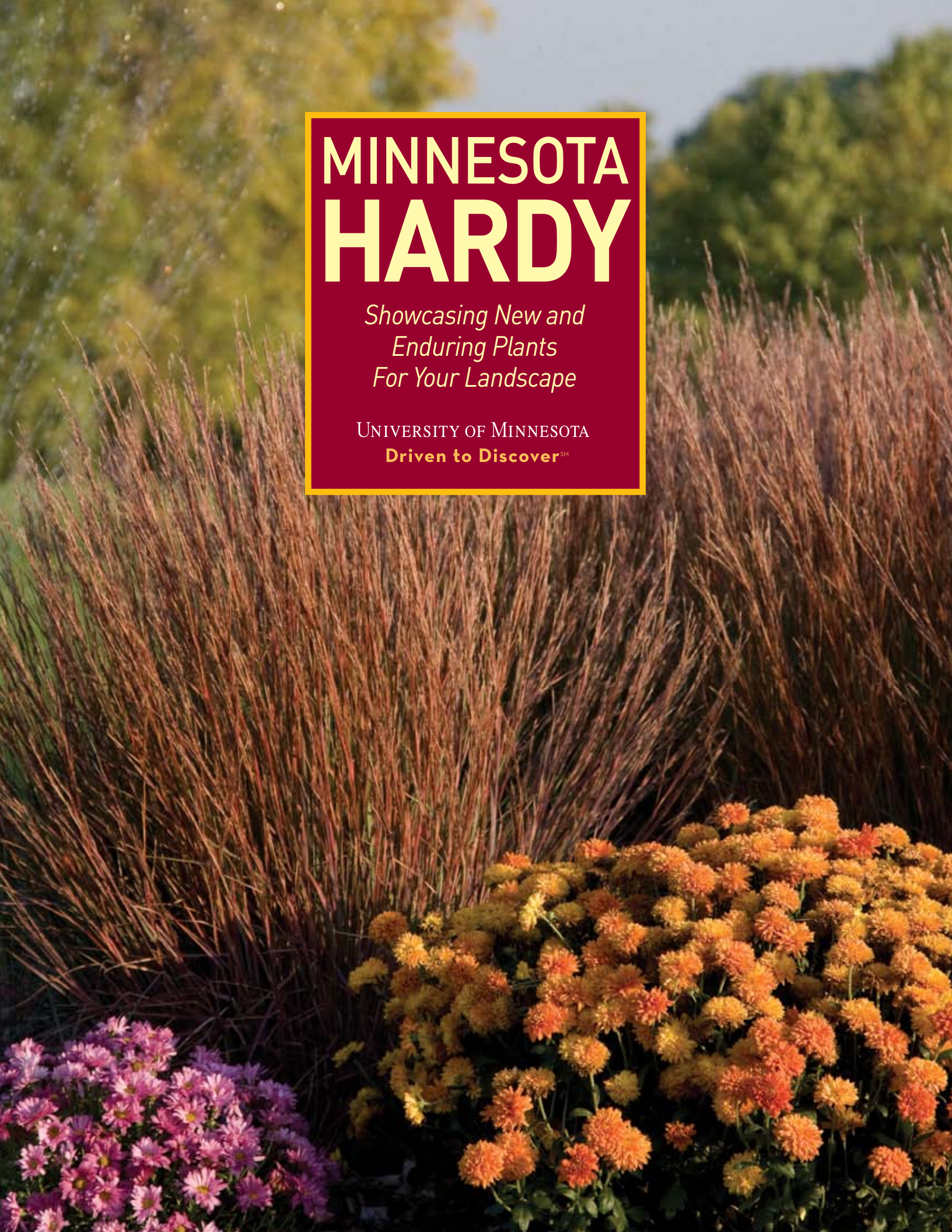


MINNESOTA HARDY

Showcasing New and Enduring Plants For Your Landscape

UNIVERSITY OF MINNESOTA
Driven to Discover℠

Northern Accents™ Lena Rose

SnowSweet® Apple

'Marquette' Wine Grape

What's New?

In the five short years since *Minnesota Hardy* was first published, University of Minnesota plant breeders have produced an abundance of new cultivars.

With apples, roses, and mums, the good news comes in threes. The newest apples—SnowSweet®, Frostbite™, and SweeTango® apples—vary in taste, texture, and purpose.

The three new hardy shrub roses produce constant bloom throughout the summer, need little winter preparation, and are memorable for their names—"Sven, Ole, and Lena"—as well as their stellar features.

The popular Mammoth™ shrub-sized mums are available in three new colors: dark bronze, lavender, and dark pink.

The first hardy ornamental grass released by the University, Blue Heaven™, is already popular with home gardeners and landscapers. New hardy blueberries and wine grapes will add more locally grown choices to our menus.

Innovations in turfgrass are destined to help expand Minnesota's important grass seed and turf industries, and to ease maintenance of parks, athletic fields, and golf courses.

A Legacy of Discovery

The University's Driven to Discover℠ initiative recognizes that all of us are born with a passion to search, a fundamental need to discover. The University nurtures a thriving community for those with an overwhelming drive to teach and to learn, to research and to serve.

For the first Minnesota Agricultural Experiment Station plant breeders, the drive to discover started back in 1887 with the quest for a hardy apple. Selections came from favorite trees from "back East," which often suffered severe winter injury or failed to ripen before a killing autumn frost. Crosses with wild Minnesota apples and the subsequent trials were primitive and time-consuming, but led to the enduring favorites, 'Haralson' and 'Beacon'.

Plant breeding has expanded to encompass ornamental trees and shrubs, flowers, berries, and grasses. Now, University plant scientists collect germplasm from far-flung locales, such as native blueberries in the Adirondacks, wild grapes from Manitoba, wild apples from the Tien Shan Mountains in Kazakhstan, and hardy kiwifruit from northern China. Breeding goals go far beyond producing a hardy plant, now evaluating disease resistance, color, taste, growth habit, uses, and other differentiating features. But, the process of growing plants, making selections, and testing remains time-consuming.

"Driven to Discover" describes the University's mission and communicates the search for knowledge and the drive to share that learning and discovery with students and the larger community. That role is vital to the state's health, well-being, and economy.

The University began one of the earliest college horticulture programs in the United States and that program is nationally prominent today. The results number well over 400 proven hardy varieties and provide a foundation for Minnesota's over two-billion-dollar horticultural industry, spanning the borders from Roseau grass seed growers south to Lanesboro vineyards.

Throughout this book, a selective timeline highlights notable U of M plant breeding achievements.

1887: Minnesota Agricultural Experiment Station created as part of national land-grant university network

1888: U of M hires 1st horticulturist, Samuel Green, to improve tree fruits

1901: Vegetable breeding efforts begin

1908: St. Paul Fruit Breeding Farm established on 80 acres near Victoria

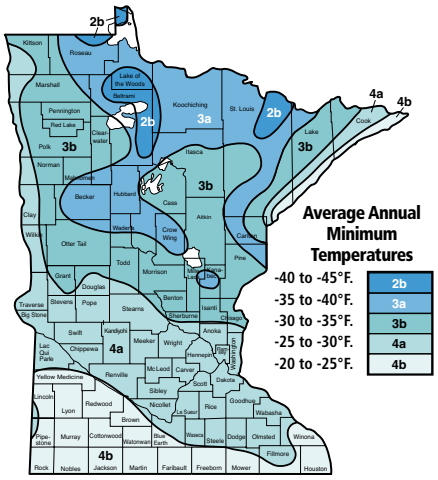
Azalea trials at the University's Minnesota Landscape Arboretum near Chanhassen

This book divides currently available U of M cultivars into two groups: the "Garden & Landscape"section describes ornamental plants, and "Healthy Foods, Healthy Lives" describes fruits. In addition, environmental research projects demonstrate techniques to restore wetlands and lakeshores, capture urban runoff in rainwater gardens, and prevent the introduction of invasive species.

The University does not sell plant material directly to the public, but provides it to licensed propagators who then distribute it to growers, retailers, and landscapers in northern states and adjacent provinces, with some cultivars available worldwide. No one nursery carries all of the U of M introductions, but potted or bare root plants are sold at thousands of commercial nurseries and garden centers. This resource is meant to help you make informed choices, whether you want to add a few hardy shrubs and flowers to your yard, or plant hundreds of grape plants in a commercial vineyard.

The Minnesota climate presents unique challenges to gardeners, farmers, and nurseries. Temperature fluctuations rival those of any state in the nation, from hot, sometimes dry summers to extremely cold winters that may leave the land bare of insulating snow. For over a century, University of Minnesota researchers have worked to develop, grow, and evaluate the best plants for conditions ranging from USDA Plant Hardiness Zone 4B in the south to Zone 2B in certain locations in the north. The University maintains 10 Research and Outreach Centers where breeders and field assistants conduct numerous field trials. Most plant trials are replicated at Grand Rapids, Morris, Rosemount, St. Paul, and the Horticultural Research Center or the Minnesota Landscape Arboretum near Chanhassen. Some plants are also tested nationally, in cooperation with other institutions or private companies.

