United States Department of Agriculture

Natural Resources Conservation Service	Bismarck Plant Materials Center 3308 University Drive Bismarck, ND 58504	Field Planting Summary March 2026

The Bismarck Plant Materials Program focuses on finding plant-based solutions for conservation issues. Field Plantings provide a way for plant species and technology to be evaluated across a variety of soils, climatic, and site conditions not found at the Bismarck Plant Materials Center (PMC). Typically, someone from a Natural Resources Conservation Service (NRCS) Field Office, Conservation District, or partner agency assists with planning and annual evaluations of the planting. The cooperator, usually a land operator/owner or partner, is responsible for planting and management at the site. The evaluation period is three years for herbaceous species and five years for woody species. Supplementary evaluations are sometimes necessary to ensure sufficient information.

Meyer Spruce (*Picea meyeri*)

Purpose of Evaluation

Few spruce species are known to be adapted to the Northern Plains. Many are susceptible to diseases such as the fungal disease Rhizosphaera needle cast (*Rhizosphaera kalkhoffii*). Identifying a spruce species resistant to needle cast and adapted to the region would enhance conservation diversity. The PMC started assessing Meyer spruce for adaptability and disease resistance in response to this need.

Figure 1 Meyer spruce approximately 10 years old.

Species Characteristics

Meyer spruce is an evergreen conifer native to China and Russia. In North Central China, trees from both natural forests and plantations provide lumber for buildings, poles, furniture making, and pulp.

Figure 2 Meyer spruce (front) resembles Colorado blue spruce (back 2 trees) but has slower initial growth.

The species has a dense pyramidal shape with short blue-green needles (Figure 1). Meyer spruce is similar in appearance to Colorado blue spruce and Black Hills spruce (Figure 2). In contrast, Meyer spruce has branches that are attached to the trunk at a 45-degree angle, cones that are large and long, and initial growth that is denser and slower than Colorado blue spruce or Black Hills spruce (Figure 8). The species is commonly available from local conservation nurseries.

Planting Locations

Meyer spruce trees (accession 9094411) were propagated by the North Dakota Forest Service Nursery near Towner, North Dakota from seed originating from Chifeng in Southeastern Inner Mongolia.

Trees were distributed for Field Planting to 29 counties across North Dakota, South Dakota, and Minnesota (Figure 3) in 2013 and 2014. Evaluations were completed annually for five years on criteria such as survival, height, drought tolerance, and overall performance.

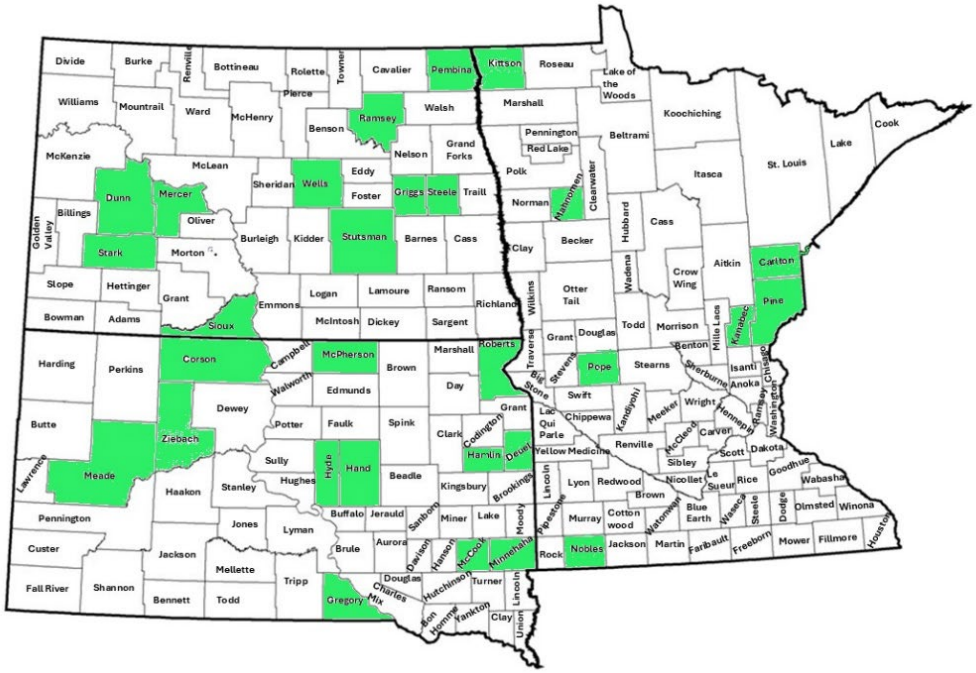

Figure 3 Counties where Meyer spruce Field Plantings were initiated in 2013 and 2014.

In 2024, the NRCS and multiple partners in North Dakota and South Dakota requested additional Meyer spruce data. This prompted 10-year follow-up evaluations at remaining Field Plantings established in 2013 and 2014 and at sites where Meyer spruce was planted by a Soil Conservation District or as an NRCS variance (Figure 4). At each planting site, data on survival, age, height, vigor, competition, location, and general information was recorded. Special emphasis on Conservation Tree and Shrub Groups (CTSG) led to soil scientists documenting and confirming CTSGs at each planting location.

