

THE
UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
AND
NORTH DAKOTA
AGRICULTURAL EXPERIMENT STATION
AND
SOUTH DAKOTA
AGRICULTURAL EXPERIMENT STATION
AND
MINNESOTA
AGRICULTURAL EXPERIMENT STATION

Crataegus
Mollis Scheele

Notice to Nurserymen of the naming and release of 'Homestead' Arnold hawthorn.

Homestead Arnold hawthorn, *Crataegus arnoldiana* Sarg. (*C. Mollis* Scheele), is a seed propagated cultivar recommended for use in multi-row farmstead and single row field windbreaks, wildlife habitat, and recreation, urban, industrial development and transportation corridor plantings. The vigorous, dense growth makes it useful for shelterbelts and screening. The attractive form, foliage and flowering is of ornamental value. The fruit is edible. Many song and game birds utilize this tree for food and nesting.

Arnold hawthorn is a small slow growing tree **15 to 20 feet (450-600 cm)** tall, with a trunk **8 to 10 inches (20-25 cm)** in diameter, stout wide spreading branches forming a broad round-tipped often symmetrical head, and slender conspicuously zigzag branchlets coated early in the season with long matted pale hairs, and armed with many stout straight or slightly curved chestnut-brown shiny spines 2 to 3 inches (5.0-7.6 cm) long. Leaves dark yellow-green, glabrous above, pubescent below, ovate to broadly ovate, sharply serrate. Flowers 3/4 inch (1.9 cm) in diameter, pale yellow, on slender pedicels, blooming in early to mid May. Fruit subglobose (1.4-1.6 cm) in diameter, turning fleshy and bright red when mature in late August.

Arnold hawthorn is found growing naturally in thickets in the Arnold Arboretum, West Medford, Connecticut and is often cultivated in the parks and gardens of Boston.

Accession ND-20, PI-503530, was collected by John McDermid, Soil Conservation Service, Bismarck, North Dakota, on the Agriculture Canada, Research Station, Morden, Manitoba, Canada, in 1954. The Research Station received their plants from the United States Plant Introduction Station, Chico, California as PI 130958 in 1941.

The USDA, Soil Conservation Service (SCS) has evaluated the adaptation and performance of Homestead Arnold hawthorn at the SCS Plant Materials Centers at Bismarck, North Dakota; Bridger, Montana; Manhattan, Kansas; Elsberry, Missouri; and East Lansing, Michigan.

Field evaluation studies were conducted cooperatively with the Soil Conservation Service and the North Dakota Game and Fish Department, Bismarck, North Dakota; North Dakota Forest Service, Bottineau, North Dakota; Morton County Parks Department, Mandan, North Dakota; North Dakota State University Experiment Station, Dickinson, North Dakota; South Dakota State University, Central Research Station, Highmore, South Dakota; USDI, Fish and Wildlife Service, Lake Andes National Wildlife Refuge, Lake Andes South Dakota; University of Minnesota, West Central Experiment Station, Morris, Minnesota; University of Minnesota, Northwest Experiment Station, Crookston, Minnesota; and Minnesota Department of Natural Resources, Rochester, Minnesota.

Field plantings in actual use situations were conducted in cooperation with state and federal agencies and conservation district cooperators in North Dakota, South Dakota, Minnesota, Montana and Wyoming.

Homestead Arnold hawthorn has performed well on soils that are in Windbreak Suitability Groups 1-6 (deep and moderately deep, moderately coarse through fine texture, somewhat poorly drained to well drained).

The northern limit for the area of adaptation of Homestead Arnold hawthorn appears to be hardiness zone 3 and performs well southward to hardiness zone 6. The most limiting factors to survival and growth rates are weed competition, animal damage and lack of adequate soil moisture.

Observations at some test locations have shown damage from cedar apple rust (*Gymnosporangium* sp. Helwig), fireblight (*Erwinia amylovora* Wescott 1950) and woolly apple aphid (*Eriosoma lanigerum* Hausm.).

The result of these studies and others in adjacent states indicate that Homestead Arnold hawthorn is adapted to the states of North Dakota, South Dakota, Montana, Wyoming, Minnesota, Nebraska, Kansas, Missouri, Iowa, Illinois, Michigan, Wisconsin, Indiana, and Ohio. Its performance outside of this area has not been adequately tested.

