.) (Table 3). 'MNUS 248' is resistant to 5 eastern North American races of *Phytophthora fragariae* Hickman (Races A-1, A-2, A-3, A-4, and A-6), the fungus that causes red stele root rot (Galletta et al., 1994). It is susceptible, relative to other cultivars tested, to iron chlorosis induced by high pH soils (pH7.5-8.0) at Morris, Minn. and to black root rot associated with *Rhizoctonia* spp. and *Pythium* spp. based on field observations at the Horticultural Research Center, Excelsior, Minn. (Table 3). Plants of 'MNUS 248' seldom have exhibited symptoms of winter injury in Minnesota trials.

Strawberry growers that have fruited 'MNUS 248' in Minnesota have reported that it is winter hardy, moderately vigorous, may be sparing in producing plants, very productive with moderately large berries of excellent eating quality and moderate firmness.

Description

Plants of 'MNUS 248' usually form a matted row with a flat to flat-globose habit. Stolons are green proximal to the mother plant and, distally, take on a slight red coloration. Stolons have divaricate pubescence and may have bracts at the blind nodes.

The leaves have medium to short petioles (typically ≤20 cm) with divaricate pubescence. Leaf-like bracts may be present on the petiole. The three leaflets of a leaf are equal in size, broadly elliptic, and have a waxy bloom on the upper side giving slightly bluish-green cast. The color of the terminal leaflet corresponds to Royal Horticultural Society (RHS) Colour Chart (Royal Horticultural Society, 1966) plate 146A on the upper side and plate 147C on the lower side. The terminal leaflet is equal in length and width, has a flat to cupped profile, a rounded base, and single teeth that are obtuse on older leaves.

The inflorescence is usually slightly below, or level with, the foliage when the flowers are

Table 1. Mean performance over 1992 to 1997 for yield, average fruit weight, and early crop of strawberry cultivars at three locations in Minnesota. Plantings were established in 1991, 1993, and 1995 and harvested for the subsequent 2 years. The planting at Excelsior was not harvested in 1993 due to flooding.

	Yield (t·ha^{-1})				Fruit wt (g)				Early crop[z] (%)			
	Grand Rapids				Grand Rapids				Grand Rapids			
Cultivar	Mulched	Unmulched	Morris	Excelsior	Mulched	Unmulched	Morris	Excelsior	Mulched	Unmulched	Morris	Excelsior
Annapolis	9.9	6.8	8.6	8.7	13.5	12.2	9.7	12.3	54	71	53	72
Cavendish	11.4	10.9	14.2	12.0	14.9	13.9	13.1	11.9	27	40	26	36
Glooscap	11.3	10.7	11.3	10.9	12.0	11.6	9.0	9.1	25	37	36	44
Honeoye	9.6	10.4	11.1	10.8	11.5	11.1	10.8	9.9	43	56	40	66
Jewel	6.5	6.9	11.1	10.1	11.9	12.0	11.2	11.8	21	31	23	45
Kent	13.7	12.9	13.2	10.4	12.5	12.6	10.6	10.7	26	38	30	50
Lateglow	6.1	6.8	9.1	8.6	14.3	12.9	10.0	11.3	9	31	10	18
MNUS 210	11.2	11.4	11.1	11.1	16.0	14.5	12.1	14.0	7	17	15	22
MNUS 248	17.2	15.3	16.1	16.7	14.1	13.0	9.9	11.4	30	36	27	35
$LSD_{0.05}$	3.8	4.4	3.9	3.5	1.9	2.1	1.8	1.9	12	15	12	16

[z]Proportion of total yield that was harvested during the first 7 to 10 d of the season.
[y]At Grand Rapids, plots were split, with half of each plot being mulched with 10 to 15 cm of straw from November through April. All plots at Morris and Excelsior were also similarly mulched during the winter. All trials had straw mulch applied between the rows in the spring.