USDA Plant Hardiness Zones



Contents

On the cover: Blue Heaven™ Little Bluestem and Mammoth™ Mums

1909: University Extension Service begins

1926: 1st flower breeding efforts result in hardier roses and chrysanthemums

1954: Woody landscape breeding projects begin

1967: Fruit Breeding Farm is renamed "Horticultural Research Center" to reflect the diversity of work on 230 acres

1977: 1st U of M plant patent, for 'Mimngopher' cushion mum

2004: Launch of "Healthy Foods, Healthy Lives" initiative

Mammoth™ 'Red Daisy'

Garden & Landscape

The University's success in developing hardy azaleas and large cushion chrysanthemums of every hue is unparalleled. Now, new shrub roses, gaura, and ornamental grasses promise varied color and texture—and easy maintenance—for years to come. Trees and shrubs for northern landscapes are bred for blossom display, plant size, and early fall color, in addition to proven hardiness.

Chrysanthemums

The University's mum breeding program is one of the oldest public sector breeding programs in the world and the only one in North America. Trend-setting breeding endeavors, coupled with its germplasm base and genetic resources, continue to bring a wide range of colors and shapes of proven hardy mums to northern gardens.

Beginning in the 1920s, U of M researchers were selecting and breeding mums for early flowering; there were none that bloomed before Minnesota's killing frosts.

The cushion habit of mums, a genetic discovery of Experiment Station mum breeders, was the basis for the U of M's first plant patent, in 1977 for 'Minngopher.' Plants are dome-shaped, with flowers almost completely covering the outside surfaces of each plant. Previous mums bloomed only at the top of long stems (upright habit). Within a decade, the cushion type became the dominant chrysanthemum plant habit worldwide.

In 1990, breeders inspecting field plantings (pictured above) found seedlings of unprecedented size. Now marketed worldwide as "Mammoth™" mums, the plants produce several thousand flowers and grow to three to four feet across in the second season and thereafter.

The University's floral research garners international respect and collaboration. Scientists collected wild mum species in western China, near Tibet, to add to the germplasm collection. And, scientists from Asia study here and bring new breeding techniques back to the place where many of our exotics originated.

Even more colors and shapes are on the way. "Wave" types, which spread up to three feet across and remain low to the ground, and are also ideal for hanging baskets, will soon be released in a range of colors with daisy or double blossoms.

Mammoth™ 'Dark Pink Daisy'

Mammoth™ 'Lavender Daisy'

Mammoth™ 'Dark Bronze Daisy'

1926-1939: Breeding and release of greenhouse mums

1939: 'Duluth' — the 1st winter-hardy mum released

1977: 1st U of M plant patent, for 'Minngopher' cushion mum

1990s: Extraordinarily large cushion mums lead to 'Mammoth' series

Chrysanthemums

Tests show that garden mums survive the winter better when the above-ground dead plant stems are not removed in the fall. This is also a beneficial technique to use with other herbaceous perennials.

Cushion growth habit

Upright growth habit

Shrub/Cushion growth habit

Wave growth habit

CULTIVAR	YEAR	GROWTH HABIT	FLOWER COLOR, SIZE, TYPE	BLOOM PERIOD
Inca™	1996	cushion	Light bronze, 2" double button.	early
Lemonsota	1988	low cushion	Lemon yellow, 1" pompon.	early
Minngopher	1977	cushion	Ruby-red 2-2 1/2" decorative.	early
Minnqueen	1979	cushion	Rose-pink 3" decorative.	early
Minnrose	1966	cushion	Rose-pink 1 1/2" pompon.	early
Minnruby	1974	cushion	Ruby-red 2 1/4" decorative.	early
Minnwhite	1968	cushion	White 2" decorative.	early
Minnyellow	1972	cushion	Lemon-yellow 2" decorative.	early
Sesquicentennial Sun	2001	cushion	Gold, fully double 1-2" pompon. Frost-tolerant.	midseason
Snowsota	1989	cushion	White with cream centers, 1 1/2" pompon.	early
Burnt Copper	1988	tall upright	Orange bronze, 3" double pompon.	midseason
Centerpiece	1982	tall upright	Rose-lavender with gold center, 4" quill/spoon.	midseason
Gold Country	1983	upright	Peachy yellow, 4" fully double, incurved football.	midseason
Grape Glow	1988	upright	Bright rosy purple, 3 1/2" flat decorative.	midseason
Lindy	1974	tall upright	Lavender-pink, 4 1/2" quilled incurve.	midseason
Maroon Pride	1989	upright	Dark red, 3 1/2" flat, decorative.	early
Mellow Moon	1983	upright	Cream, 4 1/2" semi-incurved, fully double, football.	midseason
Peach Centerpiece	2000	tall upright	Peach colored with gold center, 2-4" flowers, quill/spoon.	midseason
Rose Blush	1993	upright	Mauve, 2-3" decorative.	early
Mammoth™ * Coral Daisy	2002	shrub cushion	Coral with a gold center, single. Frost tolerant.	early
Mammoth™ * Dark Bronze Daisy	2006	shrub cushion	Bronze with a gold center, single. Frost tolerant.	early
Mammoth™ * Dark Pink Daisy	2006	shrub cushion	Deep pink, large sized daisies with a gold center, single. Frost tolerant.	early
Mammoth™ * Lavender Daisy	2006	shrub cushion	Lavender with a gold center, single. Frost tolerant.	early
Mammoth™ * Red Daisy	2007	shrub cushion	Red petals with a gold center, daisy. Frost tolerant.	early
Mammoth™ * Twilight Pink	2002	shrub cushion	Pink with a gold center and a purple eye, single daisy. Frost tolerant.	early
Mammoth™ * White Daisy	2002	shrub cushion	White, gold center, semi-double, daisy. Frost tolerant.	early
Mammoth™ * Yellow Quill	2002	shrub cushion	Yellow with a gold center, single daisy, quilled petals.	midseason
Snowscape	1996	semi-wave	White with purple tips, 3" semi-double flowers.	early

** "Mammoth™" mums were previously marketed as "Maxi-Mums" and "My Favorite™".*

Mammoth™ 'Red Daisy'

'Snowscape'

Mammoth™ 'Coral Daisy'

'Gold Country'

Inca™

Mammoth™ 'White Daisy'

Mammoth™ 'Twilight Pink'

'Mellow Moon'

'Minngopher'

'Peach Centerpiece'

'Sesquicentennial Sun'

Mammoth™ 'Yellow Quill'

Candy Lights™

'Golden Lights'

'Mandarin Lights'

'Northern Hi-Lights'

Tri Lights™

'White Lights'

'Orchid Lights'

'Lemon Lights'

Azaleas

'Spicy Lights'

The "Lights" series of azaleas brings the colors of the tropics to Minnesota's early spring landscape. The plants are world-renowned for varied colors and incredible flower bud hardiness—an achievement that initially took two decades. The first crosses were made in 1957; 'Northern Lights'—with various shades of fragrant pink flowers on a 4- to 6-foot bush—was the first introduction, in 1978. Since then, 12 new "Lights" have been released.

Although nearly commonplace in Zone 4 landscapes today, the range of colors and flower forms in the 'Lights' azaleas were unknown even as recently as the mid-'80s when some of the richer yellow, orange and multi-hued cultivars began to find their way into the landscape.

University azalea breeders continue to improve foliage quality and powdery mildew resistance. Researchers are screening 41 deciduous azalea varieties in replicated field plots in Minnesota and Ohio to identify mildew tolerant or resistant cultivars for use in future breeding. Most of the varieties in the field are also screened in growth chamber experiments to determine whether the same resistance/susceptibility reactions occur. If so, the powdery mildew screening can occur more quickly—on a smaller scale, in the off-season, and with less expense.

Breeders now select for attractive fall foliage color, flower fragrance, and significantly extended bloom periods—cultivars that flower later into June and possibly even July.

Lilac Lights™

CULTIVAR	YEAR	COLOR	FEATURES
Apricot Surprise	1987	Light orange	Fragrant flowers. Latest flowering. 3-4'
Candy Lights™	2001	Light pink	Pale yellow streaks, very fragrant. 5-6'
Golden Lights	1986	Golden	Fragrant. Greater mildew resistance. 4-6'
Lemon Lights	1996	Lemon yellow	More narrow, upright plant. 4-5'
Lilac Lights™	2001	Pinkish purple	Darker speckles on upper lobes. 3.5-5'
Mandarin Lights	1992	Orange	Extremely hardy. 5-6.5'
Northern Hi-Lights	1994	Creamy white	Bright yellow upper petal. 5-6'
Northern Lights	1978	Pink	Fragrant flowers,various shades of pink. 4-7'
Orchid Lights	1986	Orchid	Earliest flowering of the 'Lights.' Extremely hardy, compact plant. 2-3'
Rosy Lights	1984	Deep rosy pink	Abundant blossoms, buds hardy to –45°. 4-5'
Spicy Lights	1987	Salmon orange	Large flowers. Early flowering. 5-6.5'
Tri Lights™	2000	Soft pink	Deep rose buds. Yellow upper petal highlight. 5'
White Lights	1984	White	Abundant blossoms, with slight yellow highlight. 5-6'

Rhododendron is the genus name for both rhododendrons and azaleas. In the upper Midwest, azalea refers to the deciduous members of the genus Rhododendron and rhododendron refers to those that hold their leaves through the winter.