Figure 4 Participants in the Meyer spruce 2024 evaluation tour included (left to right) Keith Kinneberg, Greg Bengtson, Matt Olson, Jordaan Thompson Larson, Jonathan Quast and Ed Bahm.

Data and Trends

Initial Field Planting Evaluations

Field Plantings established in 2013 and 2014 had data collection completed at five years old (Table 1). Average survival was 48% and height was 2.1 feet in year five. Overall, trees had slow initial growth and survival was mediocre. Prior to 2017, survival percentages were substantially higher. In 2017, many areas in the Northern Great Plains had drought conditions, which might explain the higher mortality rates beginning in 2017.

Follow-up/Additional Evaluations

In 2024 and 2025, 118 Meyer spruce evaluations were completed in North Dakota and South Dakota. Data from the evaluations has been divided into two categories; plantings under the age of 7 years (Table 2) and those age 7 through 11 years old (Table 3). Plantings with extreme weed competition were excluded from analysis.

Figure 5 Young Meyer spruce are often short and dense.

Plantings less than 7 years old (Figure 5) showed high survival percentages across most CTSGs, which contradicts 5-year data collected for Field Plantings established in 2013 and 2014. Unlike the 2013 and 2014 Field Plantings, trees more recently planted did not experience drought, which may explain improved survival.

Meyers spruce trees 7 years and older (Figure 6) performed well on CTSGs 1, 1k, 1kk, with survival percentages more than 80% and good vigor scores (Table 3). On CTSG 3, which was the most frequently evaluated group, survival rate was a strong 89%. The species struggled in CTSGs 2k, 2KK, 4, 5, 6g, 6gk and 9n; with survival percentages ranging from 9% to 67%. Surprisingly, survival was 88% on CTSG 10. Some sites were categorized as CTSG 10 because soils had poor drainage at shallow depths, which typically lead to drown out. Moisture levels were likely not excessive during the testing period, preventing drown out and keeping mortality low.

Figure 6 These 10 year old Meyer spruce are thriving near Mobridge , South Dakota.

Colorado blue spruce and Black Hills spruce in adjacent rows were always taller and generally had better survival percentages than Meyers spruce. Young trees were initially short and dense but increased in vertical growth and decreased in density with age. Wildlife browsing was very common on Meyer spruce, causing lack of a central leader, significant reduction in height, and denser trees. No obvious disease symptoms were observed on Meyer spruce at any planting.

Off Center Evaluation Plots (OCEP)

Meyer spruce trees were also planted in 2001 and 2011 in long term evaluation plots in six locations across North Dakota, South Dakota, and Minnesota (Figure 7). They are doing well in most of the plots and have more than 80% survival except where soils are sandy and precipitation is low.

Figure 7 Meyer spruce trees are vigorous at the Off Center Evaluation Plot (OCEP) near Brookings, South Dakota.

Conclusion

Meyer spruce had slow initial growth. Expect initial growth to be slower than other common spruce species in the region. Browse was also noted. Protecting trees in wildlife-dense areas should be considered. Drought appears to increase mortality. Consider hand planting to replace dead trees. Data suggests that Meyer spruce will succeed on CTSG 1, 1k, 1kk, and 3 soils with proper competition control and site maintenance. Further evaluation of Meyer spruce is needed to determine adaptability at sites identified as CTSG 2. As there are limited spruce options for the region, planting Meyer spruce on suitable sites where it is adapted would enhance diversity of the planting.

Figure 8 Black Hills spruce (left); Colorado blue spruce (center) and Meyer spruce (right). Photo by Aaron Bergdahl, North Dakota Forest Service (now employee of Maine Forest Service).

Table 1 Year 5 Field Planting data for Meyer spruce planted in 2013 & 2014.

CTSG *mapped*	MLRA	State	County	Trees Planted	Survival	Average Height (ft)	Average Vigor*
1	92	MN	Kanabec	25	36%	2.7	7
1KK	55A	ND	Ramsey	25	80%	1.5	5
3	54	ND	Stark	25	52%	1.6	5
3	54	ND	Mercer	25	40%	1.7	7
3	55B	ND	Steele	25	8%	1.2	7
3	55C	SD	McCook	20	65%	1.6	3
3	55C	SD	Hand	25	48%	2.1	5
3	53B	SD	McPherson	25	16%	0.8	7
3	63A	SD	Corson	25	100%	2.5	2
3	102A	MN	Pope	25	0%	0	9
4	54	ND	Stark	24	21%	1.0	7
4	54	ND	Stark	25	28%	1.2	7
4	102A	SD	Roberts	25	72%	4.0	5
4C	55B	ND	Wells	25	0%	0	9
4C	54	ND	Sioux	25	44%	2.0	3
5	60A	SD	Meade	25	12%	7.6	4
5	57	MN	Mahnomen	25	76%	2.0	3
6	54	ND	Stark	25	56%	2.0	3
6	66	SD	Gregory	25	100%	3.5	1
6	90	MN	Pine	24	79%	2.0	4
6G	55B	ND	Griggs	25	64%	2.0	7
6G	102A	SD	Deuel	25	56%	1.5	5
7	90A	MN	Carlton	25	84%	2.5	3
8K	102B	SD	Minnehaha	25	20%	2.5	7
Total/Average					**48%**	**2.1**	**5.2**

*Vigor 1-9 scale 1=good 9=poor

Table 2 Data collected in 2024 & 2025 from Meyer spruce trees 1-6 years old.

