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National Survey of State Operated Tree Seedling Nurseries and Tree Improvement Programs

A Report Developed
by the National Association of State Foresters



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EXECUTIVE SUMMARY

In May of 2016 the National Association of State Foresters provided all states, territories and the District of Columbia a comprehensive questionnaire (See Appendix) concerning state-operated tree seedling nurseries and tree improvement programs. Responses were received from 48 states, Guam and the District of Columbia.

Twenty-nine states and Guam currently operate nurseries. Eight states used to have nurseries with most of those having closed since 2005. The principle reason for closing was that they were unable to adequately cover costs through nursery sales. Of those eight, seven have concerns about commercial nurseries providing an adequate supply. Overall, states are more concerned about declining seedling demand and difficulty hiring both skilled personnel and laborers.

Nurseries produced 117,011,000 seedlings per year and shipped over 40,000 orders. Over 70 species were listed among the top five for each nursery with obvious regional differences. Six nurseries grew between 5 and 25 different species. Nineteen grew between 26 and 55 species and three grew from 56 to 75 species.

The most important customers are family forest owners and contractors serving family forest owners. Unlike commercial nurseries, state nurseries sell speculatively and for that reason are important to family forest projects. The most common use of state seedlings was reforestation after harvest, though a variety of other common uses were also well represented in the responses. Over half of the nurseries are expected to cover their costs through sales income.

Thirty states operate seed orchards, though they are not exactly the same as the ones who operate nurseries. The most common coniferous species involved were loblolly pine, eastern white pine, and douglas-fir. Though several orchards contained a variety of hardwoods the most common was black walnut. The most common user of orchard seed was the state's own nursery. Conferences, workshops and a variety of other cooperative endeavors were listed as the most desired assistance that orchard managers would like to receive.

Less than half of the states have a tree improvement program within their agency and these are staffed by only 9 trained geneticists. Almost half actively participate in a tree improvement cooperative. The most commonly mentioned desire for additional assistance involved setting up or enhancing cooperatives.

Nearly everyone was aware of the US Forest Service Reforestation, Nursery and Genetic Resources (RNGR) Cooperative Program. Few acknowledged using RNGR funds. They would certainly welcome them, but most also acknowledge that their programs would go forward without RNGR funding. States do appreciate the technical assistance that RNGR provides

INTRODUCTION/METHODOLOGY

At their 2015 summer meeting members of the NASF Forest Resource Management Committee engaged in a discussion about the challenges facing state tree nurseries, the need for greater tree species gene conservation and other related issues. It became apparent that no one had a comprehensive picture of the extent of these programs nation-wide. It was decided that the committee would develop and implement a questionnaire that would gather sufficient information to provide this nation-wide view.

That fall it was learned that Northeast Area State Foresters and US Forest Service staff were planning to conduct a survey in that region dealing with the Reforestation, Nursery and Genetic Resources cooperative federal program. In order to avoid duplicative efforts this work was combined with the committee's.

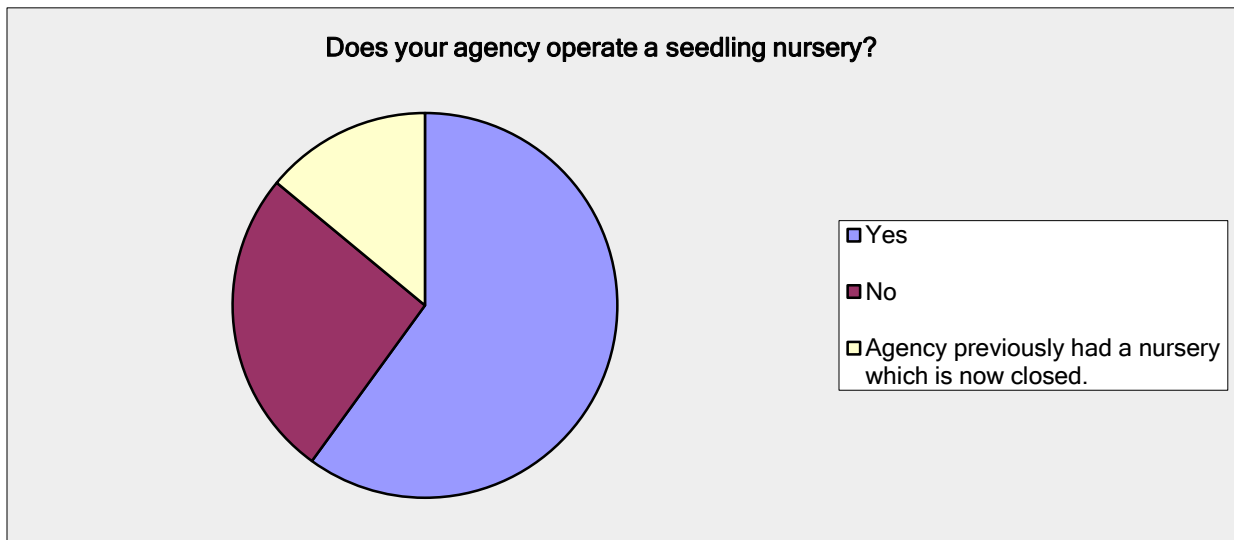
The questionnaire was drafted, then reviewed and modified at the committee's February 2016 meeting. Members provided the second draft to selected nursery staff for field testing and then a third draft was provided to the NASF Executive Committee who offered additional suggestions.

At the end of May all states, territories and the District of Columbia were given a Survey Monkey web link to the survey and asked to complete it. In total 48 states, Guam and the District of Columbia responded to the survey. After 3 requests, responses were not received from Maine and Nevada.

RESULTS

Seedling Nursery Operations

Thirty respondents currently operate at least one nursery. Twelve do not and eight had nurseries which are now closed.



Respondents with State Operated Nurseries

(Southern Region)

Tennessee Arkansas Virginia Oklahoma Kentucky
 Georgia North Carolina Florida South Carolina Texas

(Northeast Region)

Pennsylvania Wisconsin New Jersey Missouri Michigan Iowa
 New York West Virginia Maryland Minnesota Indiana Illinois
 New Hampshire

(Western Region)