The USDA, Soil Conservation Service, Plant Materials Center, P.O. Box 1458, Bismarck, North Dakota 58502, will maintain breeders seed and foundation seed of Homestead Arnold hawthorn. Certified seed (source identified and selected class) will be available from growers approved by the North Dakota, South Dakota, and Minnesota State Certified Seed Departments.

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DATA TO SUPPORT THE RELEASE OF HOMESTEAD ARNOLD HAWTHORN

Cultivar: 'Homestead'

Accession No.: ND-20, 9005731, PI-503530

Common Name: Arnold hawthorn

Scientific Name: *Crafaegus arnoldiana* Sarg.

Symbol: CRAR*

Description: Homestead Arnold hawthorn is a small slow growing tree 15 to 20 feet (450-600 cm) tall, with a trunk 8 to 10 inches (20-25 cm), stout wide spreading branches forming a broad round-tipped often symmetrical head, and slender conspicuously zigzag branchlets coated early in the season with long matted pale hairs, and armed with many stout straight or slightly curved chestnut brown shining spines 2 to 3 inches (5.0-7.6 cm) long. Leaves dark yellow green, glabrous above, pubescent below, ovate to broadly ovate, sharply serrate. Flowers 3/4 inch (1.9 cm) in diameter, pale yellow, on slender pedicels, blooming in early to mid May. Fruit subglobose (1.4-1.6 cm) in diameter, turning fleshy and bright red when mature in late August.

Arnold hawthorn is found growing naturally in thickets in the Arnold Arboretum, West Medford, Connecticut. Often cultivated in parks and gardens of Boston.

Origin: Seed of **NO-20** (PI-503530) was collected by John McDermid, Plant Materials Specialist, Soil Conservation Service (SCS), Bismarck, North Dakota, on the Agriculture Canada, Agriculture Research Station, Morden, Manitoba, Canada, in 1954. The Research Station received their plants from the United State Plant Introduction Station Chico, California as PI-130958 in 1941.

Method of Breeding: An open-pollinated seed increase of the 1954 collection (**ND-20**) was established at the USDA, Soil Conservation Service, Plant Materials Center (PMC), Bismarck, North Dakota. The progeny were tested in advanced evaluation and field plantings to determine soil and climatic adaptation.

Uses: Homestead Arnold hawthorn is a seed propagated cultivar recommended for use as a small tree in multi-row farmstead and single-row field windbreaks, wildlife habitat, and recreation and urban development plantings. The vigorous, dense growth makes it useful for shelterbelts and screening. The attractive form, foliage and flowers is of ornamental value. The fruit is edible. Many song and game birds utilize this tree for food and nesting.

Performance: USDA, Soil Conservation Service has evaluated the adaptation and performance of ND-20 Arnold hawthorn for windbreak and wildlife habitat purposes in the Great Plains states. Initial evaluation studies have been conducted at the SCS, Plant Materials Centers at Bismarck, North Dakota; Bridger, Montana; Manhattan, Kansas; Elsberry, Missouri; and East Lansing, Michigan (Tables 1-5). Field evaluation studies were conducted in North Dakota, South Dakota, and Minnesota (Tables 6-15). These plantings are located on land provided by cooperating state and federal agencies to evaluate performance, and soil and climatic adaptation. In addition, ND-20 has been field tested on over 90 sites on conservation district cooperators land in farmstead and wildlife habitat plantings under actual conditions in North Dakota, South Dakota, Minnesota, Montana and Wyoming (Tables 16-18).

Reports from SCS field office personnel indicate this species is drought resistant and will tolerate poor soil and weed control conditions, but will not perform well on poorly drained heavy soils. Homestead hawthorn is susceptible to fireblight (*Erwinia amylovora*), cedar apple rust (*Gymnosporangium* sp.), and wooly apple aphid (*Eriosoma lanigerum*).