1957: 1st azalea crosses begin the project leading to "Lights" azaleas

1978: 'Northern Lights' released

1991: Promising azalea selections made toward true red flowers

Northern Accents™ Sven

Northern Accents™ Ole

Northern Accents™ Lena

Roses

It's been more than 40 years since the University has released a new rose. In 2008, three new, super-hardy shrub roses—"Sven, Ole, and Lena"—arrived in garden centers. A serendipitous discovery of a polyantha rose at the Minnesota Landscape Arboretum led to crosses in 1997 that were selected as potential releases in 2002 and have been in regional trials since.

Lena is a fragrant camellia flower type in white and delicate pink. Ole has single white petals with ruffled pink edges (but little fragrance). Sven is an almost cabbage rose in mauves and pinks ranging to hot pink, and is the most fragrant of the three.

These plants die back to the crown in winter but by June are two feet tall, with large clusters of small flowers. They continue to grow to over three feet tall, covered in a profusion of blooms the entire season.

In trials in Grand Rapids they survived a winter with a low temperature of -47°F. With consistent snow cover, they need no special winter care.

Watch for two soon-to-be-named relatives, red and orange selections now in regional trials.

Roots

Roses were some of the earliest woody landscape plant cultivars released from the University, and a sideline of the chrysanthemum breeding project in the 1940s. The first directed breeding work on woody landscape plants can be dated to 1942 when Dr. Louis E. Longley, who was hired at the University in 1929 and started the chrysanthemum breeding project, began making some crabapple and rose crosses.

Longley is credited with releasing four roses, 'Pink Rocket', 'Red Rocket', 'L.E. Longley' and 'White Dawn', in 1949 and developing the 'Radiant' crabapple. In 1942, Robert A. Phillips, who was hired to assist Dr. Longley and teach landscape classes, continued to make rose hybridizations after Longley's retirement in 1949. Two additional rose cultivars, 'Prairie Fire' and 'Viking Queen' are attributable to

KNOW TO GROW

University polyanthas die back to the crown in winter, and by June will have regrown to two feet tall, with a profusion of buds and blossoms. They bloom all season, and need no special winter care. No special pruning is required. Deadwood should be removed in early spring. Cultivated roses perform best when fertilized with a balanced formulation in early spring after thaw, one at the end of the first spring bloom, and a final fertilization in mid-late July.

CULTIVAR	YEAR	FEATURES
Prairie Fire	1959	Shrub. Bright red, single blooms, 4-6'
Viking Queen	1963	Large fragrant climber with pink double blooms. Glossy foliage, 8-10'
Northern Accents™ Lena	2008	Hardy shrub with frilly pink and white camellia-type flowers, 3-4'
Northern Accents™ Ole	2008	Hardy shrub with white to pale pink single petals, 3-4'
Northern Accents™ Sven	2008	Hardy shrub with fragrant, mauve-to-violet flowers, 3-4'

1949: 1st four rose releases

1959: 'Prairie Fire' shrub released

1963: 'Viking Queen' climber released

2008: Sven, Ole, and Lena shrub roses released

'Prairie Fire'

'Viking Queen'

Phillip's efforts and are still widely available.

The popular climber, 'Viking Queen,' quickly covers walls, trellises, or fences with a bounty of medium-pink, fully double blooms produced in clusters with a look of English roses. Very fragrant, and disease resistant, it blooms from June to frost.

'Prairie Fire' is a durable shrub rose with single red blooms—in enormous clusters of up to 50 blooms on long canes.

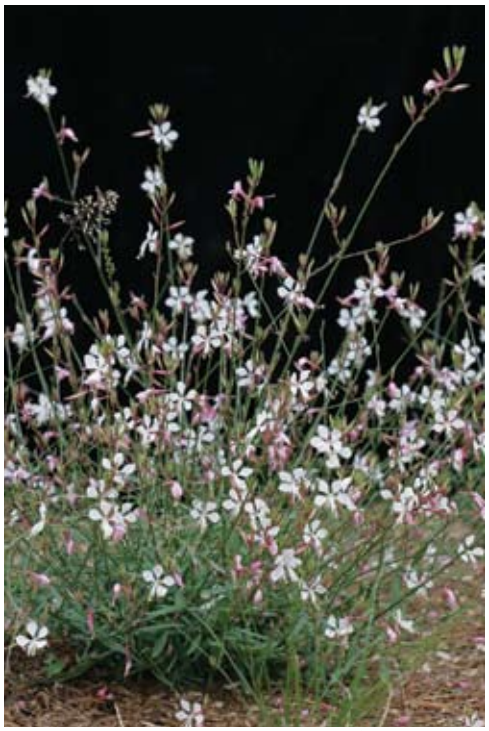
Research

Black spot fungus has challenged rose gardeners for centuries. Using black spot isolates collected from across eastern North America, University scientists can characterize the molecular diversity of the fungus. Rose genotypes are inoculated with black spot isolates to determine the race diversity of the isolates. Breeders then identify black spot resistance genes in rose germplasm and begin the process of incorporating those genes into cold-hardy shrub roses.

More selections of hybrid shrub roses are being evaluated for floral quality, rebloom, hardiness, blackspot tolerance, plant size, and habit. The best—in a variety of colors—will be commercially available in several years.

Gaura

'Snowstorm' is a vigorous new gaura for Minnesota, with abundant, continuous pink and white flowers. It flourishes in both cool and warm locations, even in extreme heat and drought. A hardy seedling was selected in 2000, and was crossed with plants gathered on collection trips to Texas, Mexico, California, and the Dakotas, resulting in a fragrant, prolific plant. Tough though it may be, 'Snowstorm' is now marketed as an annual, and will be used in future breeding efforts toward a truly winter-hardy gaura.



'Snowstorm'

2000: Gaura seedling crossed with selections

2008: 'Snowstorm' released

Shrubs

Dogwood

The underlying rosy hue of dogwood branches provides bright landscape color through even the most severe Minnesota winter. The extensive root system tolerates poorly drained soil, and can be useful for erosion control. Small white flowers appear in June, followed by white berries that many birds and other wildlife find appealing.

The newest variety, Garden Glow™, adds chartreuse foliage and a luminous glow to a shady landscape. 'Cardinal' was introduced for its vivid red winter twig color. 'Isanti' is a slower growing selection of native dogwood. Garden Glow™ performs best in filtered sunlight or where it receives protection from the afternoon sun. 'Cardinal' and 'Isanti' grow well in full sun or partial shade.

KNOW TO GROW

Garden Glow™ is adaptable to a range of soil conditions and is proven cold hardy for USDA Zone 4A. It is not recommended for full or afternoon sun because the golden leaves tend to burn or bleach in high light conditions. Dappled, light shade, or full morning sun followed by afternoon shade, produces the brightest, glowing, yellow green foliage. This dogwood tolerates heavy shade, but foliage turns a darker green.

Garden Glow™

'Isanti'

Research

Pagoda or alternate leaf dogwood is a Minnesota native. Creamy white blossoms on horizontal branches light up the woods in May, and lead to attractive blue fruits in the fall. Unfortunately the trees are highly susceptible to *Cryptodiaporthe* canker, a problem identified more than a century ago. Trees rarely attain a trunk diameter greater than 4" before the tree succumbs. U of M researchers collected canker samples from around the state in order to isolate and culture the fungus. New seedlings, grown from seeds from hardy trees across Minnesota, are systematically infected with the cultured pathogen in the first step to develop a canker-resistant cultivar. In the process, breeders will select for improved fall color, richer and varied flower color, and larger flower size.

DOGWOOD CULTIVARS	YEAR	FEATURES
Cardinal	1986	Young growth has bright red winter color.
Garden Glow™	2001	Brilliant yellow-green foliage. Thrives in shade. 6'
Isanti	1971	Mound-shaped. Fine twigged with red bark.

Native Pagoda

1971: 'Isanti' released

1986: 'Cardinal' released

2001: Garden Glow™ released

'Northern Pearls'

'Emerald Triumph'

'NorthernSun'

Forsythia

The bright yellow flowers of forsythia appear before the leaves, signaling the arrival of spring. 'Northern Sun' was bred to flower in early spring despite cold temperatures. A forsythia's vigorous growth makes it suitable for screens and bank plantings. 'Northern Sun' thrives in full sun, and tolerates poor soil.

Pearlbush

'Northern Pearls' is the only selection of pearlbush hardy for Minnesota. Its name comes from its flower buds, arrayed like pearls along a stem. In early May, each bud opens into a showy white flower, two inches across. It can be pruned to a single trunk for a small tree, or grown as a five- to eight-foot shrub.

Viburnum

'Emerald Triumph' features dark green, glossy foliage and white flowers in late spring. Fruit turns bright red in August and changes to black by mid-autumn. Fall color may not develop completely before a hard freeze, but in the South, the foliage turns bronze to dark red. 'Emerald Triumph' is a compact shrub that grows 6 to 10 feet wide and high, and dense foliage makes it an ideal screen hedge. Watch for a new powdery mildew resistant Nannyberry viburnum in a few years.