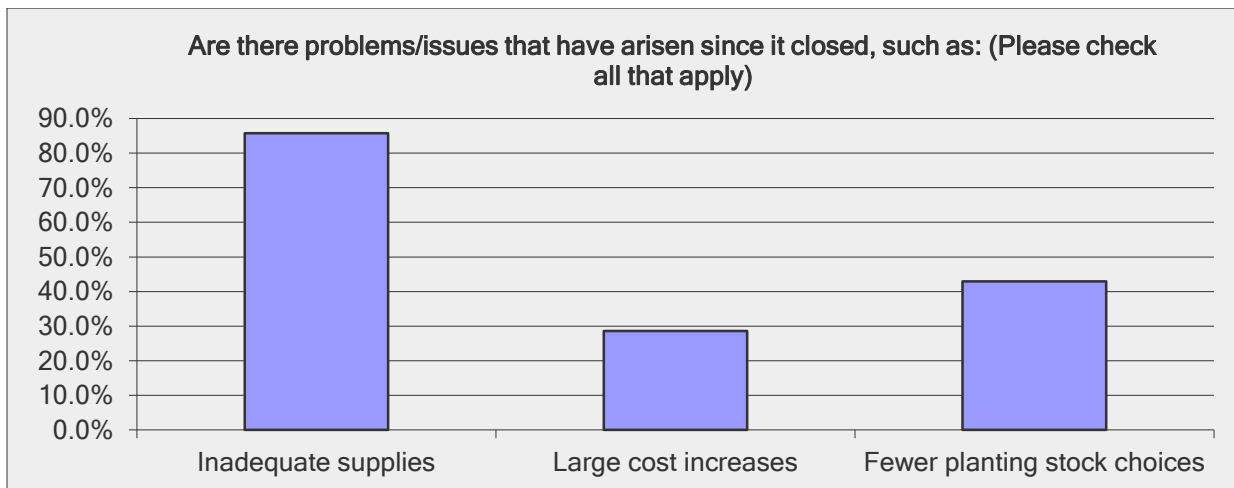
Kansas Hawaii Colorado Washington North Dakota Guam
 Montana

Respondents Who had Nurseries in the Past

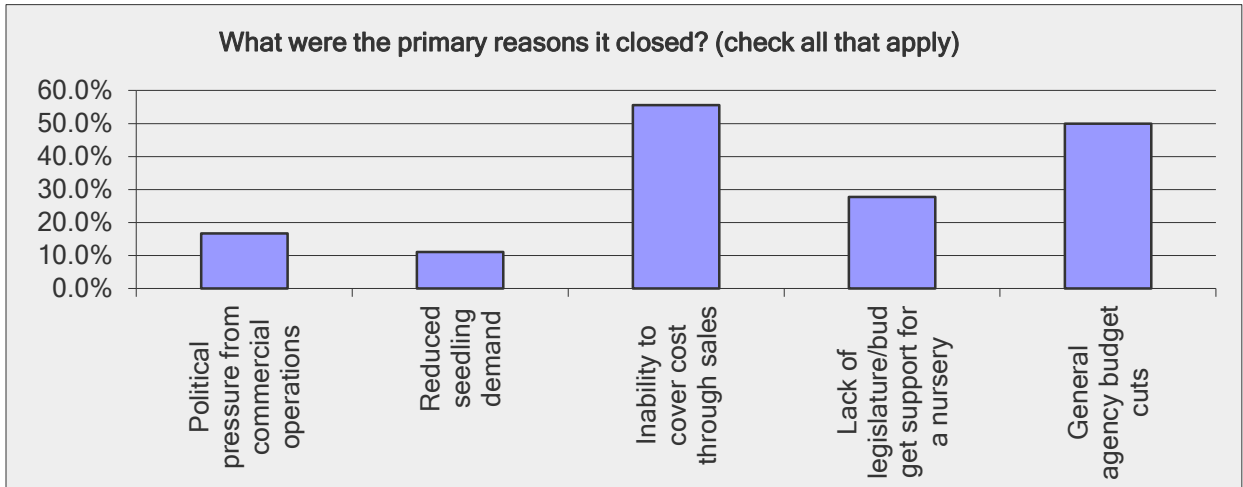
Louisiana Arizona California Massachusetts Oregon Utah
 Mississippi Vermont

One nursery closed as early as 1976, but most closures occurred after 2005. South Dakota turned theirs over to a Conservation District. Illinois consolidated their operations from two nurseries to one, while Wisconsin and Florida went from three to one.

Of the 20 without nurseries 13 indicated that private nurseries were providing an adequate supply of seedlings. Six felt they did not and one did not answer the question. Of the eight with closed nurseries, seven indicated that there were concerns, primarily around inadequate supplies.

