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Forest Nursery Seedling Production in the United States—Fiscal Year 2019

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Abstract

Forest nursery production for the 2019 planting season was more than 1.3 billion tree seedlings (including about 18 million container seedlings imported from Canada). Approximately 75 percent of seedlings were produced as bareroot stock. Only a small portion (3 percent) of seedlings were hardwood species. Based on this total number of seedlings and estimated planting densities in each State, approximately 2.5 million ac (1.0 million ha) of trees were planted. More than 80 percent of production and planting occurred in the Southern States.

Background

This annual report summarizes forest nursery seedling production in the United States. The number of seedlings reported is used to estimate the number of acres of forest planting per year. Prepared by the U.S. Department of Agriculture, Forest Service, Forest Inventory and Analysis (FIA) and State and Private Forestry, this report includes State-by-State breakdowns, regional totals, and an analysis of data trends. Universities in the Southern, Northeastern, and Western Regions of the United States made an effort to collect data from all the major producers of forest and conservation seedlings in the 50 States. Forest and conservation nursery managers provided the information presented in this report. As far as we know, it is the most complete compilation of such data in the country. Because all data are provided voluntarily by outside sources and some data are estimated, caution must be used in drawing inferences.

Methodology

State and Private Forestry, in collaboration with Auburn University, the University of Idaho, and Purdue University, produced the data for this report. These universities collected forest tree seedling production data directly from the forest and conservation nurseries that grow forest tree seedlings in their region of the United States (Auburn University collected from 13 States in the Southeast, the University of Idaho collected from 17 States in the West, and Purdue University collected from 21 States in the Northeast and Midwest). The approximation of planted acres for each State is derived from FIA estimates of tree planting area based on ground-plot data that States collected during 5-, 7-, or 10-year periods and compiled as an average annual estimate for the associated period. FIA estimates of acres of trees planted by State may not correlate with nursery production surveys because nurseries do not report shipments across State lines. Total acres by region, however, provide a reasonable comparison between the two methods. Data collected are reported by hardwood and conifer seedlings produced and acreage planted of each (table 1) and by bareroot and container seedlings produced (table 2).

Table 1. Hardwood and conifer tree seedling production and acres planted for each State and each region during the 2019 planting year.

State	Hardwood seedlings produced	Hardwood acres planted[1]	Conifer seedlings produced	Canadian conifer imports	Conifer acres planted[1]	Total seedlings produced	Total acres planted[1]	FIA data acres planted[10]
Southeast								
Florida[2]	1,457,000	2,649	45,046,000	—	81,902	46,503,000	84,551	150,006
Georgia[2]	4,573,000	8,315	326,070,000	—	592,855	330,643,000	601,169	212,353
North Carolina[2]	223,000	405	63,258,000	—	115,015	63,481,000	115,420	108,401
South Carolina[2]	450,000	818	161,005,000	—	292,736	161,455,000	293,555	88,362
Virginia[2]	893,000	1,624	28,245,000	—	51,355	29,138,000	52,978	57,031
Regional Totals	**7,596,000**	**13,811**	**623,624,000**	**0**	**1,133,862**	**631,220,000**	**1,147,673**	**616,153**
South Central								
Alabama[2]	2,913,000	5,296	107,473,000	—	195,405	110,386,000	200,702	218,748
Arkansas[2]	8,449,000	15,362	103,468,000	—	188,124	111,917,000	203,485	89,136
Kentucky[3]	450,320	1,035	114270	—	263	564,590	1,298	1,142
Louisiana[2]	—	—	50,559,000	—	91,925	50,559,000	91,925	160,561
Mississippi[2]	1,154,000	2,098	84,691,000	—	153,984	85,845,000	156,082	140,495
Oklahoma[2]	413,000	751	2,341,000	—	4,256	2,754,000	5,007	31,659
Tennessee[2]	2,519,000	4,580	3,535,000	—	6,427	6,054,000	11,007	24,386
Texas[2]	—	—	89,328,000	—	162,415	89,328,000	162,415	126,044
Regional Totals	**15,898,320**	**29,122**	**441,509,270**	**0**	**802,799**	**457,407,590**	**831,922**	**792,171**
Northeast								
Connecticut[3]	200	—	100	—	—	300	1	0
Delaware[2]	—	—	—	—	—	—	—	515
Maine[5]	—	—	—	4,000,000	6,667	4,000,000	6,667	4,069
Maryland[2]	989, 717	1,799	664,300	—	1,208	1,654,017	3,007	0
Massachusetts[3]	10,000	23	5,000	—	11	15,000	34	0
New Hampshire[3]	24,500	56	297,600	—	684	322,100	740	402
New Jersey[3]	93,035	214	145,050	—	333	238,085	547	0
New York[5]	99,300	166	584,500	—	—	683,800	166	2,0 77
Pennsylvania[3]	5,283,020	12,145	3,888,215	—	8,938	9,171,235	21,083	1,847
Rhode Island	—	—	—	—	—	—	—	0
Vermont[3]	2,000	5	100	—	—	2,100	5	0
West Virginia[3]	149,242	343	74,555	—	171	223,797	514	0
Regional Totals	**6,651,014**	**14,751**	**5,659,420**	**4,000,000**	**18,014**	**16,310,434**	**32,765**	**8,910**
North Central								
Illinois[3]	486,440	1,118	183,050	—	421	669,490	1,539	1,667
Indiana[4]	1,627,595	2,504	637,241	—	980	2,264,836	3,484	2,413
Iowa[5]	458,338	764	110,350	—	184	568,688	948	0
Michigan[2,9]	2,230,217	4,055	11,135,281	2,894,960	25,510	16,260,458	29,564	6,330
Minnesota[2,9]	317,033	576	2,480,170	3,376,626	10,649	6,173,829	11,225	8,403
Missouri[3]	976,845	2,246	500,845	—	1,151	1,477,690	3,397	223
Ohio[3]	10,100	23	50	—	—	10,150	23	2,173
Wisconsin[6,9]	784,950	981	2,295,993	874,580	3,963	3,955,523	4,944	8,256
Regional Totals	**6,891,518**	**12,268**	**17,342,980**	**7,146,166**	**42,858**	**31,380,664**	**55,126**	**29,465**