'Emerald Triumph'

TYPE	CULTIVAR	YEAR	FEATURES
Forsythia	Northern Sun	1982	Hardy to –30°F. Fast-growing. 8-10'. Tolerates a wide range of soils.
Pearlbush	Northern Pearls	1995	Attractive flowers. Showy exfoliating bark.
Viburnum	Emerald Triumph	1994	Showy, white, nearly flat flower clusters in mid-May. Hardy to –30°F. Best in full sun to part shade and in well-drained soil.

1982: 'Northern Sun' forsythia released

1994: 'Emerald Triumph' viburnum released

1995: 'Northern Pearls' Pearlbush released

Firefall™

Trees

Maples

'Autumn Spire'

Brilliant early fall color distinguishes the Firefall™ Freeman maple. It is the result of a cross between 'Beebe,' a cut-leaf silver maple, and an earlier University red maple introduction, 'Autumn Spire.' It is a male selection that produces no messy seed.

Field trials began in 1992, with young trees evaluated for form, cold tolerance, and quality and timing of autumn leaf color. The initial selections were propagated by softwood cuttings in 1994 and sent to cooperators in Iowa, Oregon, Manitoba, and outstate Minnesota before introduction in 2005.

Research

Mass screening of various non-hardy species for cold hardy variants is ongoing at the Horticultural Research Center and at the North Central Research and Outreach Center in Grand Rapids (USDA Zone 3). Individual seedlings that exhibit exceptional hardiness are propagated and evaluated in additional trials.

Firefall™

'Northwood'

The focus is on overall environmental adaptability—improved cold hardiness, drought tolerance, heat tolerance, as well as disease and insect resistance.

White Pine

'Patton's Silver Splendor' white pine, the newest tree release from the University, was discovered by U.S. Forest Service researchers. It has excellent resistance to white pine blister-rust, which threatens to destroy native white pines. Thicker than usual waxy deposits inhibit the disease and give the blue-green needles a distinctive silvery look. Cones develop with age and enhance the tree's ornamental and wildlife value. After years of testing, it has been released to nurseries for propagation and should be available as three-foot potted specimens in 2011. Hardy through Zone 3.

'Patton's Silver Splendor'

CULTIVAR TYPE & NAME	YEAR	SIZE	FEATURES
RED MAPLE, *Acer rubrum*			
Autumn Spire	1992	40'	Upright form. Good red fall color.
Firefall™ Freeman	2005	50'	Early fall color, orange to scarlet.
Northwood	1980	50'	Bright orange fall color.
WHITE PINE, *Pinus strobus*			
Patton's Silver Splendor	2011	100'	Fast-growing white pine that is resistant to blister rust disease, due to waxy needles.

1923: 'Newport' flowering plum released

1992: 'Autumn Spire' released

1992: 'Minnesota Strain' redbud released

2002: 'Stately Manor' Kentucky coffeetree released

2005: Firefall™ Freeman maple, a cross of 'Autumn Spire', released

Trees

Redbud

'Minnesota Strain'

A hardy variant of redbud appeared in a mass screening of seedlings planted at the Horticultural Research Center many years ago. Before the 'Minnesota Strain' was developed in 1992, few large specimens survived as far north as Minnesota. Flowers are rosy pink, and open before leaves appear.

Buckeye

'Autumn Splendor'

silvery spring foliage and unusual creamy white flowers in July and August.

The 'Autumn Splendor' buckeye is popular for its stunning maroon fall color, and its tolerance of deicing salts makes it a good boulevard tree. It has showy flowers in late spring and shiny nutlike buckeyes in fall.

The 'Stately Manor' Kentucky coffeetree is a male selection, with no pods, that offers interesting gray bark and yellow fall color. A good shade tree with a narrow, upright form and large leaves, it could be a suitable replacement for ash in Minnesota.

Flowering Plum

'Princess Kay'

'Newport' and 'Princess Kay' flowering plums are fragrant ornamental trees in the spring. Plums can produce fruit that is attractive to wildlife and useful for making jelly.

Amur Maackia

Summertime™

The little-known Summertime™ Amur maackia is a small, tough tree that glows with

CULTIVAR TYPE & NAME	SIZE	FEATURES	YEAR
BUCKEYE, *Aesculus* **Autumn Splendor**	35'	Clusters of large yellow flowers followed by shiny, nut-like fruits and brilliant maroon fall color. Resists leaf scorch diseases.	1980
KENTUCKY COFFEETREE, *Gymnocladus dioicus* **Stately Manor**	50' x 40'	Male selection; no seed pods. Tolerates a wide variety of soil conditions. Unusual, deeply-furrowed bark adds winter interest.	2002
CORKTREE, *Phellodendron amurense* **His Majesty**	40' x 35'	Fast growing, open-spreading, male selection producing no fruit, has interesting corky bark. Tolerates alkaline soils. Resistant to insects and diseases.	1996
AMUR MAACKIA, *Maackia amurensis* **Summertime™**	18'	Silvery leaves in spring turn deep green until leaf fall. Blooms late July-early August with small bottlebrush-like cream colored flowers. Mottled bark provides winter interest.	2001

Kentucky Coffeetree

'Stately Manor'

Crabapples bloom abundantly in spring and have attractive displays of fruit. The ornamental U of M cultivars get no taller than 20 feet, with foliage colors that vary from light, bright green to deep maroon or silvery red. Forms may be horizontal, oval, rounded, or vase-shaped.

Flowering Crab

'Sparkler'

Sometimes thought of as a novelty tree due to its irregular growth habit, fast-growing jack pines can grow well on impoverished, sandy sites with acidic soil. 'Uncle Fogey' is an exceptionally hardy, prostrate, drooping tree that does well in urban settings.

The 'Wissota' red pine is a dwarf version of a tall native tree, and is a hardy, diminuitive landscape tree.

Corktrees get their name from the deeply furrowed and soft corky bark. The fast-growing 'His Majesty' develops an open, spreading crown with coarse branches and dark green foliage. This male selection produces no seeds or fruit and so is not spread by birds.

Jack Pine

'Uncle Fogey'

Corktree

'His Majesty'

CULTIVAR TYPE & NAME	SIZE	FEATURES	YEAR
FLOWERING PLUM, *Prunus*			
Princess Kay	20' x 15'	White double blossom. Smooth trunk and branches. Red fall foliage.	1986
Newport	20' x 20'	Pink flowers followed by purple fruit. Dark purple foliage.	1923
REDBUD, *Cercis canadensis*			
Minnesota Strain	12' x 12'	Dark pink to purple flowers open in early May before leaves appear.	1992
CRABAPPLE, *Malus*			
Flame	20' x 15'	White double flowers. Red fruits. Green foliage.	1934
Radiant	20' x 20'	Red flowers. Red fruits. Purple/green foliage. Oval shape.	1958
Sparkler	15' x 15'	Pink flowers. Deep red fruits. Red/green foliage. Flat-topped tree.	1969
Vanguard	18' x 12'	Red flowers. Red fruits. Green foliage. Vase-shaped tree.	1963
JACK PINE, *Pinus Banksiana*			
Uncle Fogey	6'	Prostrate, drooping habit. Hardy to USDA Zone 2.	1971
RED PINE, *Pinus resinosa*			
Wissota	6'	A landscape-friendly dwarf form of a tree that otherwise reaches 100'.	1998

Grasses

'Arctic Green'

Selection for improved winter hardiness is complicated by unpredictable and unrepeatable winters. University of Minnesota researchers exchange plant materials and conduct multiple trials in cooperation with researchers nationwide.

Turfgrass

Most Americans value lush green lawns, parks, school playgrounds, and athletic fields for aesthetic reasons. But there are other benefits. Grass absorbs water, which helps reduce storm runoff and improve water quality. Lawns also have a significant cooling effect, provide oxygen, and can trap dust and dirt, promote healthful micro-organisms, prevent erosion, and filter rainwater contaminants.

In Minnesota, producing grass seed and sod suitable for northern climes is a growing industry. University of Minnesota developments of sustainable, environmentally friendly alternatives to intensive, high-maintenance turfgrass are in high demand. Many grass species popular in other states, such as perennial ryegrass, lack the hardiness to survive a winter of harsh temperatures or little insulating snow. University grass breeders use genetic material from old turf areas in Minnesota, along with materials from research institutions in other states, to develop improved hardy turfgrass varieties.

Researchers continue to test several species including Kentucky bluegrass, perennial ryegrass, tall fescue, fine fescue, and a few native grass species. In addition to winter hardiness, they evaluate quality traits such as color, density, texture, mowability, growth habit, and seed production, as well as multiple pest resistance, efficient water and nutrient use, and drought tolerance.

Genetic improvement of native grasses such as prairie junegrass into top-performing turfgrass varieties should reduce water, fertilizer, and pesticide inputs, resulting in environmental benefits and reduced costs.