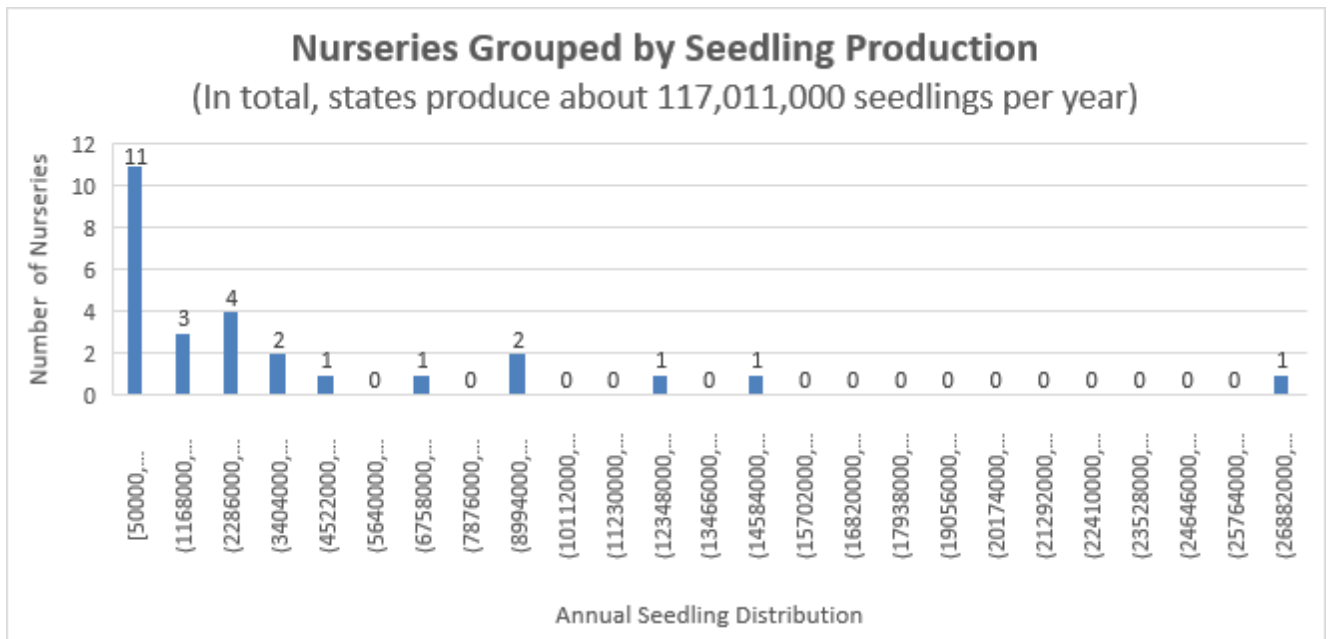


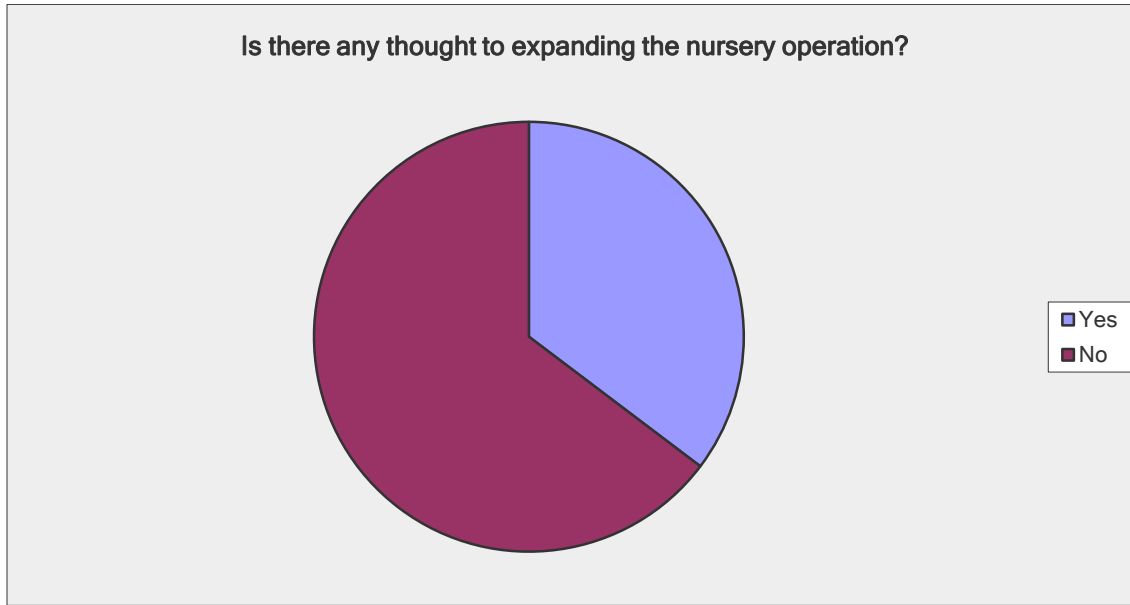
Of the reasons why nurseries closed the most common answer was because they were unable to cover costs through nursery sales.



Only 2 have given any thought to starting a nursery – one (CA) to fill a niche need for having at least one nursery in the state that grows speculatively rather than with pre-orders. The other state (ID) feels there is a need for seed sources better tied to elevation.

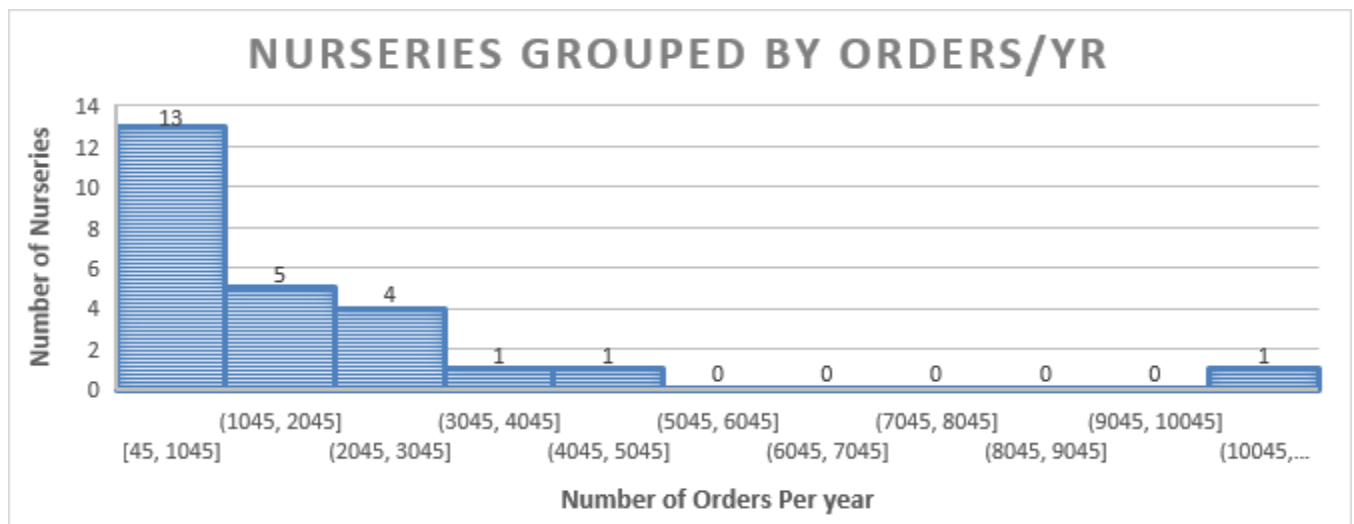
There is a very wide range in the number of seedlings produced each year with the greatest annual production occurring in the Lake States and the South. Virtually all indicated that they had more capacity than what they were using. In some cases, it was substantially more. About one-third (12) said they were considering expansion in amounts that ranged from 1 million to 20 million (+) seedlings per year.