Homestead arnold hawthorn is adapted to a wide range of soil and climatic conditions. Its average growth rate for 11 successful field plantings [Windbreak Suitability Groups (WSG) 3-51 in North Dakota was .58 ft/year (17.7 cm/yr) and 68 percent survival; 15 successful field plantings in South Dakota (WSG 1-31, .87 ft/year (26.5 cm/yr) and 80 percent survival; and 9 successful field plantings in Minnesota (WSG 2-7), .76 ft/yr (23.2 cm/yr) and 67 percent survival. Average for the three states was .74 ft/yr (22.5 cm/yr) and 72 percent survival. These averages were reduced by poor weed control, animal damage, and low precipitation. Under good to excellent conditions, Homestead did obtain 1.10 ft/yr (33.5 cm/yr) with 95 percent survival in South Dakota within Major Land Resource Area (MLRA) 102A and WSG-1 soil (SCS-PMC 1972-1987).

Data at field evaluation locations, indicates Homestead is 30-40 percent lower in rate of growth per year than similar species. Vigor and percent survival is equal to, and in a few locations better than, comparable species: 'Midwest' Manchurian crabapple *Malus baccata mandshurica*, common Siberian crabapple *Malus baccata sibirica* and 'McDermand' ussurian pear *Pyrus ussuriensis* (Tables 6-15).

Although Homestead's slow rate of growth can be considered a disadvantage, this is offset by the high vigor and survival rates obtained under a variety of site conditions. Homestead's attractive form, foliage and fruit; dense branching habit and longevity make Homestead a valuable conservation and ornamental plant.

Adaptation: Based on performance studies conducted by the USDA, Soil Conservation Service, the projected area of adaptation for Homestead Arnold hawthorn was determined to be:

States: North Dakota, South Dakota, Minnesota, Montana, Wyoming, Nebraska, Kansas, Missouri, Iowa, Illinois, Michigan, Indiana, Wisconsin, and Ohio.

Major Land Resource Regions:

Northern Great Plains Spring Wheat Region
 Northeast portion of the Western Great Plains Range and Irrigated Region
 North one-half of the Central Great Plains Winter Wheat and Range Region
 Northern Lake States Forest and Forage Region
 Lake States Fruit, Truck, and Dairy Region
 Central Feed Grains and Livestock Region

Major Land Resource Areas (USDA, SCS, 1982):

536 - Central Dark Brown Glaciated Plains
 53C - Southern Dark Brown Glaciated Plains
 54 - Rolling Soft Shale Plain
 55A - Northern Black Glaciated Plains
 55B - Central Black Glaciated Plains
 55C - Southern Black Glaciated Plains
 56 - Red River Valley of the North
 57 - Northern Minnesota Gray Drift
 58A - Northern Rolling High Plains, Northern Par

- 58B** - Northern Rolling High Plains, Southern Part
- 63A** - Northern Rolling Pierre Shale Plains
- 63B** - Southern Rolling Pierre Shale Plains
- 64** - Mixed Sandy and Silty Tableland
- 65** - Nebraska Sand Hills
- 66** - Dakota-Nebraska Eroded Tableland
- 71** - Central Nebraska Loess Hills
- 72** - Central High Tableland
- 73** - Rolling Plains and Breaks
- 74** - Central Kansas Sandstone Hills
- 75** - Central Loess Plains
- 76** - Bluestem Hills
- 88** - Northern Minnesota Glacial Lake Basins
- 90** - Central Minnesota and Wisconsin Thin Loess and Till
- 91** - Wisconsin and Minnesota Sandy Outwash
- 92** - Superior Lake Plain
- 94A** - Northern Michigan and Wisconsin Sandy Drift
- 94B** - Michigan Eastern Upper Peninsula Sandy Drift
- 95A** - Northeastern Wisconsin Drift Plain
- 95B** - Southern Wisconsin and Northern Illinois Drift Plain
- 96** - Western Michigan and Northeastern Wisconsin Fruit Belt
- 97** - Southwestern Michigan Fruit and Truck Belt
- 98** - Southern Michigan and Northern Indiana Drift Plain
- 99** - Erie-Huron Lake Plain
- 100** - Erie Fruit and Truck Area
- 102A** - Rolling Till Prairie
- 102B** - Loess Uplands and Till Plains
- 103** - Central Iowa and Minnesota Till Prairies
- 104** - Eastern Iowa and Minnesota Till Prairies
- 105** - Northern Mississippi Valley Loess Hills

- 106** - Nebraska and Kansas Loess-Drift Hills
- 107** - Iowa and Missouri Deep Loess Hills
- 108** - Illinois and Iowa Deep Loess and Drift
- 109** - Iowa and Missouri Heavy Till Plain
- 110** - Northern Illinois and Indiana Heavy Till Plain
- 111** - Indiana and Ohio Till Plain
- 112** - Cherokee Plains
- 114** - Southern Illinois and Indiana Thin Loess and Till Plain.