Learn more about research on low-maintenance plant materials and best management practices for lawns and turf with a visit to the research plots on the St. Paul campus, and at Rosemount, the Lake Harriet Rose Garden in Minneapolis, and the Minnesota Landscape Arboretum.

CULTIVAR	YEAR	SPECIES	USES
Arctic Green	2007	Perennial ryegrass	Lawns/athletic fields
Polar Green	2006	Perennial ryegrass	Lawns/athletic fields
Ragnar	2001	Perennial ryegrass	Lawns/athletic fields
Ragnar II	2005	Perennial ryegrass	Lawns/athletic fields
MinnFine	1993	Kentucky bluegrass	Lawns
Park	1957	Kentucky bluegrass	Lawns
TruePutt™	1998	Creeping bluegrass	Golf courses

1957: 'Park' released

2007: 'Arctic Green' released

U of M grass seed trials and production fields near Roseau inform a major Minnesota industry.

Ornamental Grasses

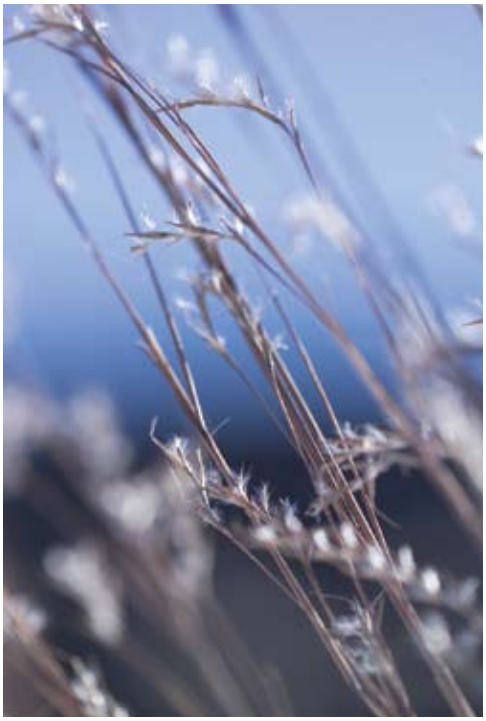
The University's first release of an ornamental grass, Blue Heaven™, is a unique form of little bluestem, a native prairie grass known for its tolerance of sites with dry soil and full sun. The selection process began in 1995, with seed from Benton County and 30 other locations statewide. Three years later, superior individual plants were planted for further evaluation, and by 2004 there was a clear selection being propagated for sale.

Several characteristics make this carefully selected variety ideal as a four-season addition to your landscape. It has a taller, more upright form (40-48" height and 25-30" width) than is typical of little bluestem. And, the colors of Blue Heaven™—dark blue to burgundy foliage during the summer turning red to purple and violet in the fall—are unique on a tall columnar plant. It flowers in September, and fall color extends into winter.

Blue Heaven™

Research

The grass collection at the University's Minnesota Landscape Arboretum includes more than 200 different ornamental and native species and is one of the largest in the United States. Plants are evaluated for winter survival, flowering time, self-seeding, invasiveness, and winter interest. Since the initial planting in 1987, about half of the original grasses, sedges, and rushes have proven hardy at the Arboretum.



Ornamental grasses add beauty and interest to the garden. Their dramatic change through the seasons gives a new dimension to the garden: an informal, natural look that is unique and refreshing.

FROM "ORNAMENTAL GRASSES FOR COLD CLIMATES," U OF M EXTENSION

KNOW TO GROW

Blue Heaven™ little bluestem prefers drier, well-drained sites. This clump-forming grass grows well in sandy soil, but will also tolerate heavier clay soils. Plant Blue Heaven™ in full sun. Once established, it is quite drought-tolerant. To maintain, cut back the previous year's growth to ground level in early spring to allow light to penetrate the crown, which will help new foliage grow quickly.

1987: 200 grass species form U of M grass collection

2008: Blue Heaven™ little bluestem released

Healthy Foods, Healthy Lives

The interdisciplinary arena of food, nutrition, and health research and outreach is a key initiative at the University of Minnesota. With six key components on one campus—agriculture, human nutrition, medicine, pubic health, exercise science, and veterinary medicine—interdisciplinary cooperation can translate quality science to sound public policy.

Berries

Strawberries

Planting several different varieties of strawberries in the field offers growers extended ripening times, and curtails the spread of diseases. University fruit breeders continue research for more cold-hardy, productive plants.

It is not a fast process. Strawberries undergo years of scrutiny and propagation tests before being released. After a year in the greenhouse, the most disease-resistant seedlings are tested at the nation's coldest agricultural research center, the North Central Research & Outreach Center at Grand Rapids and at the Horticultural Research Center near the Twin Cities. In the second summer, the fruit is evaluated: some may be small, tasteless, or too acid or tannic tasting. The best berries are notable for their creamy, juicy texture and flavor. Plants that don't survive the winter or show signs of disease or mold are eliminated. Only a small percentage is good enough to save, and the best plants are set out in rows and monitored for two more years.

In the final stage, test plots are added at the West Central Research & Outreach Center at Morris. The harvests are evaluated—berries are measured and the yield is weighed—for two more years. If the variety is a winner, it is sent to nurseries where it will be propagated for two more years. That may seem like a long process, but strawberries yield fruit in their second year—grapes and apples keep breeders in suspense until fruit appears four or five years after planting. After years of trials, the new cultivars are proven hardy, high-quality, and disease-resistant.

CULTIVAR	YEAR	RIPENS	FEATURES
Itasca™	2006	Late June-early July	Hardy through USDA Zone 3B. Productive plant with richly colored tart berries
Mesabi™	1999	Mid-late June	Large, bright red glossy fruit with melting texture. Fine flavor. Winter hardy. Impressive disease resistance. Ideal for gardens with reduced pesticide use.
Winona™	1997	Late June-early July	Large fruit with excellent texture and hints of peach flavor. Hardy and disease resistant.

Itasca™

Mesabi™

KNOW TO GROW

Grow strawberries in moist, well-drained soil of good fertility. Plant several varieties to extend the season and curb the spread of disease. Apply a winter mulch of clean, weed-free straw to help protect the crowns and flower buds.

1997: Winona™ released

2006: Itasca™ released

'Superior'

'Chippewa'

Science may accelerate natural cycles to some extent, but breeding, selecting, and testing new fruits is not a job for the impatient.

—W.H. ALDERMAN, 1957, IN *FRUIT VARIETIES DEVELOPED AT THE UNIVERSITY OF MINNESOTA FRUIT BREEDING FARM*

Blueberries

Blueberries have been grown at research stations in Minnesota for nearly a century. In 1967, a blueberry breeding program was initiated to develop cold-hardy, low-stature ("half-high"), high quality, large fruited cultivars. The first varieties released from this effort, 'Northblue,' 'Northsky', and 'Northcountry' avoid low-temperature injury by their cold-tolerant buds and a low stature that allows part of the bearing surface to be covered by protective snow. In the '90s, 'St. Cloud,' 'Chippewa,' and 'Polaris' were bred to be chest-high for easier picking. The most recent introduction, 'Superior,' matches them for height, and is highly productive.

Blueberry plants can be decorative, with profuse miniature white blossoms in late spring, glossy green leaves in summer and colorful maroon or orange foliage in autumn.

CULTIVAR	YEAR	FEATURES	PLANT HEIGHT	PLANT SPREAD	YIELD
Chippewa	1996	Most productive U of M variety.	30 - 40"	30 - 60"	3 - 8 lbs / bush
Northblue	1983	Large fruit. Tart flavor. Productive. Half-high habit.	24 - 36"	30 - 40"	3 - 9 lbs / bush
Northcountry	1986	Half-high habit. Wild blueberry flavor.	18 - 24"	24 - 36"	3 - 5 lbs / bush
Northsky	1981 or 1983	Half-high habit. Compact.	12 - 18"	24 - 30"	1 - 3 lbs / bush
Polaris	1996	Aromatic flavor and firm texture. Early maturing.	30 - 40"	30 - 60"	3 - 8 lbs / bush
St. Cloud	1990	Sweet flavor. Early maturing.	30 - 48"	30 - 40"	2 - 7 lbs / bush
Superior	2009	Highly productive. Late season variety.	30 - 48"	30 - 40"	3 - 8 lbs / bush

'Superior'

KNOW TO GROW

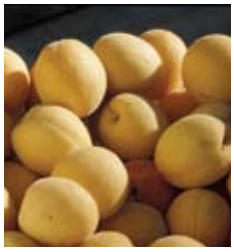
Blueberry growing presents a challenge for many gardeners because plants require acidic, well-drained soil. Most soils—where the native pH of the soil is less than 7.0— can be amended to make them suitable (4.0-5.0). Plant more than one variety for effective pollination resulting in better yield and berry size.

1981-83: 1st U of M blueberry releases

1988: Blueberry muffin adopted as Minnesota State Muffin

Tree Fruits

Apricots, cherries, and plums grow rapidly and often produce fruit in the first or second year—a joy for home orchards and a benefit to fruit breeders evaluating fruit for flavor, texture, and timing. University fruit breeders continue to investigate wild germplasm in breeding fruit plants that better resist cold-temperature injury. The fruit-breeding program also evaluates varieties from other breeding programs around the world—apples, apricots, and pears from China; cherries and currants from Europe—looking for any fruit that may be adaptable to our region.