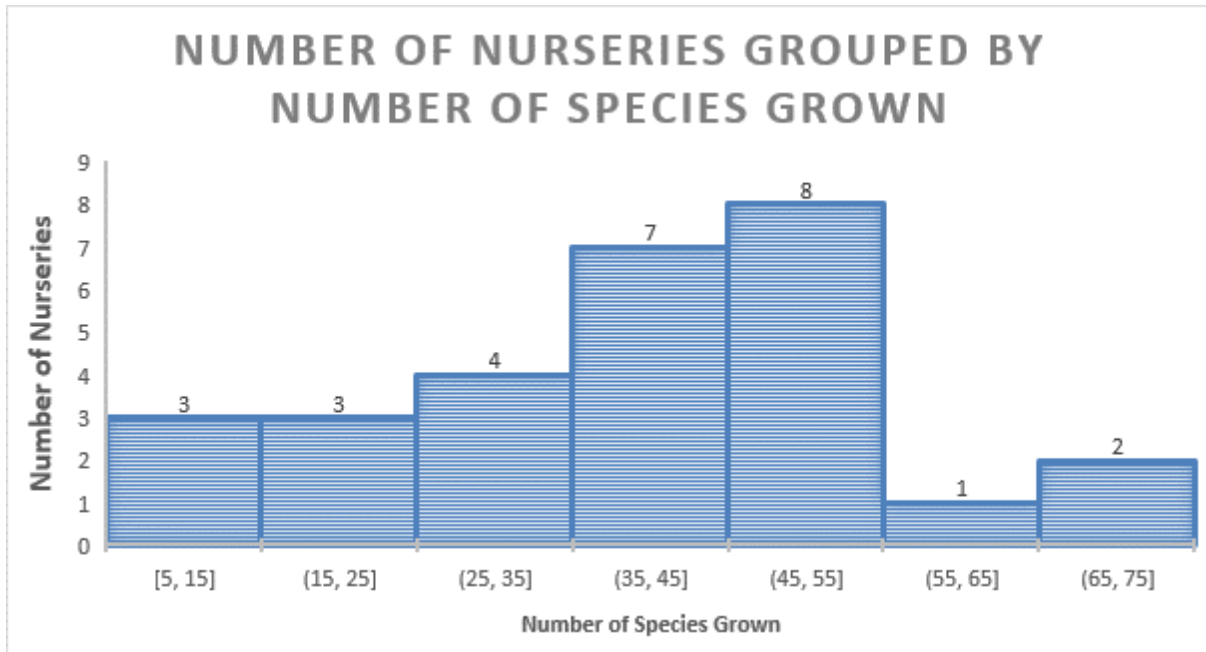




Thirteen states indicated they purchase seedlings from other nurseries. Most (10) indicated they purchased from private nurseries. Three purchased from other state nurseries. Mississippi purchased nearly 6.5 million seedlings from private sources, but most other states purchased smaller amounts ranging from 450,000 to 20,000. Of the states that acquired seedlings from outside sources they were about evenly split as to whether the material was intended for state-owned land or for distribution to private landowners. Ten states indicated that they traded stock with other nurseries in varying amounts.

A few nurseries shipped a very small number of orders and one shipped a great many, but most were grouped in the range 1000 to 4000 orders shipped per year. In total, state nurseries ship about 44,300 orders in a given year.





The number of species that each nursery grows is characterized by a typical bell-shaped curve. Some only grow just a few....as few as 5 species. Some grow much more....as many as 75 species. Most fall somewhere in between those amounts.

States listed nearly 70 different species among the top 5 they grow, with obvious differences by region.

In the South these species were the most commonly grown:

Loblolly Pine	Shortleaf Pine	Longleaf Pine	Sycamore
Pecan	White Oak	Swamp Chestnut Oak	Fraser Fir
Swamp White Oak	Northern Red Oak	Black Walnut	Prunus spp.
Eastern White Pine	Afghan Pine	Italian Stone Pine	Eastern Redcedar
Bur Oak	Slash Pine	Choctawhatchee Sand Pine	

In the Northeast the most common species were:

Eastern White Pine	Northern Red Oak	Black Cherry	Norway Spruce
Pitch Pine	Red Pine	Jack Pine	White Spruce
Pitch x Loblolly Pine	White Oak	Red Bud	Wild Plum
Shortleaf Pine	Black Walnut	Pecan	Bur Oak
Silver Fir	Balsam Fir	Fraser Fir	Blue Spruce
Sycamore	Loblolly Pine	Swamp White Oak	Red Osier Dogwood

In the West the most common species were:

Eastern Redcedar	American Plum	Sandhill Plum	Fragrant Sumac
Sycamore	Ponderosa Pine	Caragana	Western Larch
Golden Current	Silver Buffaloberry	Rocky Mountain Juniper	
Colorado Blue Spruce	Chokecherry	Black Hills Spruce	

Hawaii and Guam grow tropical species unique to their islands.

Most southern pines and a few northern conifer species are grown from 1st, up to 3rd or more, generation **improved seed sources**. Pennsylvania grows all of their black cherry from 1st and 2nd generation improved seed. Indiana grows a small amount of black walnut from improved seed.

States ranked individual and family forest owners as their most important customers with consulting foresters or contractors working for landowners as the second most important.

How States Ranked the Importance of Different Customers	Most important customer would be ranked "1"	Number of Respondents
Direct to Family/Individual Forest Owner	1.73	26
Consulting foresters or planting contractors/vendors acting on behalf of landowners	2.82	22
Industrial/REIT/TIMO/Forest Owner	4.65	17
Federal Agency	5.36	22
Your State/Local Agency within your state	3.26	27
Other State/Local Agency from a different state	4.13	16
Urban/Community Forest Organization	6.06	16
NGO	6.58	12
Private-Sector nurseries	6.62	13
Other	8.14	7

Except for the two categories shown at the bottom of this next table, seedlings were used fairly equally for various purposes.

What were the most common uses of state seedlings?	A lower number indicates the highest use	Number of Respondents
Reforestation after harvest	2.65	20
Produce timber income	3.70	20
Reforestation after wildfire or other natural disturbance	4.67	21
Reforestation for wildlife habitat	3.33	27
Reforest previously cleared lands (eg. CRP/WRP)	3.61	23
Shelterbelt/Windbreak Planting	4.83	23
Riparian protection planting	4.54	24
Aesthetics	4.67	21
Urban/Community (Seedlings might go to an organization that grows them on to a larger plant)	7.06	16
Prairie or savanna restoration	7.58	12

Choose one of the following to best describe how your nursery is funded

Answer Options	Response Percent	Response Count
Mostly state general funds, but sales offset an unspecified portion of the cost	25.8%	8
We're required to have sales offset at least 75% percent of the cost	3.2%	1
We're required to have sales offset at least 50% percent of the cost	0.0%	0
We're required to have sales offset at least 25% percent of the cost	0.0%	0
We're required to have sales offset the entire cost of the nursery operation	22.6%	7
We're required to have sales offset the entire cost of the nursery operation, and if not then the agency must cover the shortfall by redirecting other funds	25.8%	8
Other (please specify)	22.6%	7
<i>answered question</i>		31
<i>skipped question</i>		19

About half of the states are required to have sales cover the entire cost of the nursery operation. Among those who answered "Other" there was no common theme. Pennsylvania's are used almost exclusively on state lands. State land timber sales finance Michigan's nursery. Others receive "special" rather than general revenue and two indicated receiving some federal funds.

Clearly states are more concerned about decreasing seedling demand than increasing demand. Hiring of both skilled personnel and laborers is also a concern.

What are the main challenges that your nursery operation faces? Check all that apply		
Answer Options	Response Percent	Response Count
Decreasing seedling demand	65.5%	19
Increasing seedling demand	17.2%	5
Pressure from commercial interests to shut down	27.6%	8
Budget pressure to cut funding	41.4%	12
Budget pressure to offset more of costs from increased sales revenue	24.1%	7
Difficulty hiring skilled personnel	58.6%	17
Shortages of laborers	58.6%	17
Difficulty procuring source-identified seed for native species	34.5%	10
Difficulty obtaining genetically improved seed	10.3%	3
Access to methyl bromide	17.2%	5
Need for more technical information around planting/tending/seed treatment requirements for specific species	20.7%	6

Seed Orchard Operations

Thirty respondents indicated that they operated seed orchards.