CTSG *mapped*	MLRA	State	County	Trees Planted	Survival	Average Height (ft)	Average Vigor*
1	56	ND	Richland	491	92%	2	1.9
1	53B	ND	Wells	20	95%	2	3.0
1S	56	ND	Richland	179	99%	1.9	1.25
2	56	ND	Richland	25	96%	1.5	1.50
2K	56	ND	Richland	109	98%	1.5	1.0
2KK	56	ND	Richland	94	99%	1.7	1.8
2KK	55B	ND	Wells	50	80%	3.0	2
3	55C	SD	Davison	216	97%	1.5	2.5
3	55B	ND	Wells	6	100%	2.0	3.0
3	54	ND	Hettinger	21	100%	7.0	2.0
3	53B	ND	Burleigh	63	94%	2.0	7.0
5	55C	ND	Hettinger	12	83%	7.0	6.0
5K	55C	ND	Hettinger	17	94%	3.5	3.5
7	56	ND	Richland	157	99%	2.5	1.7
9W	56	ND	Richland	10	70%	1.0	5.0
10	56	ND	Richland	10	60%	1.5	4.0

*Vigor 1-9 scale 1=good 9=poor

Table 3 Data collected in 2024 & 2025 from Meyer spruce trees 7-11 years old.

CTSG verified	MLRA	State	County	Sites	Trees Planted	Surviving Trees	Survival	Average Height (ft)	Average Vigor*
1	55A	ND	Renville	3	17	14	82%	5.6	2
1	**Total/Average**			**3**	**17**	**14**	**82%**	**5.6**	**2**
1K	55A	ND	Renville	8	51	41	80%	2.6	4
1K	**Total/Average**			**8**	**51**	**41**	**80%**	**2.6**	**4**
1KK	55A	ND	Renville	5	50	48	96%	6.6	2.4
1KK	**Total/Average**			**5**	**50**	**48**	**96%**	**6.6**	**2.4**
2K	55B	ND	Griggs	1	10	4	40%	3	6
2K	55A	ND	Renville	1	2	0	0%	0	9
2K	**Total/Average**			**2**	**12**	**4**	**33%**	**1.5**	**7.5**
2KK	102A	SD	Roberts	1	10	4	40%	10	2
2KK	102A	SD	Deuel	1	12	0	0%	0	9
2KK	55A	ND	Renville	6	55	24	44%	2.5	5
2KK	55B	ND	Wells	1	20	16	80%	7	4
2KK	**Total/Average**			**9**	**97**	**44**	**45%**	**4**	**5**
3	55B	ND	Wells	3	87	83	95%	6.3	3
3	55A	ND	Renville	17	225	196	87%	4.4	3.3
3	63A	SD	Corson	1	25	22	88%	9	3
3	**Total/Average**			**21**	**337**	**301**	**89%**	**4.9**	**3.21**
4	102A	SD	Roberts	1	15	13	87%	12	1
4	54	ND	Stark	2	53	28	53%	4	5
4	55A	ND	Renville	4	23	12	52%	5.3	3.3
4	**Total/Average**			**7**	**91**	**56**	**62%**	**5.9**	**3**
4C**	54	SD	Ziebach		3	3	100%	6	4
4C**	54	SD	Sioux		25	9	36%	4	6
4C**	**Total/Average**			**2**	**28**	**12**	**43%**	**5**	**5**
5	55B	ND	Wells	1	25	19	76%	6	4
5	54	ND	Stark	1	25	3	12%	5	3
5	**Total/Average**			**2**	**50**	**22**	**44%**	**5.5**	**3.5**
6G	102A	SD	Deuel	1	13	3	23%	4	4
6G	55A	ND	Renville	1	20	3	15%	2	4
6G	**Total/Average**			**2**	**33**	**3**	**9%**	**3**	**4**
6GK	55B	ND	Griggs	1	14	8	57%	3	7
6GK	**Total/Average**			**1**	**14**	**8**	**57%**	**3**	**7**
9N	55A	ND	Renville	2	11	4	36%	2	7
9N	**Total/Average**			**2**	**11**	**4**	**36%**	**2**	**7**
10	55A	ND	McHenry	1	9	8	89%	10	2
10	55A	ND	Renville	3	24	20	83%	3.3	3.7
10	**Total/Average**			**4**	**33**	**29**	**88%**	**5**	**3.25**

* Vigor 1-9 scale 1=good 9=poor

** CTSG mapped, not verified