State	Hardwood seedlings produced	Hardwood acres planted[1]	Conifer seedlings produced	Canadian conifer imports	Conifer acres planted[1]	Total seedlings produced	Total acres planted[1]	FIA data acres planted[10]
Great Plains								
Kansas[2]	22,000	40	46,000	—	84	68,000	124	1,012
Nebraska[2]	701,500	1275	1,250,000	—	2,273	1,951,500	3,548	0
North Dakota[2]	48,803	89	754,441	—	1,372	803,244	1,460	0
South Dakota[2]	557,436	1,014	263,099	—	478	820,535	1,492	164
Regional Totals	**1,329,739**	**2,418**	**2,313,540**	**0**	**4,206**	**3,643,279**	**6,624**	**1,176**
Intermountain								
Arizona[2]	3,360	6	680	—	1	4,040	7	0
Colorado[2]	146,000	265	168,700	32,400	366	314,700	631	669
Idaho[2]	267,396	486	8,804,450	3,749,040	22,825	12,820,866	23,311	10,016
Montana[2]	30,780	56	454,755	52,000	921	537,535	977	4,506
Nevada[2]	2,435	4	355	—	1	2,990	5	0
New Mexico[2]	4,000	7	48,000	—	87	52,000	95	0
Utah[2]	300,000	545	125,000	—	227	425,000	773	0
Wyoming	—	—	—	—	—	—	—	846
Regional Totals	**753,971**	**1,371**	**9,601,940**	**3,833,440**	**24,428**	**14,156,951**	**25,799**	**16,037**
Alaska								
Alaska[2]	12,000	22	9,000	324,544	606	21,000	628	0
Pacific Northwest								
Oregon[7,9]	3,627,300	10,364	66,872,937	390,000	192,180	70,890,237	202,544	118,350
Washington[7,9]	388,113	1,109	61,702,571	2,298,952	182,861	64,389,636	183,970	96,376
Regional Totals	**4,015,413**	**11,473**	**128,575,508**	**2,668,952**	**375,041**	**135,279,873**	**386,514**	**214,726**
Pacific Southwest								
California[8]	81,428	181	12,855,259	—	28,567	12,936,687	28,748	36,986
Hawaii[8]	5,900	13	—	—	—	5,900	13	568
Regional Totals	**87,328**	**194**	**12,855,259**	**0**	**28,567**	**12,942,587**	**28,761**	**37,554**
Totals	**43,235,303**	**85,429**	**1,241,490,917**	**17,993,102**	**2,430,381**	**1,302,362,378**	**2,515,811**	**1,716,192**

[1] Acres planted were estimated assuming:

[2] 550 stems/acre.