Do you manage one or more seed orchards?		
Answer Options	Response Percent	Response Count
Yes	60.0%	30
No	40.0%	20
<i>answered question</i>		50
<i>skipped question</i>		0

Within that group there were five who have **seed orchards but not nurseries**:

Delaware Alabama Oregon Idaho California

Correspondingly, there were five who **operate nurseries but not seed orchards**:

Kansas Guam Iowa Colorado Hawaii

And, twenty-five who **operate both nurseries and seed orchards**:

(Southern Region)

Tennessee Arkansas Virginia Oklahoma Kentucky Georgia
North Carolina Florida South Carolina Texas

(Northeast Region)

Pennsylvania	Wisconsin	New Jersey	Missouri	Michigan	New Hampshire
New York	West Virginia	Maryland	Minnesota	Indiana	Illinois

(Western Region)

Washington North Dakota Montana

Loblolly Pine was the most common seed orchard species and was cultivated in 10 states. The level of improvement ranged from one to five generations. Not everyone was able to report their quantity of production, but those who did totaled 7250 lbs.

Eight states had orchards containing **Eastern White Pine**, but overall production was relatively small compared to loblolly pine.

Other eastern conifers grown in seed orchards included:

Slash Pine	Pitch X Loblolly Pine	Norway Spruce	White Spruce
Red Pine	Jack Pine	Longleaf Pine	Sand Pine
Shortleaf Pine	Balsam Fir	Fraser Fir	Scotch Pine
Virginia Pine			

Of these, **Longleaf Pine** and the collective **Spruces** probably represented the next highest levels of production.

Eastern hardwood species found in orchards included:

Black Cherry	Black Walnut	Sawtooth Oak	Swamp White Oak
Red Oak	White Oak	Bur Oak	Shumard Red Oak
Water Oak	Live Oak	Cherrybark Oak	Nuttall Oak
Paw Paw	Black Oak	Chestnut Oak	Shellbark Hickory

Of these, **Black Walnut was the most common** and was found in five state orchards. Not every state reported quantities, but of those that did they totaled 19,350 lbs. of Black Walnut production.

In the west orchard species were:

Ponderosa Pine	Coulter Pine	Jeffrey Pine	Incense Cedar
Douglas-fir	Western White Pine	Western Hemlock	Western Red Cedar

Of these, **Douglas-fir** was produced in the greatest quantities and was the most improved. (Washington and North Dakota did not report what species were grown in their orchards.)

With a few exceptions **nearly all seed production appeared to be used by the state’s own nursery.** Oregon and Texas grow seed for cooperatives. Delaware provides seed to the Maryland Nursery. Alabama sells to a commercial nursery. Idaho to a land trust and California to private and industrial landowners.

Most orchards (17) are funded as part of the nursery operation. Six are funded through a separate general fund account and two through the sale of seed. California’s is funded by a State Seed Bank – Oregon’s by members of the cooperative and Idaho through timber sale receipts. Arkansas uses any receipts outside of general funds.

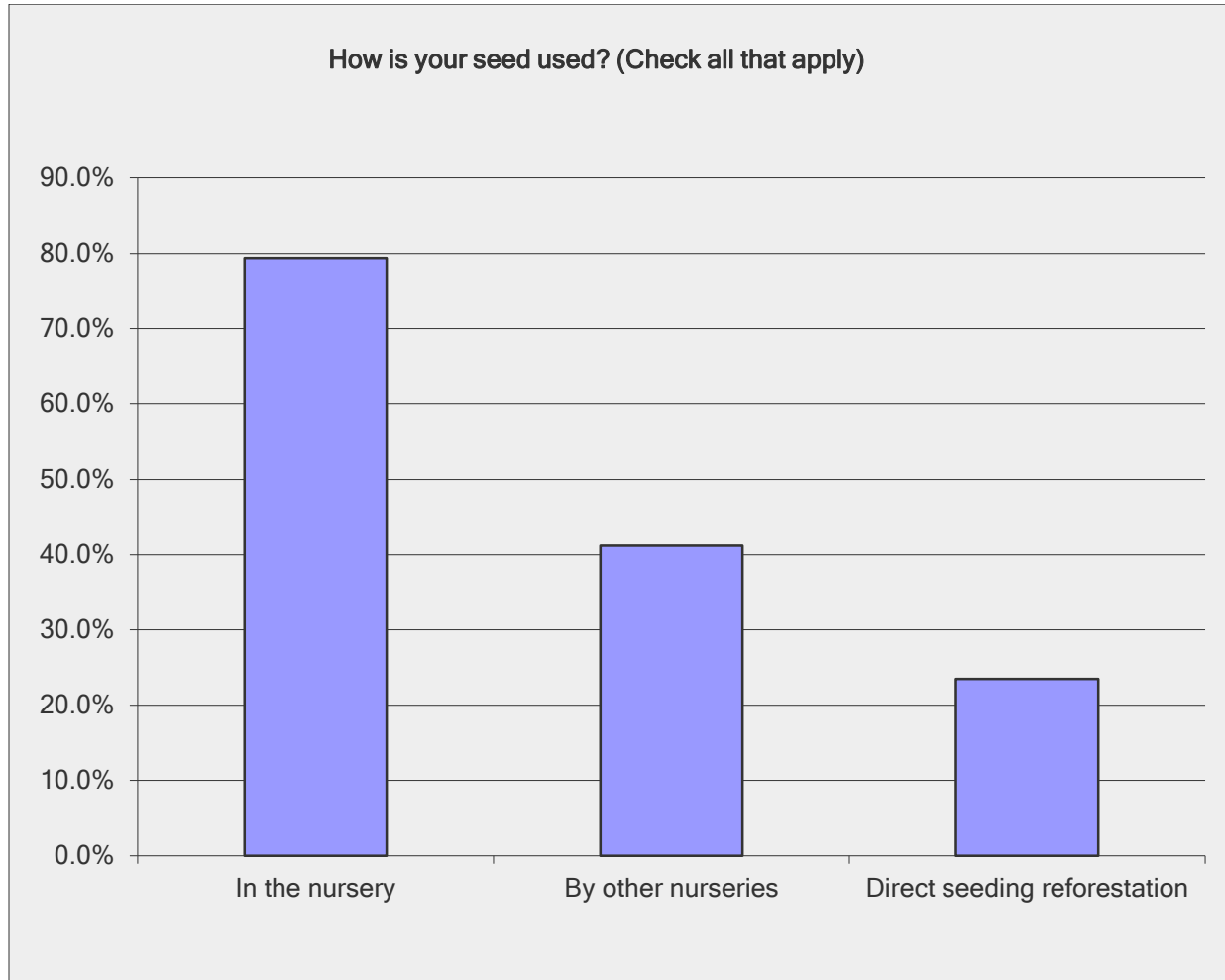
How is your orchard operation funded?		
Answer Options	Response Percent	Response Count
As part of the nursery operation	73.9%	17
Separate general fund account	26.1%	6
Through the sale of seed	8.7%	2
Other (please specify)		6
<i>answered question</i>		23
<i>skipped question</i>		27

Twenty-three indicated that there are other seed collection areas they utilize. Of these, thirteen said they mainly collect from wild sources, while the remainder had planted stands with varying levels of maintenance.