Currants

'Red Lake'

'Red Lake' has been popular in Europe and across the United States. Introduced in 1933, it is highly productive. Plants have large clusters of red, medium-size fruits, excellent for use in jellies, salads, and desserts.

Raspberries

'Latham'

'Latham' was the most widely-planted raspberry in the United States during the 1930s and '40s. It remains popular today, due to its large and beautiful fruits and disease resistance.

KNOW TO GROW

Raspberries grow in a wide range of soil types, but the ideal environment is well-drained subsoil, with full sunlight and good air circulation.

Apricots

'Sungold'

Apricots are fine ornamental small trees with an early spring bloom and bright orange-yellow fall color. Because two varieties of apricots are needed for cross-pollination, U of M 'Sungold' and 'Moongold' cultivars make a good planting combination. The fruit is fair for fresh eating and good for preserves and sauces.

'Summercrisp'

APRICOT CULTIVAR	YEAR	RIPENS	FEATURES
Moongold	1960	Late July	Golden yellow. Very hardy. Blooms the third week of April. 1 3/4" fruit hangs on tree until ripe. Self-unfruitful. Freestone.
Sungold	1960	Early August	Yellow with red blush. Very hardy, 1 1/4" fruit with clear flesh. Fruit hangs on the tree until ripe. Mild flavor. Upright growth habit. Blooms third week of April. Requires another apricot for cross-pollination. Freestone.

PEAR CULTIVAR	YEAR	RIPENS	FEATURES
Golden Spice	1949	Early Sept	A small, very hardy pear. The 1 3/4" fruits are a medium yellow, lightly blushed with dull red. Flesh is tart, spicy and ready for harvest in midseason. Good for canning and spicing. Fair for eating.
Parker	1934	Mid August	Medium to large, roundish, yellow-bronze fruit. Popular for fine-grained, tender, juicy flesh. Fruit must be picked before it ripens. Upright, vigorous growing tree used as pollinator for 'Luscious'. Tree susceptible to fire blight.
Summercrisp	1985	Mid August	Sweet flavored, crisp fruit. 2 1/2-3" in diameter and 3-4" long. Blooms early May. Fruit harvested when crisp, green with a red blush, and may be stored up to 2 months. Hardiest pear at University of Minnesota.

1920: 'Latham' raspberry released

1923: 'La Crescent' plum released

1933: 'Red Lake' currant released

1985: 'Summercrisp' pear released

Pears

'Summercrisp'

'Summercrisp' pear is hardy in most of Minnesota. To improve productivity, plant another type of pear to serve as a pollinator. Researchers are testing about 15 new selections from which a new cultivar may be introduced in the next decade.

Cherries

'Meteor'

'Meteor' tart cherry is hardy in central and southern Minnesota. Cherries bloom earlier than apples, so the flowers have a greater chance of being killed by a late spring frost. Protecting the fruit from birds is almost essential as they like them as well as people do!

TART CHERRY CULTIVAR	YEAR	RIPENS	FEATURES
Meteor	1952	Mid July	Semidwarf (10-14'). Hardy, vigorous pie cherry tree with large bright red fruit. No cross-pollination needed.
North Star	1950	Early July	Dwarf tree (7-10'). Pie cherry. No cross-pollination needed. Very productive. Bright red deepening to mahogany skin. Yellow, juicy, tender flesh. Tree resistant to leaf spot and brown rot.

PLUM CULTIVAR	YEAR	RIPENS	FEATURES
Alderman	1986	Late August	Fruit is burgundy red with golden yellow, sweet, juicy flesh. Eat fresh or use for preserves. Tree is valued as an ornamental and fruits consistently. Clingstone.
La Crescent	1923	Early August	High quality yellow plum. Fruit is small to medium, sometimes with a light blush skin. Flesh is sweet, juicy. Freestone. Somewhat suggestive of apricots. Vigorous grower but often a shy bearer.
Pipestone	1942	Late August	Large, attractive red fruits for drier areas. Sweet, juicy yellow fruit. Excellent quality for jam, jellies, and fresh use. Very hardy. Tree is productive. Clingstone.
Superior	1933	Mid August	Hybrid with large fruit with dark red, russet-dotted skin. Flesh is yellow, juicy, and sweet. Heavy bearing tree may lack hardiness in north. Often sets fruit the first year. Clingstone.
Underwood	1920	Late July	Medium-large, red fruit with golden yellow flesh. Juicy and sweet flavor. High quality for fresh use and jam. Clingstone. Hardy, vigorous grower with horizontal spread.

'Superior'

Plums

'Alderman'

'Alderman' plums are large, with golden flesh and burgundy skin. Horizontal branches make it an attractive small tree in the landscape. Plant 'Superior,' 'Toka,' or 'Compass' as pollinators for best fruit set.

Choices, choices

The selections that perform well in regional trials are the plants that will become future cultivars. Stock plants of these new cultivars are provided to licensed nurseries, who spend the next few years propagating the large quantities of plants needed for retail sales.

Cultivars developed by University of Minnesota plant breeders are released through the Minnesota Nursery Research Corporation or through the University of Minnesota's Office of Patents and Technology Marketing. In either case, royalties collected from cultivar releases play a vital part in providing financial support for future research.

KNOW TO GROW

Hybrid plums are not self-fruitful; therefore, at least two varieties must be planted. Tart cherries are self-fruitful, so a single-variety orchard could be planted.

'Honeycrisp'

SweeTango® Apple

Frostbite™ Apple

"Savor the Sweet!™" SnowSweet® Apple

Apples

Three new apples with distinctive traits—SnowSweet®, Frostbite™, and SweeTango® apples — are the most recent introductions from the University's world-renowned apple breeding program.

SnowSweet® apple trees produce savory, sweet fruit, with a slight tart balance. An added benefit is how slowly it turns brown when cut and exposed to air.

The Frostbite™ apple tree fits a special niche. It is an extremely cold hardy tree with small fruit tasting almost like sugarcane—tangy, very sweet, and juicy.

SweeTango® has quite the "family tree" as a cross between two popular apples—'Honeycrisp' (mom) and Zestar!® (dad)—yet it delivers its own unique flavor plus the satisfying "crunch" of a 'Honeycrisp'. Consumers will soon be able to purchase SweeTango® apples in stores and some orchards, but trees can be purchased by licensed growers only.

The development of 'Honeycrisp' is recognized as one of the top 25 innovations of the decade by the 2006 Better World Report. This report, by the Association of University Technology Managers, recognizes significant academic research and technology transfer that has made the world a better place. Since its introduction in 1991, millions of 'Honeycrisp' trees have been planted and are successfully producing excellent fruit.

Zestar!® apple trees, released in 1999, produce crunchy and juicy fruit with a sweet-tart taste and hint of brown sugar flavor.

Roots

In the early 1900s, U of M plant breeders collected wild trees as well as cultivars from New England and other Midwest breeders. Thousands of seedlings were grown from those parent trees, and the record-breaking cold winter of 1917-18 helped sort out the winners. Some progeny of 'Malinda'—a New England apple—survived and led to the successful apples of the 1920s, including 'Haralson' and 'Beacon.' And some of the 'Malinda' genes live on in varieties released decades later: 'Honeygold' and even 'Honeycrisp'.

Fruit from SnowSweet® Apple Tree

"Crunch into Zestar!®"™

Fruit from Zestar!® Apple Tree

Apples

KNOW TO GROW

Apple trees need neighboring trees to enhance pollination. Plus, you need at least two different varieties planted no farther than 500 feet from each other.

Frostbite™ Apple

'Honeygold'

'Prairie Spy'

Pollinated apple blossoms are protected.

EARLY SEASON CULTIVARS	YEAR	FEATURES
Beacon	1936	Bright red apple with soft, juicy flesh and a slightly tart flavor. Tree is hardy, vigorous, and susceptible to fire blight. Ripens mid- to late August.
Centennial Crabapple	1957	Large, red over orange crabapple. Excellent for fresh eating and sauce, but does not store well. Tree is very hardy, even in Zone 3. Ripens mid- to late August.
State Fair	1977	Striped red, juicy, moderately tart fruit good for eating and cooking. The fruit will store for 2 to 4 to weeks. Tree is susceptible to fire blight and somewhat prone to biennial bearing. Ripens mid- to late August.
SweeTango®	2009	Blush apple with deep red coloration over yellow background. This new variety is the result of Honeycrisp crossed with Zestar!® and is juicy and sweet, with a crisp crunchiness and an excellent sweet-tart flavor. Ripens late August-early September. Consumers may purchase SweeTango® fruit at stores and some orchards. Trees may be purchased by licensed growers only. SweeTango® is a registered trademark of the University of Minnesota for the Minneiska cultivar.
Zestar!®	1999	Large, crunchy, juicy red fruit with a sprightly sweet-tart flavor. Excellent for both fresh eating and cooking. The fruit will store for 6 to 8 weeks. Tree is vigorous, upright and very susceptible to apple scab. Ripens late August to early September. Zestar!® is a registered trademark of the University of Minnesota for the Minnewashta cultivar.