[3] 435 stems/acre.

[4] 650 stems/acre.

[5] 600 stems/acre.

[6] 800 stems/acre.

[7] 350 stems/acre.

[8] 450 stems/acre.

[9] Totals include an estimate of container conifers produced in Canada for distribution to neighboring States; bareroot imports for Maine and containers for other States.

[10] FFIA = Forest Inventory and Analysis; average annual acreage planted estimated for all States (2020) on 5-year cycles, except for Alabama, Louisiana, Mississippi, and North Carolina, which are on 7-year cycles, and for Alaska, Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, and Washington, which are on 10-year cycles. Data generated by Andy Hartsell, USDA Forest Service.

Table 2. Bareroot and container tree seedling production for each State and each region during the 2019 planting year.

State	Bareroot	Container[1]	Total Seedlings Produced
Southeast			
Florida	42,752,000	3,751,000	46,503,000
Georgia	202,373,000	128,270,000	330,643,000
North Carolina	50,885,000	12,596,000	63,481,000
South Carolina	161,441,000	14,000	161,455,000
Virginia	28,648,000	490,000	29,138,000
Regional Totals	**486,099,000**	**145,121,000**	**631,220,000**
South Central			
Alabama	88,165,000	22,221,000	110,386,000
Arkansas	111,792,000	125,000	111,917,000
Kentucky	564,590	—	564,590
Louisiana	—	50,559,000	50,559,000
Mississippi	75,691,000	10,154,000	85,845,000
Oklahoma	2,651,000	103,000	2,754,000
Tennessee	6,054,000	—	6,054,000
Texas	89,328,000	—	89,328,000
Regional Totals	**374,245,590**	**83,162,000**	**457,407,590**
Northeast			
Connecticut	—	300	300
Delaware	—	—	0
Maine	—	4,000,000	4,000,000
Maryland	1,555,617	98,400	1,654,017
Massachusetts	—	15,000	15,000
New Hampshire	322,100	—	322,100
New Jersey	198,223	39,862	238,085
New York	683,800	—	683,800
Pennsylvania	9,159,880	11,355	9,171,235
Rhode Island	—	—	0
Vermont	1,000	1,100	2,100
West Virginia	223,797	—	223,797
Regional Totals	**12,144,417**	**4,166,017**	**16,310,434**
North Central			
Illinois	647,100	22,390	669,490
Indiana	2,102,583	162,253	2,264,836
Iowa	558,988	9,700	568,688
Michigan	13,001,055	3,259,403	16,260,458
Minnesota	2,776,580	3,397,249	6,173,829
Missouri	1,477,690	—	1,477,690
Ohio	—	10,150	10,150
Wisconsin	3,028,643	926,880	3,955,523
Regional Totals	**23,592,639**	**7,788,025**	**31,380,664**
Great Plains			
Kansas	—	68,000	68,000
Nebraska	1,125,000	826,500	1,951,500
North Dakota	704,389	98,855	803,244
South Dakota	813,421	7,114	820,535
Regional Totals	**2,642,810**	**1,000,469**	**3,643,279**
Intermountain			
Arizona	—	4,040	4,040
Colorado	134,700	180,000	314,700
Idaho	1,906,035	10,914,851	12,820,886
Montana	19,558	517,977	537,535
New Mexico	—	2,790	2,790
Nevada	—	52,000	52,000
Utah	—	425,000	425,000
Wyoming	—	—	0
Regional Totals	**2,060,293**	**12,096,658**	**14,156,951**
Alaska			
Alaska	0	21,000	21,000
Pacific Northwest			
Oregon	39,776,011	31,114,226	70,890,237
Washington	35,996,236	28,393,400	64,389,636
Regional Totals	**75,772,247**	**59,507,626**	**135,279,873**
Pacific Southwest			
California	—	12,936,687	12,936,687
Hawaii	—	5,900	5,900
Regional Totals	**0**	**12,942,587**	**12,942,587**
Totals	**976,556,996**	**325,805,382**	**1,302,362,378**

[1] Ten States (Alaska, Colorado, Idaho, Maine, Michigan, Minnesota, Montana, Oregon, Washington, and Wisconsin) received container seedlings produced in Canada.