Seed purchases were from a variety of sources:

From what sources do you procure seed? (Check all that apply)		
Answer Options	Response Percent	Response Count
Commercial vendor	62.9%	22
General public	34.3%	12
Our seed orchard	74.3%	26
Seed collected by staff	74.3%	26

And seed was used for a variety of purposes, but most often in the nursery:



Answers to the question ***Can you identify any technical assistance opportunities or cooperative efforts that would benefit your nursery program if they were more readily available?.....***were unique in almost every instance. They included the following:

- ***Containerized growing***
- ***Disease Management***
- ***Economic analysis***
- ***Propagation of rare and endangered species***
- ***Sanitation protocols***
- ***Seed storage***
- ***Nursery conferences and workshops***
- ***Locating an orchard management contractor***

- **Replacement for Methyl Bromide**
- **More herbicides**
- **Cone and seed processing**
- **Continue nursery conferences and workshops**
- **Continue cooperation between state nurseries**
- **Soil amendments**
- **More inter-agency cooperative planning**
- **Requesting state funds to join NC Tree Improvement Coop (SC)**
- **More local seed sources**
- **More native and “non-commercial” species seed sources**

Genetics/Tree Improvement

Less than half of the respondents have a genetics or tree improvement program within their agency.

Do you have a genetics/tree improvement program within your agency?		
Answer Options	Response Percent	Response Count
Yes	42.0%	21
No	58.0%	29

And most are programs distinct from the state nursery.

Is it considered a distinct and separate program from the nursery or are two considered parts of the same program?		
Answer Options	Response Percent	Response Count
Yes	66.7%	14
No	33.3%	7

Among the 21 programs are 9 trained geneticists on staff, 25.6 field technicians and 2.76 administrative personnel.

Thirteen programs are funded 100% by state dollars, 2 through cooperatives, and 2 through nursery sales and other special programs. New Mexico indicated that they were 100% federally funded. Washington indicated that their funds were 98% state and 2% federal. Two states didn't answer that question.

Twenty-three work cooperatively with other entities on tree improvement.

Do you have a cooperative agreement to support tree improvement work conducted by another entity? If so, who?		
Answer Options	Response Percent	Response Count
Yes	71.9%	23
No	28.1%	9
If yes, who?		23
<i>answered question</i>		32
<i>skipped question</i>		18

Cooperators included:

- Two tree improvement coops (GA)
- US Forest Service (HI & NH & VT)
- US Fish and Wildlife Service (HI)
- Northern Sierra Tree Improvement Assoc. (CA)
- American Chestnut Foundation (PA & IN))
- Inland Empire Tree Improvement Coop (ID & MT & WA)
- BLM Seed Orchard (OR)
- University of Wisconsin – Madison (WI)
- University of Florida – Forest Genetics Cooperative (FL)
- University of Missouri (MO)
- Michigan State University (MI)
- University of Minnesota – MN Tree Improvement Cooperative (MN)
- New Mexico State University – John T. Harrington Forestry Research Center (NM)
- Purdue University - Hardwood Tree Improvement Research Cooperative (IN)
- Northwest Tree Improvement Cooperative (WA)
- Western Gulf Tree Improvement Cooperative (TX & AR & OK)
- North Carolina State University Tree Improvement Cooperative (VA & NC)
- University of Kentucky Forest Health Center (KY)

In the East projects focused on:

Conifers	Hardwoods	
Loblolly Pine -8 (projects)	American Chestnut -2	Water Oak -2
Longleaf Pine -4	Butternut -3	Nuttall Oak -1
Shortleaf Pine -4	Black Walnut -4	Willow Oak -1
Jack Pine -3	American Beech -2	
Red Pine -3	Ash -2	
Slash Pine -2	White Oak -2	
Virginia Pine -1	Red Oak -1	
Eastern White Pine -2	Black Cherry -1	
White Spruce -2	Cherrybark Oak -1	
Black Spruce -1	Shumard Oak -1	

In the West most projects focus on conifers:

Conifers

Ponderosa Pine -5
Western White Pine -3
Western Larch -3
Lodgepole Pine -2
Douglas-fir -4
Western Red Cedar -2
Western Hemlock -1
White Spruce -1
Siberian Larch -1

Hardwoods

Quaking Aspen -1
Quercus spp. - 1
Balsam Poplar -1

Answers to the question “*Can you identify any technical assistance opportunities or cooperative efforts that would benefit your tree improvement operation if they were more readily available?*” follow.

- *Receiving state funding would help tremendously*
- *Genetic improvement workshops*
- *Networking to find compatible seed sources and potential to develop a lodgepole pine seed source.*
- *Help with Family Forest Landowners*
- *Setting up a Great Lakes tree improvement coop to allow organizations to partner together and share material similar to south and west. Work on jack pine gall and growth, white pine for growth and blister rust, also well as resistance breeding programs for 1000 cankers, EAB, Dutch elm, etc.*
- *more work on longleaf pine*
- *We have good relationships with the academic organizations that are working on these subjects but we are lacking the presence of an expert located at our tree improvement center.*
- *since we do not currently have a program, it would be beneficial to get some technical assistance on the matter*
- *technical assistance with genetics*
- *Compile information from old NC99 and NC53 studies*
- *If the National Forest System were more active in tree improvement investments, work would be more feasible in geographic areas and species where it is not currently economically*
- *hybrid poplar breeding*
- *Regional USFS staff to help coordinate activities across states and across various tree improvement co-ops.*
- *No. We enjoy the support of the Western Gulf Forest Tree Improvement Program. All the breeding work we do is directed by them and all of the improved seed orchards are designed by them*
- *Research into hard to stratify species*

Reforestation, Nursery and Genetic Resources Cooperative Program

Most everyone was aware of the RNGR Program.

Are you aware of the US Forest Service Reforestation, Nursery and Genetic Resources (RNGR) Cooperative Program?		
Answer Options	Response Percent	Response Count
Yes	87.8%	43
No	12.2%	6
<i>answered question</i>		49
<i>skipped question</i>		1

Fewer felt that other decision makers were also aware of RNGR.

Is your state's governor/or legislature aware of the Cooperative Forestry Assistance Act and its support for states' reforestation programs?		
Answer Options	Response Percent	Response Count
Yes	51.2%	21
No	48.8%	20
<i>answered question</i>		41
<i>skipped question</i>		9

Less than a third of the respondents indicated that they receive RNGR funds.....13 of the 44 who answered the question.

Ten states answered the question as to **what percent of their nursery/tree improvement expenditures come from RNGR** and answers ranged from 0% to 10%.