MID-SEASON CULTIVARS	YEAR	FEATURES
Chestnut Crabapple	1949	Large, russeted crabapple with a rich, nutty flavor. Best for fresh eating or sauce. The fruit stores for 4 to 5 weeks. Ripens early September.
Red Baron	1970	Medium-size red and yellow apple with juicy flesh and a mild sweet flavor. Good for fresh eating. Storage life of 4 to 5 weeks. Tree is hardy and resistant to fire blight. Ripens mid-September.
Sweet Sixteen	1977	Crisp and juicy with an exotic yellow flesh and a very sweet, unusual sugar cane or cherry candy flavor. The fruit stores for 5 to 8 weeks. Tree is very vigorous. Fruit may be subject to premature drops. Ripens mid- to late September.
Honeycrisp	1991	Large, dappled red fruit with a well-balanced flavor, outstanding crispness and juiciness. Best for fresh eating and salads as the flesh is slow to brown. Tree has low to medium vigor and excellent scab resistance. Fruit will easily store 7 or more months, a benefit for small commercial growers. With more than 5 million trees planted, Honeycrisp is easily the most popular University of Minnesota introduction to date. Ripens late September.

1922: 'Haralson' apple released

1936: 'Beacon' apple released

1977: 'Sweet Sixteen' released

1991: 'Honeycrisp' released

1999: Zestar!® released

'State Fair'

'Regent'

LATE SEASON CULTIVARS	YEAR	FEATURES
Honeygold	1970	Golden to yellow-green fruit that is sweet, crisp, and juicy. Excellent for fresh eating and also good for cooking. The fruit will store for 2 to 3 months. Tree is easy to manage but susceptible to fire blight. Ripens late September.
Haralson	1922	Firm texture with a complex tart flavor. Good for fresh eating and cooking. Especially good pie apple. The fruit will store for 4 to 5 months. Tree is of low vigor and easily trained. Tends to be biennial bearing. Fruit may be prone to watercore and russeting. Ripens late September to early October.
Frostbite™	2008	Intensely flavored, sweet, firm and juicy flesh. Stripped maroon-red and gold-yellow, 2 1/2" diameter fruit. Fruit may be prone to russetting and cracking at the stem end. Very cold hardy and excellent for cider. Ripens late September to mid-October.
Regent	1964	Appealing red-striped apple with well-balanced flavor that's good for eating and cooking. The fruit will store for 4 to 5 months. Tree is moderately vigorous and easily trained. Susceptible to apple scab and of moderate hardiness. Ripens early to mid-October.
SnowSweet®	2006	Savory, sweet tasting apple, with a slight tart balance and rich overtones. Amazingly slow to turn brown when cut. Appealing, large, bronze-red blush fruit. Excellent for fresh eating, snack trays, and salads. Ripens mid-October. SnowSweet® is a registered trademark of the University of Minnesota for the Wildung cultivar.
Fireside/ Connell Red	1943	Very large fruit with sweet flavor and fine-grained flesh. Good for fresh eating, salads, and baked apples. Tree is vigorous and weeping. Ripens mid-October.
Keepsake	1978	Very hard and crisp with yellow flesh and an exotic sweet, spicy flavor. Good for fresh eating and cooking. The fruit will store for 6 months. Tree is of medium vigor and easy to manage. Ripens mid-October.
Prairie Spy	1940	Large, firm, dense fruit that is excellent for baking and long-term storage. Tree is very vigorous and productive. Ripens late October.

Finding that Honeycrisp crunch

- Honeycrisp apples with exceptional quality are produced in a climate with cool nights and moderate daytime temperatures leading up to the harvest season.
- Minnesota and surrounding regions of the upper Midwest are squarely in the "Honeycrisp Comfort Zone," and produce some of the best quality Honeycrisp in North America.
- A high quality Honeycrisp apple with exceptional taste and crunch can be large or small, but should have bright red stripes or blush over a yellowish-green background color when harvested.

2006: 'Honeycrisp' voted official Minnesota State Fruit

2006: SnowSweet® apple released

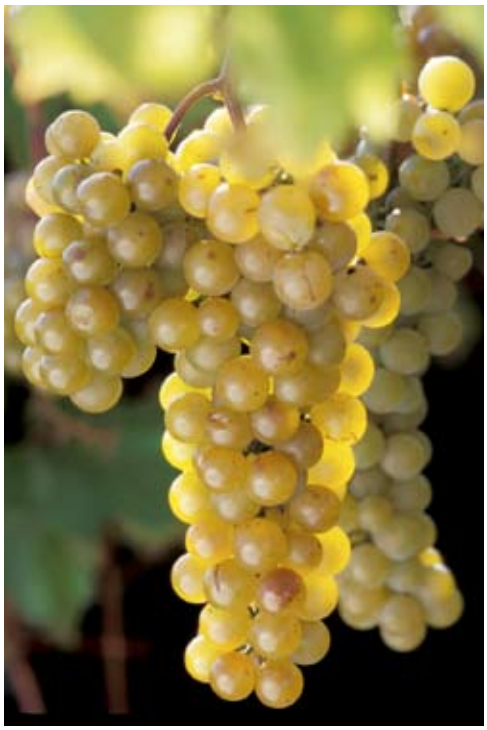
2008: Frostbite™ apple released

2009: SweeTango® apple released

www.apples.umn.edu

'Frontenac'

'Marquette'



'La Crescent'

'Frontenac gris'

Wine Grapes

The University of Minnesota is recognized as one of the top wine grape research programs in the country, with the goal of developing high quality, cold hardy, and disease resistant wine grape cultivars. The wine grape breeding program began in the mid-'70s, and in 2000 an enology lab and research winery opened at the Horticultural Research Center.

Today more than 10,000 experimental vines are cultivated on 11 acres. Thousands of seedlings are produced each year using a diverse genetic base that includes classic *Vitis vinifera* cultivars, quality French hybrids, and hardy, disease resistant selections based on *V. riparia,* Minnesota's native grape.

Currently almost 200 U of M selections are in advanced tests, as well as more than 400 named varieties and selections from other breeding programs around the world. In addition to cold hardiness and disease resistance, viticultural traits such as productivity, cluster size, growth habit, bud break, and ripening times are evaluated.

Many Midwestern wineries are now producing extraordinary medal-winning wines made from University of Minnesota cultivars.

When a new grape is released, nurseries get a well-tested selection that has been evaluated for 15 years or more. The cross for 'Marquette' was made in 1989, and it was introduced as a new variety in 2006. A promising cultivar, it is now being extensively planted throughout the Midwest and New England.

The enology project works closely with the breeders by producing numerous experimental wines from test cultivars each year. The project aids regional wineries by determining optimum processing methods for both new and existing cultivars, and provides local support for the technical and educational needs of the developing Minnesota wine industry.

In addition, researchers work to characterize the components of new grapes. U of M cultivars have different chemistry, color, tannin structure, and flavor compounds than traditional wine grapes, and those differences are reflected in the wine. The better those unique traits are understood, the easier it is for growers and winemakers to produce high-quality wine.

WINE GRAPE CULTIVARS	YEAR	TYPE	FEATURES
Frontenac	1997	Red and rose' wine, port	Vigorous and very disease resistant. Wine has flavors of cherry and plum. Can be high in acidity.
Frontenac gris	2003	White wine	Vigorous and very disease resistant. Wine has a characteristic peach flavor. Can be high in acidity.
La Crescent	2002	White wine	Very cold hardy. Wine has flavors of apricot, citrus and tropical fruit. Moderately disease resistant.
Marquette	2006	Red wine	Resists downy mildew, powdery mildew, and black rot, with open, orderly growth habit. Wine has complex notes of cherry, berry, black pepper, and spice on both nose and palate.

1989: Cross made for 'Marquette'
1997: 'Frontenac' released
2000: Enology lab and research winery opens
2002: 'La Crescent' released
2003: 'Frontenac gris' released
2006: 'Marquette' released

www.grapes.umn.edu

About enology

At the Horticultural Research Center enology lab, spectrometric tests are run on all University cultivars, especially highly-colored reds. This analysis enables researchers to quantify and compare the amounts of red pigment (anthyocyanins), tannins, and total phenolic compounds in new hybrids to those of native American and European grape varieties, and other hybrids. Flavor compounds in key wine grape cultivars—'Frontenac,' 'La Crescent,' 'Frontenac gris,' and 'Marquette'—are analyzed with a combination of instrumental and sensory methods. Determining key wine components will ultimately allow producers to make educated choices about processing methods that best fit their stylistic goals.

In the state-of-the-art facility, an expert staff works to evaluate all aspects of the experimental wines. Polyphenols (pigment and tannins), acidity, and sugar, as well as aroma and flavor can be objectively measured. A trained taste panel evaluates various sensory aspects, including visual appeal, bouquet, flavor, balance, and body.

The latest advances in propagation, hybridization, cultivation, and winemaking ensure the introduction of vines with superior performance in both vineyard and winery.