Assumptions

The following assumptions were used in compiling this report.

1. *The number of seedlings reported by the participating forest and conservation nurseries was the number of shippable seedlings produced for distribution in the 2019 planting season (i.e., seedlings that were planted from fall of 2018 through spring of 2019).*

Some species of forest seedlings require two or more growing seasons to reach accepted forest and conservation seedling size standards, so not all seedlings in production at a nursery at any given time are considered shippable (i.e., available for distribution). Therefore, only shippable seedlings were counted.

2. *All seedling production reported in this survey met the grading standards for the respective nurseries (i.e., cull seedlings were not included in the estimates).*

Table 3. Annual forest nursery seedling production in each region for FY 2012 to FY 2019.

Year	Total seedling production	West (17 States)	East (20 States)	South (13 States)
FY 2019	1,302,362,378	166,043,690	47,691,098	1,088,627,590
FY 2018	1,187,282,896	76,253,776	46,667,266	1,064,361,854
FY 2017	1,284,824,689	151,321,764	67,595,266	1,065,907,659
FY 2016	1,260,216,076	152,785,327	72,314,630	1,035,094,369
FY 2015	1,302,237,795	175,464,446	95,417,986	1,031,355,363
FY 2014	1,217,607,888	115,620,820	85,684,417	1,015,564,370
FY 2013	1,181,554,535	96,344,063	102,066,671	983,143,801
FY 2012	1,190,552,819	170,975,830	81,672,547	936,918,542

FY = fiscal year.
Sources: This report, Haase et al. (2019), Harper et al. (2013, 2014), Hernández et al. (2015, 2016, 2017, 2018)

Production estimates are often based on seedbed inventories of seedlings meeting grading standards. For cases in which nurseries ship seedlings by weight, as opposed to examining and counting each seedling, landowners and tree planters often plant every seedling that is shipped to them.

3. *Seedling production data were collected from all the major nurseries that produced forest and conservation tree seedlings for the planting season.*

Considerable effort was made to contact all major producers of forest and conservation seedlings. The universities collecting the survey data reported, with few exceptions, that the major producers were included in the results.

4. *All seedlings reported in this survey were produced for reforestation and conservation projects.*

Some of the nurseries that participated in this survey also produce seedlings for ornamental use, Christmas tree production, or other horticultural purposes. Private nurseries were asked to report only seedling production destined for conservation and reforestation planting.

5. *Forest tree seedlings remain in the general area where they are produced.*

Forest and conservation seedlings are routinely shipped across State borders and at times across international borders. It is assumed that, on average, the number of seedlings imported into a State is equal to the number of seedlings exported from that State. In some States, a significant number of container seedlings are produced in Canada and imported for planting in those States. Estimates of the number of seedlings shipped from Canada were obtained from Canadian nurseries that routinely export seedlings to the United States.

6. *Dividing the number of seedlings shipped from forest and conservation nurseries by the average number of stems planted per acre in a specific State is an appropriate proxy of the number of acres of trees planted during the planting season.*

These estimations do not include direct seeding or natural forest regeneration activities. Average tree planting densities for each State were provided by FIA.

7. *Respondents to the production survey reported only hardwood and conifer trees produced.*

Nurseries were asked not to include shrubs in their production estimates. Many conservation and restoration plantings include shrubs and herbaceous plants to address wildlife, biodiversity, or other management objectives. Using only tree production to estimate acres planted results in an underestimate of planted acreage where a mixed planting of shrubs and trees occurred.

Data Trends

More than 1.3 billion forest tree seedlings were planted in the United States in fiscal year (FY) 2019. This production level is an increase from previous years. Variation is attributed to inconsistent participation from nurseries during data collection each year (particularly in the Western States), as well as increased planting in recent years following wildfires, pests, and harvests. Based on the total number of seedlings shipped and the average number of seedlings planted per acre in each State, approximately 2.5 million ac (1.0 million ha) of trees were planted during the fall 2018 through spring 2019 planting season.

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