Answers to the question ***“If RNGR funds are not designated exclusively for nurseries, what programs are supported by these funds?”*** were:

- *I'm not sure*
- *exclusively nurseries*
- *Stewardship Program*
- *None*
- *Stewardship Program*
- *??*
- *Genetic Resources program*

- **Don't know**
- **seed bank maintenance, seed collection, field testing**
- **We receive no funds**
- **stewardship, diminished species, outreach**

Of those who answered the question, less than half indicated receiving RNGR technical assistance.

Have you received technical assistance either indirectly or directly from this program? In what areas?		
Answer Options	Response Percent	Response Count
Yes	43.2%	16
No	56.8%	21
If yes, in what areas?		18
	<i>answered question</i>	37
	<i>skipped question</i>	13

They indicated receiving technical assistance in the following areas:

- ***Insect and disease identification and help to control those pests. Methyl bromide issues.***
- ***Nursery design & technical growing advice. Alternatives to invasive spp.***
- ***Annual nursery conference, Technical assistance nursery tours***
- ***Website use.***
- ***Nurseries***
- ***Seed Processing information***
- ***Seed orchard improvement***
- ***nursery training on Guam with Palau and Commonwealth of the Northern Marianas Islands***
- ***Review of entire operation by USFS staff***
- ***Seed Processing Workshop, Nursery reviews, Meeting travel/registration assistance, Irrigation study, seed sizing study***
- ***grant funding helps connect us to cooperatives that provide technical assistance***
- ***seed workshops - native plant propagation data base***
- ***USFS western nursery specialist has toured Alaska several times.***
- ***Technical assistance to nursery***
- ***Nursery operations***
- ***Seed collection assistance***

When asked ***“How would the loss of the RNGR allocation affect your nursery program?”*** respondents said:

- ***It would impact it, but not cause irreparable damage***
- ***orchard improvement***

- **The loss of the RNGR allocation would require us to supplement our nursery budget with funds from our primary operations, which would be at the detriment of our other core work priorities within the WI Division of Forestry.**
- **No immediate impact**
- **Very Little**
- **Would not affect it. Delaware grows seed from genetically improved stock for the Maryland State nursery to grow. However, we have yet to send seed to Maryland but still maintain the seed orchard.**
- **It would have no impact.**
- **It would increase our financial loss and therefore jeopardize the continued operation of this facility**
- **Although we don't directly receive RNGR funds, we make use of nursery publication and seed testing services.**
- **we would lose a valuable resource in the area of technology transfer.**
- **Less seed available for plantations would increase reliance on natural regeneration.**
- **Program would probably not be affected. Funds would come from other sources.**
- **Very little impact at present time**
- **Unknown**
- **No financial affect.**
- **Currently, NONE**
- **Improved seed would be severely curtailed**

When asked “**How would the loss of the RNGR allocation affect your tree improvement program?**” they indicated:

- **less manpower and supplies**
- **Very little here at the orchard. It may have more of an effect on the tree breeding programs.**
- **If the RNGR allocation were cut from the nurseries, this shortfall would potentially be covered with tree improvement funding.**
- **No immediate impact**
- **Very little** (Six respondents gave roughly this same answer)
- **Devastate it**
- **Our tree improvement allocation has dropped sharply in recent years due to changes at the national level, which has resulted in the curtailment of some program work.**
- **All field testing for genetic improvement would stop.**
- **Membership driven, so RNGR as an active member matters - otherwise, no different from losing other members.**
- **Advanced selections and seed production would slow**

Respondents indicated that they would like to see the program assist them in the following ways in the future:

- **Help in identifying opportunities and sources for funding to support local university programs that we utilize.**
- **Funding!**
- **I would like to be aware of this funding. Not sure of amount, or how it's used.**
- **assist in the expansion of improved seed orchards**
- **Need more information on funding and services available.**
- **To work to coordinate more efforts between the states such as forest genetics and tree improvement. Also as the nurseries need to control cost more, look for areas where cooperative efforts will pay off. That would include fumigation and pesticide trials, as well as other seedling culturing, seedling inventory and sales programs.**
- **More cone processing information transfer**
- **Technical Information – Research**
- **Rehab Seed Orchards**
- **If they could print propagation protocols for pacific native tree species document or book.**
- **Supply information on the affects of moving non-native seed source stock to other regions. have asked for this for ten years but have received nothing.**
- **Assistance in strategies to limit frost heaving of seedlings.**
- **These funds could be used to assist university/industry cooperative nursery and tree improvement efforts.**
- **Would like more information on how to apply for funds.**
- **Assistance with Statistical processing of data, more assistance with meeting/registration attendance**
- **Restore funding to previous levels.**
- **continue the transfer of technology via seed workshops and multistate nursery meetings**
- **Increased funds would help expand program.**
- **Help stress the importance of genetics programs - apart from nurseries. Nurseries come and go quickly, genetics programs cannot - consistency matter in genetics programs.**
- **Financial support of Southern Forest Nursery Management Cooperative and Western Gulf Forest Tree Improvement Program**
- **Assist with expanding and improving outreach programs, particularly for diminished species and continued technical assistance.**
- **We would like to expand to a regional facility and given the nature of State policy funding is limited, we need some funding to help us improve and grow.**
- **Increased funding for seedling production for planning seed production of longleaf and shortleaf pines**

CONCLUSIONS

Despite several closures state operated tree seedling nurseries remain an important source of seedlings for the nation's reforestation efforts. Obviously plant spacing varies, but at a theoretical 12' by 12' spacing states produce enough seedlings to plant nearly 400,000 acres per year. They fill a key role by offering planting stock for family forest projects that do not place the advanced orders that commercial nurseries generally require or at least desire.

This material fulfills a wide variety of purposes – reforestation, afforestation, wildlife habitat, economic return and aesthetics – being among the most common.

Most have room to increase capacity, but are more concerned with decreasing seedling demand and the impact that can have on their ability to continue funding and operating their nursery program. They also have difficulty hiring and retaining both skilled personnel and general labor.

Many states take advantage of Tree Improvement Cooperatives as an efficient way to develop genetically improved stock. Nine states still have geneticists on staff and thirty maintain seed orchards.

Most everyone is aware of the RNGR program, but few acknowledge using RNGR funds in their own nursery/tree improvement efforts. Most also feel that a loss of RNGR funds would not significantly affect them. On the other hand, state folks appreciate the technical assistance and coordination of cooperative efforts that the Forest Service can provide. In fact, many would like increased assistance for participating in cooperative endeavors such as conferences, workshops, multi-state planning and other ways of sharing knowledge and coordinating efforts.