The physical features are described in Land Resource Regions and Major Land Resource Areas of the United States (USDA, SCS, 1981).

Soils: Homestead is currently recommended for planting on soils that are in the USDA, Soil Conservation Service, Field Office Technical Guide, Windbreak Suitability Group 1 (deep, moderately coarse through fine texture and somewhat poorly through well drained); Group 2 (deep, silty, loamy, and clayey soils, poorly to somewhat poorly drained with a high available water holding capacity); Group 3 (deep and moderately deep, well and moderately well drained soils, with moderate to high available water capacity); Group 4 (moderately well and well drained soils, available water capacity is low or moderate in the clayey soils and moderate to high in the silty or loamy soils); Group 5 (deep loamy and sandy, well drained to moderately well drained soils with a moderate available water capacity); and Group 6 (silty, loamy, well drained and somewhat excessively drained soils with a low or moderate available water capacity).

Climate and Elevation: The average annual precipitation of the area of adaptation for Homestead ranges from 10 to 40 inches (25.4 to 102 cm), increasing from west to east and south, with the highest amount occurring during the growing season. Winter precipitation is snow and rain. Snow can accumulate in drifts of varying depths modifying the micro-climate in windbreaks. The average annual temperatures range from 40-50 degrees F (4 to 10 degrees C), average frost-free period is 100 to 170 days. The plant hardiness zones (USDA, ARS, 1990) include 3a, 3b, 4a, 4b, 5a, 5b, 6a, and 6b. Average annual minimum temperatures range from -40 to 0 degrees F (-40 to -18 degrees C). The elevation ranges from 1,000 to 4,000 feet (300 to 1200 m) increasing from east to west.

Propagation: Homestead Arnold hawthorn is a seed propagated cultivar.

Collection of Fruit: The natural falling of the fruit from the tree is an indicator of fruit maturity. This usually occurs in late August - early September. The fruit can be collected by placing drop cloths on the ground prior to fruit drop.

Extraction and Storage of Seed: Twigs, leaves, and other debris should be removed by screening or fanning. The fruit can be depulped by wet maceration and the pulp floated off. The resulting material is spread on screens to air-dry. After sufficient drying time, the seed/inert material mixture is run through a fanning mill to remove inert material.

Six pounds of fruit will yield one pound (454 gm) of clean seed with an average of 10,000 seeds per pound.

Drying the seed to 10 percent moisture and holding in sealed containers at 32 degrees to 41 degrees F (0 to 5 degrees C) will keep the seed viable for 2 to 3 years (Holmes 1958)

Nursery Practice: The seed requires a minimum of 120 days warm stratification, followed by 150 days cold stratification for germination. Untreated seed should be planted in the summer (July) or stratified seed may be planted in the spring. If spring planted, the seed should be stratified 120 days in damp sand or peat moss at 65 to 70 degrees F (18-21 degrees C) followed by 150 days at 35-40 degrees F (2.0 to 5.0 degrees C), germination 40-50 percent can be obtained using this treatment. Acid treatment does not appear to be beneficial (Morgenson 1993). Stratified seed should be planted as early in the spring as possible (Flemion 1958).

Seed should be planted at a rate of 30 to 35 seeds per linear foot, and covered with one-quarter to one-half (7 to 13 mm) of soil. Germination is epigeal. Seedlings of 2-0 can be field planted (Morgenson 1993).

Field planting stock should be a height of 12 to 24 inches (30 to 60 cm) and a caliper of 3/16 to 1/2 inch (5 to 13 mm) at one inch (2.54 cm) above the root collar.

Sources of Seed and Planting Stock: The USDA, SCS, Plant Materials Center, P. O. Box 1458, Bismarck, North Dakota 58502, will maintain breeder seed and foundation stock of Homestead Arnold hawthorn. Certified seed (source identified and selected class) will be available from growers approved by the North Dakota, South Dakota, and Minnesota State Certified Seed Departments.

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