Table Grapes

Since the introduction of 'Bluebell' in 1944, the University of Minnesota has offered grapes that withstand cold winters, are disease resistant, and taste delicious fresh, or as juice, or jelly. In past years, the University released 'Swenson Red' and 'Edelweiss' grapes in collaboration with the legendary Elmer Swenson, a pioneering Wisconsin grape breeder who also worked at the Horticultural Research Center for a number of years. Several varieties of table grapes developed at the University in the last century are no longer commercially available. Researchers today continue work toward new seedless varieties suited to cold climates.

'Edelweiss'

'Swenson Red'

TABLE GRAPE CULTIVARS	YEAR	TYPE	FEATURES
Bluebell	1944	Table, juice, jelly	Early ripening. Blue seeded table grape with a mild Concord-like flavor. Disease resistant.
Edelweiss*	1977	Table, wine	Large-clustered, white seeded table grape with a Concord-like flavor. May need winter protection.
Swenson Red*	1977	Table	Red seeded table grape with refreshing flavor and crisp texture. Needs winter protection and a thorough spray program.

**Joint release with Elmer Swenson.*

1870: Louis Suelter, a German immigrant in Carver County, introduced 'Beta' grape

1944: 'Bluebell' released

1977: 'Edelweiss' and 'Swenson Red' released

Look & Learn

"Driven to Discover℠" encompasses the University of Minnesota's mission and communicates the search for knowledge and the drive to share that learning and discovery with students and the larger community. That role is vital to the state's health, well-being, and economy. Ongoing research is accessible online and in person at the U of M Research & Outreach Centers throughout the state.

Rain gardens on the St. Paul campus thrive in low spots where water is purposely channeled.

Green Environment

University horticultural scientists research ways to restore and preserve water quality through strategic plantings to restore wetlands, preserve lakeshore, and curb runoff through rainwater gardens. Researchers analyze the most beneficial plants for various conditions and provide information to the public on plant selection.

In wetland demonstration sites, researchers are investigating whether short-lived perennials can be used to suppress reed canary grass that invades damaged wetlands, and whether adding nutrients increases the likelihood of weedy plant invasion.

Natural landscaping along lakeshores enhances the quality of lakes by restoring fish and wildlife habitat and protecting water quality by reducing runoff. The vegetation protects the land from erosion and reduces yard maintenance. Waterfront sites, such as lakeshore, river banks and public access boat launch areas, are prone to erosion and require durable and adaptable plants. Sites are often characterized by poor soil, high shade, and seasonal flooding.

Rainwater gardens of hardy plants sited in low-lying areas trap and absorb runoff from parking lots, streets, and roofs. Parking lot runoff at the University's Landscape Arboretum and the St. Paul campus is channeled into planting beds and supports a wide variety of plants for public view. The gardens filter storm water close to where it falls and prevent additional runoff and pollution.

Phosphorus fertilizer runoff research at the Turfgrass Research, Outreach, and Education (TROE) Center on the St. Paul campus, ongoing since 2004, addresses questions of water quality, grass health, and growth.

Native prairie plants and wetlands research

Lakeshore restoration

Research & Outreach Centers

Visitors are welcome at the University's Agricultural Experiment Station research sites. Public gardens and fields allow visitors to see a variety of U of M cultivars in different settings and to learn how to grow them. Located throughout the state at Crookston, Grand Rapids, Lamberton, Morris, Rosemount, and Waseca, the six Research & Outreach Centers (ROCs) vary in climate and soil conditions. Other facilities that conduct research and outreach include the St. Paul Campus, Cloquet Forestry Center, Sand Plain Research Farm, and the Horticultural Research Center and Landscape Arboretum.

Sand Plain

The Sand Plain Research Farm at Becker provides a dry sandy site for research on many crops including blueberries (above), strawberries, currants, and potatoes. About 45 acres of research plots are tested under irrigation before a new variety is released for commercial production. An unwatered site provides an extreme test of trees and shrubs suitable for home landscapes. Visitors are welcome.

St. Paul

On the northeast corner of the University's St. Paul Campus, a vibrant and welcoming garden is a landscape laboratory for College of Food, Agricultural, and Natural Resource Sciences students majoring in environmental horticulture and a popular site for seminars, tours, and casual visitors. The Campus has many acres devoted to research, including turf and ornamental grasses, a tree and shrub nursery, a native prairie, and thousands of flowers.

Morris

At the West Central Research & Outreach Center in Morris, there is an emphasis on renewable energy and sustainable practices. Large horticultural display gardens combine research and education in an aesthetically pleasing showcase that entices the public to enjoy a gazebo, trellises, a water garden, and an interactive and informative children's area. Temperatures at Morris are similar to the Twin Cities, but stronger winds, a drier climate, and soil differences are factors in testing new University flower, fruit, and vegetable varieties.

1896: Research projects begin at Grand Rapids

1909: Cloquet Forestry Center opens

1947: Rosemount site acquired

1958: Minnesota Landscape Arboretum opens

1976: Sand Plain research at Becker begins

Grand Rapids

Much of the University's outdoor cold hardiness research takes place at the North Central Research & Outreach Center in Grand Rapids, where horticulture, agriculture, and forestry research has been ongoing since 1896. Fruits, vegetables, trees, shrubs, and flowers are challenged by the extremes of cold winters and short, humid summers at this northernmost—and coldest— horticultural research center in the continental U.S.

Rosemount

The 3,500 acres at the Rosemount Research & Outreach Center are dedicated to research in a wide range of agricultural crops and animals, as well as turfgrass, ornamental plants, and trees. This extensive site near the metro area invites the public in every season, with the scenic Lone Rock Trail for hiking and skiing, and large display gardens designed and maintained by Dakota County master gardeners.

Horticultural Research Center and Minnesota Landscape Arboretum

The Minnesota Landscape Arboretum's famous display gardens and natural woodlands are a year-round destination. Science and research underly the beauty there, but at the adjacent Horticultural Research Center, research is foremost. University horticulturists use the two facilities to develop and study hardy landscape plants, high quality grapes, berries and tree fruits, ornamental grasses, and to investigate methods for restoring wetland and prairie ecosystems. The Arboretum's "Spring Peeper Meadow" is a major wetland restoration demonstration site.

Waseca

At the Southeast Research and Outreach Center, agricultural research including drainage and water management, livestock production, alternative crops, biomass renewable energy, and plant trials provide ongoing demonstrations of new cultivars and farming techniques for the region. Research on vegetables with cancer preventive nutrients has been ongoing since the 1980s.

www.maes.umn.edu/ROCindex.asp

Look to the Future

These two pages offer a sneak peek at the most promising University cultivars—new varieties that have passed rigorous tests and are now in commercial trials or propagation.

After new selections are tested in multiple sites in Minnesota and elsewhere, the best ones are sent to commericial trials for propagation tests and grower production to meet market standards. Finally, commercial propagation begins, but it may take several years to develop sufficient plant stock for retail nurseries and garden centers.

Wild gladiolus species from South Africa and Europe have been crossed with select cultivated gladiolus to produce winter-hardy gladiolus that grow from seed. New selections have multiple three-foot-tall flowering stems with fragrant flowers, and survive in Zone 3.

Easter lilies that grow from seed and bloom all season long will offer new possibilities for home gardeners and the cut-flower industry. Varied colors are also in trials.

Northern Accents™ polyantha roses in new colors will soon join the "Sven, Ole, and Lena" family of compact, everblooming roses.

U of M azalea breeders are working to produce cultivars that flower later into June and July. Watch for a true red flower and a new series of more compact plants and flowers.

The "wave" chrysanthemums , less than six inches high with a three-foot diameter, are being propagated in every color, in both daisy and double flower types. This new shape will add beautiful new form to gardens and containers.

Horticulture is an art of endless possibilities and changes, and no person of experience in such matters ever feels that he knows it all.

—PROF. SAMUEL B. GREEN, PRESIDENT'S ADDRESS TO THE MINNESOTA STATE HORTICULTURAL SOCIETY, THE MINNESOTA HORTICULTURIST, 1908

A hardy wisteria, 'Betty Matthews,' is in commerical propagation and may be available by 2012.

Several new June-bearing strawberry cultivars will likely be entering the market as early as 2011. These will span the season from early June to mid-July, and were especially selected for productivity and winter hardiness through some cold winters at the North Central Research and Outreach Center in Grand Rapids.

A new perennial ryegrass to be released soon shows excellent turf quality and high levels of crown rust resistance in both turf and seed production, and has improved winter hardiness.

Watch for pink-fruited blueberries in 2011, sure to be a culinary surprise with the sweet taste and satisfying crispness of the best of the blues.

New black currants bred in Scotland and tested in Minnesota promise hardy plants and healthful fruit rich in vitamin C and other antioxidants.

There is a large field for the plant breeder.... We need hardier cherries and better keeping varieties of plums for the market, we need long keeping varieties of apples and many other fruits. How are we going to get these? Only through the patient and hardworking plant breeder.

—CHARLES HARALSON, THE MINNESOTA HORTICULTURIST, NOV. 1908

SnowSweet® Apple

Minnesota Hardy: Showcasing New and Enduring Plants For Your Landscape from the University of Minnesota

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