APPENDIX – SURVEY QUESTIONNAIRE

**Nursery/Reforestation/Tree Improvement
National Association of State Foresters - Questionnaire to States**

State _____

NURSERY OPERATIONS

1. Does your agency operate a tree seedling nursery? Y ____ N ____
2. If your agency had a nursery, but no longer operates one:

What year did it close? _____

Have private nurseries provided an adequate supply since then? Y ____ N ____

Are there problems/issues that have arisen since it closed, such as: (Please check and feel free to expand upon any that apply)

Inadequate supplies ____

Large cost increases ____

Fewer planting stock choices ____

Other? Please describe _____

What were the primary reasons it closed? (check all that apply)

Political pressure from commercial operations _____

Reduced seedling demand _____

Inability to cover cost through sales _____

Lack of legislature/budget support for a nursery _____

General agency budget cuts _____

Other, please explain _____

Is there any thought of restarting a nursery operation? Y ____ N ____

If yes, why? _____

If no, go to Question #15

3. Do you operate more than one? If so, then how many? _____
4. On average, how many seedlings do you distribute each year? _____
5. Assuming your normal species mix, what is the maximum number of seedlings you could grow? _____
6. Is there any thought of expanding the nursery operation? Y ____ N ____ If so, for how many seedlings _____
7. Do you purchase seedlings from other sources?
 - a. From who? _____
 - b. How many? _____
 - c. For Distribution to landowners? _Y__ _N__ Quantity _____
 - d. For use on state lands? __Y__ __N__ Quantity _____
 - e. Trades with other nurseries __Y__ __N__ Quantity _____
8. On average, how many orders do you fill each year? _____
9. On average, how many different species do you grow? (Include non-tree species such as shrubs and native grasses/forbs) _____
10. By quantity, what are the top 5 tree species you sell? Is any proportion of these species grown from genetically improved seed? (Lump single species together)

<u>Species</u>	<u>Genetically Improved available? (Y/N)</u> {Please indicate the level of improvement, 1 st gen, 2 nd gen, Etc}
1. _____	_____
2. _____	_____
3. _____	_____
4. _____	_____
5. _____	_____

11. Who are the primary customers for your seedlings? If you can please rank these choices with "1" being the category of customers who purchase the greatest quantity. If you do not sell any seedlings to a category, then do not rank it.

Direct to Family/Individual Forest Owner _____

Consulting foresters or planting contractors/vendors acting on behalf of landowners _____

Industrial/REIT/TIMO Forest Owner _____

Federal Agency _____

Your State/Local Agency within your state _____

Other State/Local Agency from a different state _____

Urban/Community Forest Organization _____

NGO _____

Private-sector nurseries _____

Other (Please describe) _____

12. Please describe what you think are the primary uses of your seedlings, again, ranking them with "1" being the most prominent use.

Reforestation after harvest _____

Produce timber income _____

Reforestation after wildfire or other natural disturbance _____

Restoration for wildlife habitat _____

Reforest previously cleared lands (eg CRP/WRP) _____

Shelterbelt/Windbreak Planting _____

Riparian protection planting _____

Aesthetics _____

Urban/Community (Seedlings might go to an organization that grows them on to a larger plant) _____

Prairie or savanna restoration _____

13. Choose one of the following to best describe how your nursery is funded.

Mostly state general funds, but sales offset an unspecified portion of the cost _____

We're required to have sales offset at least _____ per cent of the cost

We're required to have sales offset the entire cost of nursery operation _____

We're required to have sales offset the entire cost of nursery operation, and if not then the agency must cover the shortfall by redirecting other funds _____

Other, please describe _____

14. What are the main challenges that your nursery operation faces? Check all that apply and feel free to elaborate.

Decreasing Seedling Demand _____

Increasing Seedling Demand _____

Pressure from Commercial Interests to Shut Down _____

Budget Pressure to Cut Funding _____

Budget Pressure to Offset more of Costs with Increased Sales Revenue _____

Difficulty Hiring Skilled Personnel _____

Shortages of laborers _____

Difficulty Procuring Source-identified Seed for native species _____

Difficulty obtaining Genetically Improved Seed _____

Access to Methyl Bromide _____

Need for More Technical Information Around Planting/Tending/Seed Treatment

Requirements for Specific Species _____

SEED ORCHARD MANAGEMENT

15. Do you manage one or more seed orchards? Y _____ N _____

If no, go to Question #20

16. What species of seed do you produce and about how many pounds do you produce of each per year? (A rough estimate is fine) Is any genetically improved?

Species	Pounds/ Year	Genetically Improved? (Y/N) {Please indicate the level of improvement, 1 st gen, 2 nd gen, etc.}
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

17. Who are the principal customers of orchard-grown seed?

18. How is your orchard operation funded?

As Part of the Nursery Operation _____

Separate General Fund Account _____

Through the Sale of Seed _____

Other, please describe _____

19. Do you have other seed collection areas that wouldn't be described as an orchard? (please describe) _____

20. From what sources do you procure seed? (Check all that apply)

a. Commercial vendor _____

b. General Public _____

c. Our seed orchard _____

d. Seed collected by agency staff _____

21. How is your seed used (Check all that apply)

- a. In the nursery _____
- b. By other nurseries _____
- c. Direct seeding reforestation _____

22. Can you identify any technical assistance opportunities or cooperative efforts that would benefit your nursery operation if they were more readily available? Please explain

GENETICS/TREE IMPROVEMENT

23. Do you have a genetics/tree improvement program within your agency? Y ___ N ___

If no, go to Question #30

24. Is it considered a distinct and separate program from the nursery or are two considered parts of the same program? Y ___ N ___

25. If yes, how many Full Time Equivalent Positions would you classify as:

Trained Geneticist _____

Field Technician / Laborer _____

Administrative _____

26. How is the program funded?

Percent State Dollars _____

Percent Federal Dollars _____

Other, please describe _____

27. Do you have a cooperative agreement to support tree improvement work conducted by another entity? Y ___ N ___

Who? _____

28. For either internal or cooperative programs, on what species is the work focused?

Species:

29. Can you identify any technical assistance opportunities or cooperative efforts that would benefit your tree improvement operation if they were more readily available? Please explain

RNGR PROGRAM

30. Are you aware of the US Forest Service *Reforestation, Nursery and Genetic Resources (RNGR)* Cooperative Program? Y ___ N ___

31. Is your state's governor and/or legislature aware of the Cooperative Forestry Assistance Act and its support for states' reforestation programs? Y ___ N ___

32. Do you receive funding through this program? Y ___ N ___

33. What percent of your yearly nursery & tree improvement expenditures come from your RNGR allocation? _____

34. If RNGR funds are NOT designated exclusively for nurseries (the consolidated grant process does not require states to spend this money on a particular program), what programs are supported by these funds? _____

35. Have you received technical assistance either indirectly or directly from this program?

In what areas? _____

36. How would the loss of the RNGR allocation affect your nursery program?

37. How would the loss of the RNGR allocation affect your tree improvement program? _____

38. How would you like to see this program assist your state in the future?